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28 **Abstract**

29 **Background:** Sport has been identified as one of the seven best investments for increasing  
30 physical activity levels across the lifespan. Several questions remain on how to effectively utilize  
31 youth sport as a strategy for increasing physical activity and improving health in youth. The  
32 purpose of this paper is to identify the main research priorities in the area of youth sport and  
33 physical activity for health. **Methods:** An international expert panel was convened, selected to  
34 cover a wide-spectrum of topics related to youth sport. The group developed a draft set of  
35 potential research priorities and relevant research was scoped. Through an iterative process, the  
36 group reached consensus on the top ten research priorities. **Results:** The ten research priorities  
37 identified related to sport participation rates, physical activity from sport, the contribution of  
38 sport to health, and the overall return on investment from youth sport. For each research priority,  
39 the current evidence is summarized, key research gaps are noted, and immediate research needs  
40 are suggested. **Conclusions:** The identified research priorities are intended to guide researchers,  
41 policymakers, and practitioners to increase the evidence base on which to base the design,  
42 delivery and policies of youth sport programs to deliver health benefits.

43 **Background**

44 Physical activity is important for children's physical, mental and social development.<sup>1,2</sup>  
45 The Global Matrix report cards show that physical activity levels vary across countries, and  
46 suggest that overall, particularly in western countries, physical activity levels are low and  
47 physical inactivity is increasing.<sup>3</sup> Physical inactivity during childhood not only affects childhood  
48 health, but impacts health in adulthood through direct effects and tracking of inactivity behaviors  
49 into adulthood.<sup>4-6</sup> Thus, ways to increase physical activity among children around the world are a  
50 public health priority.

51 Interventions to increase physical activity among children have predominantly been  
52 implemented in the school setting.<sup>7,8</sup> Sport is the most popular type of physical activity among  
53 children,<sup>3</sup> and youth sport exists in many cultures, in various forms, around the world.<sup>9</sup> Yet sport  
54 is not often used as an intervention strategy to increase physical activity. For the purposes of this  
55 paper, youth sport is defined as formally arranged sport, governed by rules, and participated in  
56 by individuals 18 years or younger and outside of school and physical education time.<sup>10</sup> This  
57 includes attending practices and games under supervision of one or more adults, who often  
58 assume the role of team coach.<sup>10,11</sup> Importantly, sport involvement includes rules, facilities,  
59 equipment, normative beliefs and policies.<sup>12</sup>

60 Sport has been identified as one of the seven best investments for increasing physical  
61 activity levels amongst all individuals<sup>13</sup> and is particularly relevant to children due to existing  
62 cultural norms and infrastructure that encourage sport participation among children and  
63 adolescents, particularly in developed countries. This appears to be a global phenomenon as, for  
64 example, the United States (US) National Physical Activity Plan identified sport as one of nine  
65 sectors for implementing national physical activity guidelines<sup>14</sup> and recently released a National

66 Youth Sport Strategy<sup>15</sup>, the International Olympic Committee has highlighted the importance of  
67 sport in promoting physical activity,<sup>16</sup> and Sport New Zealand has focused on achieving  
68 wellbeing outcomes through sport in its National Strategy and 2020-2032 Outcomes  
69 Framework.<sup>17</sup> Therefore, sport is widely accepted as a potential avenue for promoting physical  
70 activity participation and broader social and health outcomes if young people are exposed to  
71 high-quality positive sporting experiences that increase the likelihood of continued participation  
72 in sports and physical activity. However, several questions remain on how to most effectively  
73 utilize youth sport as a strategy for increasing youth physical activity and improving health  
74 worldwide, as youth sport, in its current form, may not be enough.

75         The purpose of this paper is to identify top research priorities in the area of youth sport  
76 and physical activity for health. The overall purpose is to guide researchers, policymakers, and  
77 practitioners to increase the evidence base on which to base the design, delivery and policies of  
78 youth sport programs that will deliver health benefits.

## 79 **Methods**

80 An international expert panel (the authors) was convened following the 2016 International  
81 Society for Physical Activity and Health (ISPAH) Congress in Bangkok, Thailand. The panel  
82 was selected to cover a wide range of topics related to youth sport including youth sport  
83 specifically, children's physical activity more broadly, measurement of physical activity, and  
84 policy. Based on their knowledge and experience, the group developed a conceptual framework  
85 of the contribution of youth sport to health (see Figure 1) and collectively drafted a set of  
86 potential research priorities. Individuals were assigned to each priority area based on their  
87 expertise to scope relevant literature, which was presented back to the group. The evidence was  
88 discussed as a team, with additional research areas being added and scoped as necessary, to

89 further refine and reach consensus on the ten greatest priorities, which are presented in the paper.  
90 For each research priority, the state of the evidence is summarized, key research gaps are noted,  
91 and immediate research needs are suggested.

92

### 93 **Research Priorities**

#### 94 **Research Priority 1: What is the participation rate in youth sports?**

95         Participating in sports is the first step to ensuring children benefit from sports. Youth  
96 sport participation rates are assessed in many countries as part of existing large-scale surveys and  
97 are included in the Global Matrix as a key indicator of youth physical activity.<sup>3,18,19</sup> In the 2018  
98 Global Matrix reports, grades for organized youth sport ranged from high, with Denmark  
99 receiving an A- (with approximately 83% of 7 to 15 year-olds reporting regularly participating in  
100 sport<sup>20</sup>) to low, with Lebanon and Uruguay receiving F's (less than 20% participating), and  
101 several countries reporting incomplete information and unable to assign a grade.<sup>19</sup> However,  
102 these metrics are based on different population surveys and questions making cross-country  
103 comparisons difficult.

104         Importantly, many of these statistics are based on single- or limited-item questions, for  
105 example the Youth Risk Behavior Surveillance System multiple-choice question in the United  
106 States asks, "During the past 12 months, on how many sports teams did you play? (count any  
107 teams run by your school or community groups)." This question gives little information on the  
108 amount (duration and frequency) of participation or the level of involvement. Additionally, there  
109 are inconsistent definitions of youth sport which lead to varying participation estimates, such as  
110 not distinguishing between sport outside of school or sport that occurs during school or  
111 inconsistencies in including other activities such as dance. Further, even less evidence exists on

112 youth participation in non-traditional sports such as mountain biking, ultimate Frisbee, or  
113 competitive resistance training sports such as CrossFit, which are growing in popularity and may  
114 represent novel sporting opportunities to engage previously unengaged youth. To accurately  
115 understand participation in sport and the dose of exposure, more specific information about  
116 frequency, duration, intensity, type of competition (i.e. recreational or elite sports league), type  
117 of sport, and ultimately the quality of the sport participation are needed.

118 In addition to overall rates of participation, it is important to understand who is  
119 participating and importantly, who is not participating. Minimal information is available on how  
120 sport participation varies by gender, ethnicity, rural versus urban settings, and socioeconomic  
121 status. Furthermore, little information is available on children with disabilities' including how  
122 often they participate, in which sports, and who is not participating and why.<sup>21</sup> This information  
123 is critical to help identify target groups that may need additional support to increase  
124 participation. Standardized measures are needed to regularly assess youth sport participation  
125 rates regionally, nationally and internationally to capture which sports children are participating  
126 in and how much, as well as who is participating and who is not. Ideally, these measures will  
127 also provide an indication of how much sport participation contributes to total physical activity  
128 levels so that we can understand how this varies in different population groups and changes  
129 across the lifespan (see Research Priority 4 below).

## 130 **Research Priority 2: How can we best improve sport participation rates?**

131 Sport is one of the most popular forms of physical activity among children,<sup>22</sup> with  
132 participation rates typically increasing during childhood (e.g., <sup>23</sup>). While there is a growing  
133 amount of literature on why children join sport,<sup>24</sup> research on how to utilize these reasons to  
134 encourage and increase participation is limited. Capacity building, through the development of

135 knowledge, skills, infrastructure and systems, is one strategy that has been used to increase  
136 sports participation successfully in adults in marginalized communities.<sup>25</sup> In youth sport,  
137 building capacity could include improving the knowledge and skills of coaches and recreation  
138 practitioners; providing infrastructure such as fields, equipment and sporting leagues; and  
139 strengthening partnerships between youth sport organizations and government and other health  
140 promoting organizations.

141 While many children are enrolled in sport at a young age,<sup>3,18,19</sup> it is unknown whether  
142 there is a “critical age” by which children need to start participating in sport or if they may join  
143 at any point. Some longitudinal research suggests that there may be gender differences in the  
144 probability of joining sports, with boys more likely to join at a later age.<sup>26</sup> Therefore, efforts to  
145 get children to join sport should not just be targeted at young children but also include  
146 adolescents who have not participated in sport or are trying a new sport.

147 For young children, initial participation may be instigated by their parents. While the role  
148 of family is speculated to play a large role in sports participation,<sup>27</sup> more research is necessary on  
149 its specific involvement and how to engage family to promote sport in a positive way. One  
150 strategy may be encouraging parents to increase their levels of physical activity.<sup>28</sup> Some children  
151 may need additional encouragement to participate in sport (as identified in Research Priority 1).  
152 Overall, boys have higher sports participation rates than girls and men are more physically active  
153 than women worldwide.<sup>29</sup> Populations least likely to participate may be from lower  
154 socioeconomic groups that do not have the means to pay fees for participation, children in rural  
155 areas where distance and transportation are large considerations,<sup>30</sup> children with disabilities who  
156 do not have access to ability-appropriate sporting opportunities,<sup>31</sup> or other minority groups such  
157 as culturally and linguistically diverse and LGBTQ+ populations. Strategies need to be tested to

158 overcome barriers and perceived barriers, as parent perception of these barriers may be more  
159 critical to participation than reality. Identified barriers should be targeted in youth sport policy  
160 and programming. Furthermore, for some children or adolescents where youth sport may be  
161 more negative than beneficial due to individual health concerns or negative social interactions,  
162 alternative physical activities should be explored.

163 **Research Priority 3: How can we maintain sport participation?**

164       Once a child is participating in sport, they must maintain participation to continue to  
165 receive benefits. However, participation rates decline steadily throughout adolescence,<sup>23</sup> and  
166 there is evidence that children begin dropping out of sport and decreasing physical activity from  
167 as young as eight years of age.<sup>26,32</sup> While it is unclear what the exact rate of dropout from  
168 organized youth sports is, best estimates place it at around 30% of all participants each year.<sup>33</sup>  
169 Two systematic reviews have concluded that there are a range of established intrapersonal,  
170 interpersonal and environmental factors that predict dropout from organized sports.<sup>33,34</sup> These  
171 contributing factors include individual factors such as motor skills development, mental skills  
172 such as mental toughness and grit, social climate from coaches, parents and peers,<sup>27</sup>  
173 organizational factors such as league scheduling, cost, and competition and policy factors  
174 addressed in later priorities. The reasons are likely to be different for girls and boys, particularly  
175 as they get older and physical and social development influences sporting decisions.<sup>35</sup> Given that  
176 there is now sufficient information on the reasons for, and influences on, dropout from organized  
177 sports, a solution-oriented approach is needed.<sup>36</sup> Solution-oriented research is forward-looking,  
178 experimental in nature, and is capable of informing and changing policy and practice. This  
179 information on factors that influence participation needs to be used to identify groups that may  
180 be at high-risk of dropping out and manipulating some of these factors to reduce dropout.

181 Developmental models of sport participation and several position statements recommend that  
182 children participate in a number of sports,<sup>37-39</sup> however, there have been continued trends toward  
183 early sport specialization.<sup>40</sup> Sampling a range of sports in childhood has been associated with  
184 higher physical activity during adolescence,<sup>41</sup> and evidence does not support sport specialization  
185 increasing performance and sporting success.<sup>42</sup> In addition, children who specialize in a single  
186 sport early may be at an increased risk for a number of predictors of dropout from organized  
187 sports, including injury, social isolation, and burnout.<sup>43-46</sup> The reduction in rates of sport  
188 specialization and parallel efforts to minimize and prevent injury and burnout among organized  
189 youth sport participants are likely to be meaningful strategies in the reduction of dropout from  
190 organized sports. Research on early specialization, with long-term follow-up of youth from a  
191 developmental perspective, is needed to identify potential risks.

192         Lastly, it should be noted that there are circumstances where it is entirely appropriate for  
193 children or adolescents to cease participation in a sport, including burnout, injury, or lack of  
194 enjoyment. However, given the health and well-being detriments associated with dropout from  
195 all sports,<sup>47,48</sup> maintenance of participation via transfer to an alternate level of competition or  
196 alternate sport may be beneficial. Little is known about the benefits or correlates of sports  
197 transfer, or the switching between sports – in contrast to dropout. With the emergence of sports  
198 such as skateboarding and mountain biking, there are alternatives for children who do not enjoy  
199 traditional team and individual sports. It is also important to identify these children to improve  
200 their current sporting participation or help them find an alternative sporting environment that  
201 they can continue in.

202 **Research Priority 4: How much physical activity does sport provide participating youth?**

203 Sport (including dance) may represent one of the widest reaching out-of-school settings  
204 for physical activity. In many countries around the world, the majority of youth participate in at  
205 least one sport annually,<sup>49</sup> which could have substantial public health implications as youth sport  
206 participation has been associated with an increased likelihood of meeting national physical  
207 activity guidelines.<sup>50-52</sup> Still, the actual contribution of sport to children and adolescents' total  
208 physical activity is still unclear. For instance, one study found that youth sport contributed 26  
209 mins of participants' total moderate-to-vigorous physical activity (MVPA) for that day;<sup>53</sup>  
210 whereas, another found that youth participating in sport accumulated 7 min/day of MVPA more  
211 than youth who did not participate in sport (with ~5 additional min/day of MVPA for each  
212 additional sport they participated in).<sup>54</sup> These figures are likely to vary by measurement protocols  
213 (e.g., accelerometer cut-points, self-report tool used), sports, cultures and population  
214 socioeconomics. It is also possible that increasing physical activity through sport may displace  
215 other physical activity, though limited experimental research does not support this.<sup>55</sup> It is,  
216 therefore, critical to better understand the contribution of sport to overall physical activity.

217 While it is encouraging that many youth have access to sports and sports participation  
218 increases the likelihood of being sufficiently active, it appears that there is still room for  
219 improving physical activity in youth sport. Observational studies have consistently shown that  
220 despite being in a sporting context, youth sport participants spend the majority of time inactive or  
221 in light-intensity physical activity, regardless of setting context (e.g., practices, games), sport,  
222 and sex.<sup>53,56-61</sup> One of the primary factors influencing the quality of physical activity  
223 participation in sporting contexts is the coach. Accordingly, there have been calls to investigate  
224 and improve the current quality of coaching youth sports and particularly to determine efficient  
225 ways of optimizing the dose of physical activity accumulated during youth sport.<sup>59,62,63</sup> Other

226 contextual factors that may influence physical activity during sport may be the physical  
227 environment, peer interactions (i.e. age-groupings and variations in skill level), or rules of the  
228 game (i.e. modifications on player positioning and playing time). In particular, studies using  
229 nuanced observation systems to capture these contextual data are needed. Further, for some  
230 sports these data can then be paired with accelerometry and other data collection tools that use  
231 novel sensory technology to assess patterns of variability during particular time segments. Few  
232 studies to date have provided these contextual data in youth sport.<sup>56,64-67</sup> Only two of these  
233 studies paired contextual data with accelerometry to assess patterns of variability.<sup>64,65</sup> Findings  
234 showed that physical activity and inactivity were highly variable throughout the sporting event  
235 and differed by task (e.g., warm-up, game play, management) and setting demand (i.e., whether  
236 the practice setting fostered participation or exclusion).<sup>64</sup> This contextual information can be  
237 used to inform interventions aiming to increase activity in youth sport; therefore, a more nuanced  
238 examination of the structure and characteristics of youth sport settings is warranted.

239 **Research Priority 5: How can we develop effective and sustainable coaching interventions**  
240 **to improve physical activity in sport?**

241 Coaches are in an ideal position to impact the health and wellbeing of youth sport  
242 participants, as they are viewed as experts, have regular direct involvement, and carry  
243 considerable influence over participants and the environment.<sup>68,69</sup> Coaches are key figures in the  
244 youth sport setting and play an important role in ensuring that youth have high-quality sporting  
245 experiences.<sup>70</sup> Unfortunately, not all youth have positive experiences and their coach is one of  
246 the most commonly cited reasons for dropping out of sport.<sup>71</sup>

247 Many youth sport organizations do not require coaches to receive any formal coaching  
248 qualifications.<sup>63</sup> Further, the coach training programs (or accreditation courses) that are available,

249 generally do not provide coaches with direction on how to create structured environments that  
250 promote physical activity.<sup>63</sup> Schlechter et al. found no difference in the percentage of time youth  
251 playing American flag football spent in MVPA between coaches who completed a standard  
252 coach training program compared to those with no training.<sup>57</sup> One of the factors contributing to  
253 high percentages of inactivity and light intensity activity, may be that coaches spend little time  
254 preparing for practices, relying on their experience in the sport to create impromptu practices.<sup>72</sup>  
255 While sport can include some beneficial activities of lower intensity, such as motor skill  
256 development, team strategizing, and intentional observation, coaches have been observed  
257 spending a considerable percentage of practice time in less effective management activities (e.g.,  
258 setting up drills, transitioning between drills, instructions).<sup>56</sup> This lack of appropriate training and  
259 planning negatively affects physical activity intensity, where MVPA is lower when coaches are  
260 disengaged and in a management context.<sup>66,67</sup>

261       Even when the coach is not specifically cited as the reason for youth drop out, the reasons  
262 given are generally factors coaches control or affect, and thus can improve. For instance, lack of  
263 excitement and fun, boredom, and not enough participation were some of the most common  
264 reasons for withdrawing from sport in a study of over 500 youth athletes.<sup>73</sup> Since we know  
265 coaches spend a considerable percentage of practice time in management <sup>56</sup> and youth MVPA is  
266 lower during this time <sup>66,67</sup>, it is possible that poor management practices contributes to youth  
267 dropout from sport.

268       Research is needed to create and evaluate coaches' training programs aimed at improving  
269 the quality of youth sport coaching. We are aware of only one experimental study that  
270 investigated the efficacy of coach training on youth physical activity intensity in a small  
271 convenience sample during sport practice.<sup>74</sup> This study showed that brief coach training can

272 significantly increase MVPA and decrease inactivity. Additionally, after coaches were trained to  
273 implement efficient activity-promoting practices, attenuated differences in MVPA between youth  
274 with high and low self-determined motivation were found.<sup>75</sup> However, this intervention was  
275 short in duration (one week), highly controlled, and only focused on increasing physical activity  
276 by modifying the structure of practices. Therefore, longer, fully-powered effectiveness trials of  
277 interventions that are scalable are needed. In addition to increasing physical activity by  
278 modifying the physical environment, future coach training programs could also incorporate  
279 psychosocial (e.g., motivational climate, coach-athlete relationships) or developmental (e.g.,  
280 interpersonal development, fundamental movement skills, physical literacy) elements. Future  
281 interventions may also explore alternate training methods (e.g., online modules), incorporating  
282 parents or families, maintain sport between sport seasons, and aim to influence physical activity  
283 outside of the youth sport environment.

284 As discussed in the previous section, there is a dearth of interventions aiming to increase  
285 physical activity during youth sport. While promising, the long-term effectiveness of training  
286 coaches to implement activity-promoting practices is currently unknown and warrants further  
287 investigation. However, interventions with long follow-ups in youth sports are difficult because  
288 sport seasons are generally short, and there is high turnover amongst coaches and athletes. Future  
289 interventions can continue to deliver interventions to coaches, but should conduct analyses at a  
290 higher level (i.e., organization or club level). Therefore, organizational, club, or perhaps  
291 governmental, buy-in is needed for interventions to be sustainable and to assess long-term  
292 effectiveness.

293 **Research Priority 6: What policy-level actions on youth sport are most effective at**  
294 **increasing physical activity?**

295 To achieve the required reach and scale of change in physical activity to benefit  
296 population health, policy-level interventions are needed.<sup>76</sup> Several international and national  
297 documents and initiatives highlight the roles of policy in promoting physical activity, and the  
298 importance of sport policy within that. For example, the World Health Organization's Global  
299 Action Plan on Physical Activity highlights policy actions across four objective areas that engage  
300 and utilize sporting structures.<sup>77</sup> In the United States, the National Physical Activity Plan has 8  
301 strategies with detailed tactics on how to use sport to promote physical activity<sup>14</sup> and has recently  
302 released a National Youth Sport Strategy;<sup>15</sup> several of these strategies and tactics address policy-  
303 level actions.<sup>14</sup> The International Society for Physical Activity and Health's Bangkok  
304 Declaration highlights sport policy actions to support the Sustainable Development Goals.<sup>78</sup>  
305 Whilst there is recognition of the potential role of sport in shifting population levels of physical  
306 activity, the most effective strategies for increasing physical activity within this sector remain  
307 unclear, and past efforts have been mostly unsuccessful.<sup>79</sup>

308 While tools exist to evaluate physical activity policies,<sup>80</sup> there is a need for long-term  
309 evaluations following sport-related policy changes with appropriate comparison groups to  
310 determine long-term effectiveness. These can include natural experiments with matched control  
311 communities. Evaluations of the effectiveness of policies should include cost-effectiveness  
312 analyses by examining the return on investment for policy implementation. Cost-benefit analyses  
313 should examine how a policy that increases sport participation increases physical activity and  
314 decreases overall healthcare costs, in addition to other benefits to society. While policy change  
315 can often be slow, research including a series of systematic reviews and modelling scenarios to  
316 inform the development of a league table of the most effective and cost-effective policy level  
317 actions on youth sport could help to enhance sport policies.

318 **Research Priority 7: How does youth sport contribute to physical health?**

319 Youth sport is a key opportunity for physical activity and the physical benefits of  
320 physical activity are well documented.<sup>81-83</sup> As discussed in Research Priority 4, the total amount  
321 of physical activity during sport needs to be assessed using direct observation or objectively  
322 measured by devices. Sport, however, unique from other forms of physical activity, may provide  
323 additional benefits such as improved motor skills and multiple fitness components, for example,  
324 muscular strength, endurance, flexibility, cardiorespiratory fitness and body composition. Sport  
325 participation, likely due to its physical activity with high intensity intervals, has been linked to  
326 decreased risk of obesity<sup>84</sup> and other chronic diseases.<sup>85,86</sup>

327 While cross-sectional studies provide evidence that participation in youth sport is  
328 associated with improved physical health and fitness,<sup>50,87</sup> there are few experimental studies  
329 showing that joining sports increases physical health. A feasibility study randomized low-  
330 income, overweight children to a soccer program and found improvements in body composition  
331 after 3 months.<sup>88</sup> However, in typical sport settings, it is likely that children who have greater  
332 physical health and fitness are more likely to participate, limiting any causal inferences. It is  
333 unknown if joining sport, in its current form, is sufficient to improve physical health and which  
334 sports in which settings improve which physical health outcomes. While some evidence suggests  
335 answers to these questions,<sup>88</sup>, such as reducing obesity, longitudinal studies that assess the  
336 impact on overall physical health over time are needed to understand how the effects of youth  
337 sport may translate into adulthood. Well-designed experimental studies are needed to assess the  
338 physical effects of youth sport participation, and particularly how individuals with lower fitness  
339 may benefit from joining and maintaining participation in appropriate sporting opportunities.

340 **Research Priority 8: How does youth sport contribute to mental health?**

341 Youth sport participation has been associated with improved mental health outcomes  
342 including reduced mental illbeing (e.g. anxiety and depression), and increased mental wellbeing  
343 (e.g. happiness).<sup>89-91</sup> In addition, sport and physical activity has been positively associated with  
344 educational outcomes including improved cognitive performance and academic achievement.<sup>92</sup>  
345 Some of these benefits may be directly from the neurobiological effects of physical activity.  
346 More research is needed on the specifics of these mechanisms, however, they may include acute  
347 and chronic neuroelectric effects,<sup>93</sup> brain-derived neurotrophic factor, or cerebral blood flow  
348 mechanisms.<sup>92,94</sup> It is likely, however, that youth sport has an effect on mental health outcomes  
349 independent of physical activity. Improved mental illbeing and wellbeing may be mediated  
350 through psychosocial mechanisms that result from positive social interactions, outdoor activity,  
351 or feelings of accomplishment.<sup>94,95</sup> There may also be behavioral mechanisms linked to  
352 improved auto-regulation or sleep patterns for those engaged regularly in sport that positively  
353 influence mental health.<sup>(94)</sup> Similarly, improved cognitive performance may be a result of  
354 complex problem solving and spatial reasoning needed during sport performance.

355 The majority of the evidence to support the relationship between physical activity and  
356 mental health is either from tightly controlled laboratory experiments or cross-sectional data.<sup>92,96</sup>  
357 Broader effectiveness studies in real-world settings are indicated. These studies also need to  
358 explore how sport is only part of the broader social phenomenon that surrounds it when delivered  
359 as a mental health intervention.<sup>97</sup> Specifically, there may also be negative effects of sports on  
360 mental health including eating disorders, increased anxiety or decreased self-esteem, particularly  
361 in low quality sporting experiences.<sup>98</sup> It is likely that these mediators are variable between  
362 individuals, sports, and sporting experiences.<sup>12</sup> Consequently, it may not be the traditional  
363 components of physical activity dosage that are critical for achieving mental health outcomes

364 through sport.<sup>99</sup> For example, it may be that sport that is light-intensity and is performed in a  
365 social and fun context for a short duration is effective at changing mental health outcomes,  
366 despite have minimal impact on physical health. Well-designed, ecologically valid experiments  
367 are needed to provide causal evidence on the benefits of sport on mental health. Additionally,  
368 more research is needed on the mediators of these positive mental health benefits so that these  
369 factors can be maximized during youth sport. Furthermore, longitudinal studies are needed to  
370 determine how these changes in mental health may be sustained or dissipate.

371 **Research Priority 9: How does sport contribute to social health?**

372         There are several other developmental benefits of youth sport participation including the  
373 social benefits of youth sport. Social identity is likely to contribute to positive youth  
374 development.<sup>100</sup> Sport has been identified as a way to encourage and promote positive youth  
375 development.<sup>101</sup> Youth sport participation has also been shown to promote indicators of success  
376 such as reduced school dropout, juvenile detention and crime rates.<sup>102</sup> Youth sport may also  
377 directly affect social capital through teamwork and social training. For example, children and  
378 adolescents involved in youth sport may develop critical ‘21<sup>st</sup> century skills’ that increase their  
379 employability such as communication and cooperation. High quality youth sport experience will  
380 likely teach good social skills similar to other quality after school programs.<sup>103</sup> For youth who  
381 have immigrated or are from international backgrounds, sport may also help with integration and  
382 acculturation.<sup>104</sup>

383         Youth sport also creates a setting for interactions with peers and family. Friends were  
384 consistently reported as a predominant reason given by children and adolescents for participating  
385 in sports, and good teammates are critical to a positive sport experience.<sup>105</sup> Siblings and parents  
386 may encourage participation,<sup>28</sup> but are also involved in the entire sporting experience such as

387 attending games, helping with skill practice and providing transportation. Strategies to encourage  
388 and maximize these positive social experiences need to be explored.

389 Through its inherent social interactions, sport can be used as a vehicle for positive  
390 change, in addition to health promotion.<sup>106</sup> One sporting opportunity that has been used to effect  
391 change in more than traditional physical health outcomes is Sport for Development.<sup>107</sup> However,  
392 many of these programs have been implemented by health and non-profit agencies without  
393 rigorous evaluation of effectiveness and evaluation has found mixed results on diverse  
394 outcomes.<sup>97,108</sup> Researchers can capitalize on the natural experiment opportunities that arise from  
395 implementation of these programs as well as collaborating with existing sport for development  
396 programs to strengthen implementation and evaluation design.<sup>109</sup>

397 **Research Priority 10: What is the overall return on investment for youth sport**  
398 **participation?**

399 As highlighted, there are physical, mental and social health benefits of sport participation.  
400 However, the benefits of positive sporting environments extend to economic and social benefits.  
401 With limited resources, governments and agencies need to understand the relative return on their  
402 investments, including the contribution of sport. Understanding the overall contribution of youth  
403 sport to society may make decisions about resource allocation and sport-related policies more  
404 obvious. It is impossible to capture all the benefits of youth sport. From a socioecological  
405 perspective, studies on the benefits of youth sport typically focus on individual and interpersonal  
406 benefits for the participating youth. However, expanding the research lens to macro-levels of  
407 communities, policies, and environments may yield some unexpected outcomes from youth  
408 sport. Some novel areas of research on outcomes can be applied to youth sport from other  
409 disciplines. For example, one such area of exploration is the economic benefits of youth sport. In

410 the U.S. it is estimated that youth sports is a \$15 billion industry.<sup>110</sup> This includes revenue from  
411 participation, tourism, and advertising. Advertising through youth sporting events has been  
412 controversial, but sports marketing has rarely been evaluated, either at the grassroots or national  
413 level.<sup>111</sup> Organizations and investors will want to know the overall return on investment in youth  
414 sport, including quantification of the benefits of advertising. Thus, social return on investment  
415 analyses should consider these macro-level effects on community economies and environments  
416 through partnerships with sustainability organizations that already exists. A series of different  
417 methods to assess social return on investment have been trialed in various countries.<sup>112</sup> The  
418 variation in the results of these analyses is thought to largely reflect the diversity of the methods  
419 used rather than large differences in the value of sport across countries. Further research is  
420 indicated to refine these methods and apply them to various sporting interventions, which include  
421 strategies to directly influence the knowledge, skills and motivation of sport participants as well  
422 as more indirect interventions like the creation or renovation of sporting facilities.

423

## 424 **Conclusion**

425         Researchers in physical activity and health, exercise science, sociology, youth  
426 development and other disciplines should work collaboratively to answer the youth sport  
427 research questions highlighted in the current paper and summarized in Table 1. Specific actions  
428 by collaborative stakeholders to support the research questions and priorities in Table 1 could  
429 include better alignment of comprehensive surveillance across countries; robust evaluations of  
430 all sports initiatives; a shift in the focus of evaluation towards understanding the effects of  
431 participation on physical, mental, and social health outcomes; and the integration of health  
432 economics into the evaluation of sports initiatives to enhance understanding of their cost-

433 effectiveness. Investments are needed in initiatives to engage specific population groups such as  
434 girls and minority groups as well as capacity building to increase knowledge and skills among  
435 coaches, and. Specific activities for the research community that may support this  
436 interdisciplinary research include data sharing, conference symposia calls, special issues in  
437 journals, and funding opportunities that address youth sport topics. A truly convergent research  
438 approach, involving international stakeholders, is needed to tackle the issue of youth sport  
439 participation. Better understanding of these research priorities will assist in gaining funding  
440 agencies' and stakeholders' recognition of the potential for youth sport to contribute to youth  
441 health and development, which will lead to improved practice and in turn better health outcomes  
442 for youth worldwide.

443

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735

**Table 1: Suggestions for future research directions**

<b>Research Question</b>	<b>Research Priority</b>
1. What is the participation rate in youth sports?	Research using standardized and more in-depth assessment of sport participation including the frequency, duration, intensity and type of sport participation are needed and these should include special populations and alternative sports
2. How can we best improve sport participation rates?	Research on the barriers to participation and strategies to overcome these barriers, particularly among underserved populations (i.e. girls, low SES families, rural areas, and other minority populations)
3. How can we maintain sport participation?	Research using a solutions-oriented approach to prevent dropout from sports  Research on multi-level factors and strategies to target these factors  Research with a developmental focus on sport specialization and strategies for sport transfer
4. How much physical activity does sport provide participating youth?	Research on the examination of sporting structure context and its influence on physical activity including using devices like accelerometers and contextual data.
5. How can we develop effective and sustainable coaching interventions to improve physical activity in sport?	Research using longer, fully-powered effectiveness trials that are scalable are needed on effective training and planning for coaches
6. What policy-level actions on youth sport are most effective at increasing physical activity?	Research to determine the most effective policy actions to improve youth sport
7. How does youth sport contribute to physical health?	Well-designed experimental studies are needed to assess the physical effects of youth sport participation, particularly how individuals with lower fitness may benefit from joining appropriate sporting opportunities
8. How does youth sport contribute to mental health?	Research supporting causal evidence on the benefits of sport on mental health Research examining mediators of these positive mental health benefits so that these factors can be maximized during youth sport
9. How does sport contribute to social health?	Research testing strategies to maximize positive social experiences  Research on the implementation and evaluation of benefits of sport for development
10. What is the overall return on investment for youth sport participation?	Analyses considering macro-level effects on community economies and environments through partnerships with sustainability organizations

738 **Figure 1.** A conceptual framework of the contribution of youth sport to health  
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