



Can participation in organized sports help adolescents refrain from self-harm? An analysis of underlying mechanisms

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ABSTRACT

Research has rarely focused on what might make adolescents less likely to engage in deliberate self-harm. Because the sports domain is an important context promoting positive adjustment, we proposed that engaging in organized sport activities could help adolescents refrain from self-harming through affecting their psychosocial well-being. Using two annual waves of longitudinal data from 998 Swedish adolescents in grades 7 and 8 (52% boys), we tested whether depressive symptoms and self-esteem mediated the link between organized sport activities and self-harm. Results showed that self-esteem, but not depressive symptoms, mediated the association between organized sport activities and lower self-harm. Our findings reinforce the idea that organized sport activities could be a viable way of promoting mental health, laying the foundation for future interventions.

1. Introduction

Around a third of adolescents deliberately harm themselves at least once in their lifetime (Muehlenkamp et al., 2012). Although adolescents who engage in self-harm are at high risk for suicidal ideation and attempts (Beckman et al., 2018), little research has focused on potential factors that decrease youth's self-harming behaviors (Klemera et al., 2017). Deliberate self-harm is the act of causing injuries to oneself without any conscious suicidal intent and includes actions such as cutting, hitting, or biting oneself (Beckman et al., 2018). This behavior starts around age 12 (Hawton et al., 2012), and peaks around age 15 (e.g., Morey et al., 2017). The majority of adolescents use this behavior as a strategy to cope with negative emotional feelings, such as depressive symptoms or low self-esteem, experienced as overwhelming and difficult to handle (e.g., Chapman et al., 2006; Schmidtke et al., 1996). Although self-harm can occur independently of suicidal thoughts or attempts (Nock, 2008), it increases the risk of future suicide attempts (Hawton et al., 2012). Thus, understanding factors that might prevent adolescents from engaging in this behavior is warranted.

Organized sports are an important developmental context and widely believed to offer youth with opportunities for positive development (Larson, 2000; Mahoney et al., 2005; McMahon et al., 2017).

Supporting this argument, a large body of studies has examined and found positive associations between youth's participation in organized sports activities and youth's adjustment across the academic, behavioral, and psychological domains (Chang et al., 2021; Panza et al., 2020; Sharp et al., 2015). For example, cross-sectional (McMahon et al., 2017; Murphy et al., 2021; Vierimaa et al., 2018) and longitudinal studies (Graupensperger et al., 2021; Murphy et al., 2021; Sabiston et al., 2013; Sharp et al., 2015), and qualitative reports (Holt et al., 2017) have documented that participation in organized team sport activities is associated with a range of mental health indicators, including high self-esteem, and low depressive and anxiety symptoms. Above and beyond the most common benefits, involvement in organized sports have also been linked with lower risk of suicidal thoughts and behaviors (e.g., Harrison & Narayan, 2003; Taliaferro et al., 2008). To summarize, participation in organized sports activities may increase the likelihood for positive youth development across a range of domains.

Although participating in organized team sports appears to protect adolescents from a broad array of negative psychological outcomes, to our knowledge there is a limited understanding of the link between participation in organized team sports and the occurrence of self-harm among adolescents. Two studies have highlighted sport and exercise as one of the most helpful ways of resisting the urge to harm oneself

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(Klonsky & Glenn, 2008; Plener et al., 2013). A third reported physical exercise as a possible treatment for self-harm in a single case study (Wallenstein & Nock, 2007). However, these studies 1) do not examine why involvement in organized team sport or exercise might protect adolescents from engaging in self-harm; 2) use a broad definition of exercise, which does not allow generalizing the findings to complex activities comprising of various components, such as involvement in structured and adult-led sports activities on regular basis (Mahoney et al., 2005).

When examining specific components of sport activities, studies found that the presence of an adult leader, as well as meetings on a regular basis, play an important role on adolescents' well-being. Specifically, the presence of adult leaders seems to help create constructive climates (Duda & Balaguer, 2007), providing support for adolescents (Eccles & Gootman, 2002). It is also associated with low depressive symptoms (Denault & Poulin, 2008; Mahoney et al., 2002). As for participation on a regular basis, it is argued that developing positive and supportive relationships, forming new behavioral patterns, and learning new skills and competencies requires commitment and takes time (Larson & Verma, 1999). Supporting these arguments, a growing body of research has revealed that youth who are consistently involvement in organized sports are more likely to benefit from the positive outcomes linked with participation compared to youth reporting less consistent participation patterns (Denault & Poulin, 2009; Gardner et al., 2008; Rose-Krasnor et al., 2006). In line with these arguments, we focused on adolescents' that were involved in adult-led organized sports activities on a regular basis.

To understand the association between adolescents' involvement in organized sports and engagement in self-harm, we use one of the most cited models of positive youth development (PYD; Agans et al., 2016; Lerner, 2005), which has also laid the foundation for recent models of PYD through sports (e.g., Deal et al., 2020; Holt et al., 2017). Overall, these models share similar views by stressing that all youth have the potential for positive growth when development occurs through interactions within supportive interpersonal contexts. Organized activities outside of school time, including sports, have been hypothesized as part of the contexts that might promote PYD. Researchers have proposed that sports participation facilitates positive developmental trajectories because it helps youths who acquire important skills, including emotional regulation (Larson et al., 2006). Because participating in organized sport activities promotes emotional regulation (Agans & Geldhof, 2012), and self-harm is a maladaptive emotional regulation strategy (Chapman et al., 2006), organized sport activities might provide adolescents with adaptive strategies to cope with their negative emotional experiences, decreasing their need to self-harm. Last, and in line with social learning theories (Vygotsky, 1978), cooperative peer environments promote optimal growth. All these aspects have been shown to be associated with youth's psychological well-being, including low depressive symptoms and high self-esteem (e.g., Fredricks & Eccles, 2010; Sabiston et al., 2013). Because depressive symptoms and low self-esteem are two strong correlates of self-harm (e.g., Fliege et al., 2009; Madge et al., 2011), improvement in these two psychological aspects through participation in organized sport activities could help adolescents resist engaging in self-harm.

1.1. The present study

Sweden has around 20,000 sports clubs throughout the country, 12,000 of which are organized sport activities for youth (Jakobsson et al., 2018). Around 13 years of age, about 66% of Swedish adolescents participate in organized sports clubs (Statistics-Sweden, 2017-2018). This percentage decreases slightly around 16 years of age (Jakobsson et al., 2018). Also, Sweden seems to represent one of the European countries most affected by self-harm, where up to 42% adolescents engage in it (Muehlenkamp et al., 2012). Given the relevance of both organized sport activities and self-harm in Sweden, in this study, we

aimed to determine if organized sport activities predict change in adolescents' self-harm and the mechanisms that might explain such a link. We hypothesized that organized sport activities would reduce the levels of self-harm, through decreasing adolescents' depressive symptoms and increasing their sense of self-worth (see Figure 1 for the conceptual model).

When looking at organized sport activities, internalizing problems and self-harm individually, studies showed some gender differences. Although organized sport activities are becoming increasingly popular among girls, they represent one of the most popular free-time activities for boys (Kaestner & Xu, 2006; Ungdomsbarometern, 2019). Further, during adolescence, girls report more internalizing problems than boys, especially depressive symptoms (Girgus & Yang, 2015) and low self-esteem (Orth & Robins, 2019). Last, there are arguments about whether girls are more likely to harm themselves than boys (for a review see Plener et al., 2013). For these reasons, we controlled for the effect of gender in our analyses.

2. Method

2.1. Participants

The study sample was taken from a longitudinal project, [REMOVED FOR BLIND REVIEW], which involved students in 7th, 8th and 9th grade from seven municipal high schools in a medium-sized city in Sweden. Data were collected annually for four years. The target sample for our analyses was taken from students at the second and third time point (from here after T1 and T2). The analytical sample for this study comprised 998 adolescents attending 7th and 8th grade (519 boys; $M_{age} = 13.94$; $SD = 0.74$). In our analyses, we included all students who participated at T1. Most of the adolescents in our sample were born in Sweden (85.3%). The majority of the adolescents lived with both parents (around 66%) whereas others lived in joint custody settings (14.4%), lived with only one parent (17.3% mother, 2.4% father), or had other custodial arrangements (around 1%). Also, the majority of the adolescents' fathers (89.4%) and mothers (73.2%) had full-time jobs.

2.2. Procedure

The study procedure was approved by the Research Ethics Board in [REMOVED FOR BLIND REVIEW]. Following the approval of both the local municipality's education authority and the leaders of each school, parents were sent a letter that informed them about the purpose of the study and were asked to sign and return a form if they refused to allow their children to participate in the study (they could also call or email their refusal). Consent was assumed if not declined (i.e., passive consent). In total, 1.7% of the parents did not give their consent. Students were also informed that their participation was voluntary and were assured of the confidentiality of their responses. Trained research assistants oversaw the data collection at the schools. Students received refreshments while filling in the questionnaires and a contribution to their class funds.

2.3. Attrition analyses

Around 11% of participants (115) were missing at T2. To test for attrition effects, we conducted a logistic regression, regressing the attrition variable (dropout = 0, retention = 1) on all our study variables. The results showed that adolescents who harmed themselves at T1 were more likely to drop out (OR 0.76, $p = .01$, 95% CI = .67–0.93). None of the other study variables predicted drop out. Thus, we concluded that attrition only minimally affected our results, most likely by restricting variance in our outcome variable and attenuating estimates.

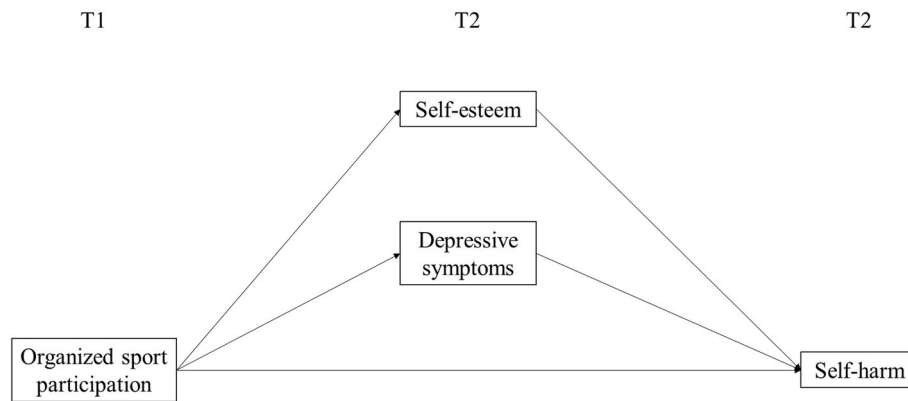


Fig. 1. Conceptual model.

2.4. Measures

Self-harm. Self-harming behaviors were measured using a shortened version of the original Deliberate Self-Harm Inventory translated into Swedish by Lundh and colleagues (Lundh et al., 2007). This version has been used for samples of Swedish adolescents (Jutengren et al., 2011). Adolescents responded to nine items about the extent to which they had inflicted non-lethal injuries on themselves in the last 6 months. The sample items include: “In the last 6 months have you purposely cut your wrists, arms, or some other part of your body?” and “In the last 6 months have you purposely burnt yourself with a cigarette, lighter, or matches?”. Adolescents answered each question on a 7-point scale, ranging from “0 times” (0) to “More than 5 times” (6). Cronbach’s alphas for this scale were 0.90 at T1 and 0.94 at T2.

Participation in organized sport activities. Consistent with the literature (e.g., Mahoney et al., 2005), we defined organized sports as after-school activities that occur under adult-supervision and on a regular basis. We combined two items to measure participation in organized sports activities. Initially, using a dichotomous item, “No” (0) and “Yes” (1), youth were asked “Are you involved in some club or organization or the like where there is an adult leader whom you meet one or several times a week at a specific time?” Subsequently, youth were asked “If you are involved in a club or organization, what kind of organization is it and how often do you meet?”, with sport being one forced-choice option. Responses were “No” (1), “Yes, we meet once a week” (2); “Yes, we meet two or more times a week” (3).

Depressive symptoms. We used 16 of the 20 items of the Center for Epidemiological Studies-Depression Scale for Children (CES-DC; Faulstich et al., 1986) to assess adolescents’ depressive symptoms. We excluded four items because they assessed adolescents’ well-being and because the internal consistency drastically dropped once included (Olsson & von Knottting, 1997). We asked the adolescents to think about the past week and to state how often they experienced situations like the following: “I was bothered by things that usually do not bother me.” The response scale ranged from “Not at all” (1) to “Often” (4). Cronbach’s alpha at T2 was 0.94.

Self-esteem. To measure self-esteem, we used the 10-item Rosenberg self-esteem scale (Rosenberg, 1979). Adolescents were presented with statements such as, “You feel you do not have much to be proud of.” The response scales ranged from “Don’t agree at all” (1) to “Agree completely” (4). Cronbach’s alpha at T2 was 0.85.

2.5. Analytic plan

To address our research question (i.e., Does participating in organized sport activities decrease the likelihood of engaging in self-harm during adolescence? And if so, why?), we fitted a mediation model in MPLus (Muthén & Muthén, 1998 – 2010–2010), and assessed whether

sport participation was associated with decreased self-harming behaviors through decreasing depressive symptoms and increasing self-esteem. In this model, we controlled for self-harm at T1 and gender. We used the full information maximum likelihood (FIML) estimation approach to deal with the missing data, as it provides more reliable standard errors than mean imputation, listwise, or pairwise deletion (Little & Rubin, 2002).

3. Results

3.1. Descriptive information and correlation analyses

Descriptive information and correlation analyses are reported in Table 1. Overall, 42% of the youth were not involved in any organized sport activity, almost 12% were involved once a week, and the rest (almost 47%) were involved twice weekly or more at T1. Around 38% of adolescents at T1 and 28% at T2 engaged in self-harm at least once in the last 6 months. The correlations were in the expected directions. With few exceptions, all the variables under study were significantly correlated with each other.

3.2. Does participating in organized sport activities decrease the likelihood of engaging in self-harm during adolescence? And if so, why?

To address our research question, we fitted a mediation model, which showed good fit, $\chi^2(1) = .01, p = .92, CFI = 1.00, RMSEA = .00, SRMR = .001$. After controlling for both self-harm and gender at T1, results showed a positive association between participation in organized sport and self-esteem ($\beta = .16, p = .001, 95\% CI = .07-0.25$). Also, self-

Table 1
Correlations and descriptive analyses.

	Correlations						Mean (SD)
	1.	2.	3.	4.	5.	6.	
1. Self-harm (T1)	–	–	–	–	–	–	.32 (.77)
2. Self-harm (T2)	.40 ^d	–	–	–	–	–	.27 (.82)
3. Depressive symptoms	.30 ^d	.41 ^d	–	–	–	–	1.70 (.64)
4. Self-esteem	-.26 ^d	-.36 ^d	-.58 ^d	–	–	–	1.82 (.59)
5. Sport participation	-.11 ^b	.07 ^d	-.05 ^{****}	.15 ^d	–	–	2.05 (.94)
6. Gender ^a	.09 ^c	.06 ^d	.23 ^d	-.18 ^d	-.06	–	1.49 (.50)

^a Males = 1, females = 2
^b p < .05.
^c p < .01.
^d p < .001.

esteem was associated with decreases in the level of self-harming behaviors ($\beta = -0.14$, $p = .001$, 95% CI = -0.22 to -0.06). In addition, tests of indirect effects revealed that when adolescents were involved in organized sport activities, their self-esteem increased and, in turn, their levels of self-harm decreased ($\beta_{\text{ind.}} = -0.02$, $z = -2.43$, $p = .02$, 95% CI = -0.04 to -0.004).

By contrast, our results showed a lack of association between sport participation and depressive symptoms ($\beta = -0.06$, $p = .25$, 95% CI = -0.15 – 0.04). However, depressive symptoms were associated with an increase in self-harming behaviors ($\beta = .24$, $p = .00$, 95% CI = $.13$ – 0.34). Lastly, depressive symptoms did not significantly mediate the association between sport participation and self-harming behaviors ($\beta_{\text{ind.}} = -0.01$, $z = -1.15$, $p = .25$, 95% CI = -0.03 – 0.01).

3.3. Supplementary analyses

To test whether the frequency of sport participation played a mediating role for self-esteem and depressive symptoms, we ran supplementary analyses, and divided the organized sport activities variable into three categories: 1) no participation in organized sports, 2) participation in organized sports once a week; 3) participation in organized sports twice or more a week. The first model assessing the mediating role of self-esteem showed good model fit $\chi^2(2) = .05$, $p = .98$, CFI = 1.00, RMSEA = .00, SRMR = .002. The results showed no difference on self-esteem between adolescents who did not participate and those who participated in sports once a week ($\beta = .02$, $p = .66$, 95% CI = -0.08 – 0.12). However, adolescents who participated in sports twice or more a week were more likely to have higher self-esteem than those who did not participate at all ($\beta = .17$, $p = .001$, 95% CI = $.07$ – 0.26). Indirect effects showed no difference between no participation and participation in sport once a week ($\beta_{\text{ind.}} = -0.003$, $z = -0.44$, $p = .66$, 95% CI = -0.02 – 0.01). However, and in line with the primary results, these findings showed that adolescents who participated in sports twice or more a week were more likely to have higher self-esteem and in turn lower levels of self-harm compared to those who did not participate in organized sports ($\beta_{\text{ind.}} = -0.02$, $z = -2.41$, $p = .02$, 95% CI = -0.04 to -0.004).

When examining the mediating role of depressive symptoms, the results confirmed the previous findings. Specifically, they showed no difference on depressive symptoms between adolescents who did not engage in sports and those who did it once a week ($\beta = -0.02$, $p = .70$, 95% CI = -0.11 – 0.08) or twice or more a week ($\beta = -0.06$, $p = .25$, 95% CI = -0.16 – 0.04). Indirect effects confirmed no difference between lack of sport participation and participation once a week on the mediating role of depressive symptoms ($\beta_{\text{ind.}} = -0.004$, $z = -0.38$, $p = .70$, 95% CI = -0.03 – 0.02). The same was true for the difference between no sport participation and participation twice a week or more ($\beta_{\text{ind.}} = -0.01$, $z = -1.17$, $p = .24$, 95% CI = -0.04 – 0.01).

4. Discussion

In the current study we investigated the role of organized sport activities for reducing self-harm and examined whether youth's depressive symptoms and self-esteem could account for this association. Our results showed that adolescents who engage in organized sport activities are more likely to report increases in self-esteem one year later, and this is associated with decreases in self-harming behaviors. These findings are in line with models of PYD through organized activities (Lerner, 2005), such as sports (e.g., Holt et al., 2017), which posits that the youth's positive development occurs through the interaction with supportive interpersonal contexts, and organized sports represent such contexts.

Although engagement in organized sport activities was negatively associated with self-harm at the same time point, this direct association did not hold when assessing self-harm one year later. It may be important to use intensive longitudinal designs to study the ties between engagement in sports and self-esteem, where the lag between

measurements is much shorter than in traditional longitudinal designs. Such short-term assessments may reveal processes that we were unable to capture.

Contrary to our expectations, engaging in organized sports did not affect adolescents' depressive symptoms, which in turn did not decrease the level of adolescents' self-harm. Generally, findings on the association between sport participation and psychological well-being are mixed. While one line of studies reports positive associations, others report some null findings or negative effects (for systematic reviews see, Eime et al., 2013; Evans et al., 2017). It is suggested that the effects of being involved in sports might occur through other psychosocial factors, rather than being direct (Mahoney et al., 2005; Osgood et al., 2005; Shaffer & Wittes, 2006). Because adolescents who engage in organized sport activities report an increased ability to regulate negative emotion (Larson et al., 2006), one may speculate that sport participation helps adolescents to regulate their own negative emotions in a more adaptive manner, which in turn might decrease their depressive symptoms. Such hypothesis needs to be tested in future studies.

4.1. Limitations and strengths

This study has limitations that need to be mentioned. First, we only used two time points to answer our research questions, with the mediators and self-harm assessed in the same wave. Although three assessments would be ideal for studying mediation, we reasoned that cross-sectional assessment of the mediators and self-harm were closer to theory and empirical findings. That is, adolescents who self-harm report an increase in negative affect directly before harming themselves (e.g., Hughes et al., 2019; Kranzler et al., 2018). Our choice captures the nearly instantaneous nature of the relations between negative emotions (i.e., depressive symptoms and self-esteem) and self-harm.

Second, we used self-reported information from adolescents. This use of a single reporter may have led to shared-method variance, possibly inflating estimates. However, studies have shown that adolescents' reports of their own well-being often have higher validity than reports from others (Schneider & Schimmack, 2009) and provide insight into their own perspectives. Thus, it seems reasonable to use adolescents' own reports to examine personal experiences, including psychosocial maladjustment.

Third, although representative, our sample included only adolescents in Sweden. A small number of reviews show that Swedish adolescents are more likely to engage in self-harm (Muehlenkamp et al., 2012) than their European counterparts. Given these cultural variations, studies in other countries should be conducted to verify our findings. Further, given that our attrition analyses showed that adolescents who engage in self-harm were significantly likely to drop out of the study, future studies should replicate these findings. Last, gender was only measured as binary in our data. The traditional binary definition of gender is very reductive and does not account for people who do not fit neatly into the restrictive categories of males and females. Given that the recent literature has reported valuable insights on the association between impaired mental health (e.g., depression, anxiety; Gordon et al., 2017) or self-harm (Liu et al., 2019) and non-binary gender, further studies in this direction are needed.

Despite the limitations of this study, a few strengths are also worth mentioning. To our knowledge, this is the first study using longitudinal data to examine the role of organized sport activities on the occurrence of self-harm among adolescents. Compared to previous studies, this provided more robust evidence that organized sports could be a protective context. Also, this is the first study to explore mechanisms that could help explain how sports activities could reduce self-harm. In doing so, we provided empirical support for the Health through Sport model, which proposes that organized sport activities promote psychosocial well-being (Eime et al., 2013). Identifying mediational processes not only allows a more nuanced understanding of the benefits of organized sports, it also points to changes practitioners should look for when

recommending sports as a means of alleviating psychosocial distress.

4.2. Future directions and implications

In light of our results, we suggest both theoretical and applied directions for future research. Theoretically, our results are consistent with the premise that improved self-esteem is a mechanism that explains the link between sport participation and self-harm. Researchers could identify what aspects of organized sports prompt better self-esteem, so that adults working with youth could ensure these aspects are promoted. For example, it has been reported that having prosocial peers in the sports context explained the link between sports involvement and positive youth adjustment (e.g., Bruner et al., 2017; Holt et al., 2017). Although this assumes that adolescents are modelling their behavior on the basis of prosocial peers, there are other possibilities (e.g., being treated well by prosocial peers makes adolescents feel supported and enhances their well-being). Others have found that having supportive adult-leaders (e.g., coaches) links participation in extracurricular activities to PYD (Ferguson et al., 2019; Holt et al., 2017; Vella et al., 2011), such as reductions in youth's depressed mood (Mahoney et al., 2002). In a similar way, having prosocial peers or supportive activity leaders may improve youth's self-esteem, and, in turn, reduce youth's self-harm behavior. Examining these associations could offer further insight into how participation in organized activities, such as sports, could reduce self-harming behavior among adolescents.

Although similar benefits for depressive symptoms were not supported, we encourage more focus on how organized sports might reduce psychosocial complaints through promoting emotion regulation. This link has been suggested by others (Agans & Geldhof, 2012). Better emotion regulation would likely have a strong impact on self-harm, as research has shown that adolescents who engage in self-harm lack adaptive coping strategies to deal with negative emotions experienced as overwhelming (You et al., 2018). It is worth knowing what aspects of organized sports promote functional emotion regulation. One possibility, consistent with models of PYD (Deal et al., 2020; Lerner, 2005), is that in positive interactions with teammates and coaches, adolescents learn adaptive ways of dealing with stressful situations. Certainly, adolescents who are involved in sports experience both "victory and defeat," and the accompanying emotional highs and lows. It may also be that having others to share these experiences removes some of the "sting" of lows. All are worth examining.

In conclusion, our findings suggest that participating in organized sport activities could decrease self-harm through improving adolescents' self-worth. This is particularly encouraging for at least two reasons. First, they reinforce the idea that organized sport activities could, at least in part, represent a viable and economical avenue for prevention and intervention among adolescents. Second, they can be translated into practical considerations for teachers, sport coaches, and parents who put their daily efforts into promoting their pupils/children positive development.

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Declaration of competing interest

The authors do not see any conflict on ethical grounds.

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