

The connections between young people's mental health and sport participation: Scoping the evidence

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Executive summary

In this scoping review we focused on the role of sport and organised physical activity in helping to prevent and treat mental health problems in young people, particularly in the 14-25 age group.

The results suggested:

- There are positive associations between sport and organised activity and mental health outcomes for young people at all levels of intervention.
- The relationship is strongest for the use of sport to treat symptoms of clinical depression.
- Methodological shortfalls in the existing research mean we have limited understanding about the exact positive benefits. These may be pharmacological, social or behavioural.
- Benefits may vary by gender and for young people from particularly vulnerable or excluded groups.
- There is no 'one size fits all' recommendation. There are many ways in which participation in sport and organised exercise can vary, and the effects may be different for different groups of young people.

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Background

Intuitively it seems obvious that sport and organised physical activities should promote good mental health. Indeed, there is now a considerable literature suggesting a link between the two. Professional bodies such as the Royal College of Psychiatrists make it very clear in their advice to the public that keeping active is critical for lowering depression, feeling good about yourself, concentrating, focusing and sleeping better, and a range of other outcomes (Royal College of Psychiatrists, 2015; MIND 2015). Research has suggested that for depressed adults exercise is as good as drugs (Cooney et al, 2013).

It is less clear what the messages are for young people, for example those aged 14-25. This is a life stage that brings huge physical, psychological and behavioural changes.. In addition, there are a number of issues and questions concerning the evidence. Even for older adults it is not clear whether different kinds of sport are useful for different mental health problems. The factors that mediate the relationship between organised physical activity and mental health symptoms are poorly understood. Given the very different life stages that they are at, there are likely to be differences between the mechanisms and impacts of sport for adults versus young people in this age range. It is also important to understand the impact of gender and socioeconomic issues on participation and outcomes.

The most recent Cochrane review on the role of exercise in preventing and treating anxiety and depression in children and young people concluded that the research data are sparse and mostly collected from college students (Nordheim et al, 2010). However this was a fairly circumscribed exercise that relied on formal research trials and addressed a specific question. In addition it was not specifically focused on sport and organised physical activity, nor especially on our age group. Elsewhere there is evidence that sport is a significant part of the package for positive youth development for older teens (Holt 2008). In this scoping review we look at the full range of literature from preventing problems arising, promoting positive youth development, and treating problems once they exist. Separately we are complementing the results of this desk-based review by asking the views of young people, key stakeholders and providers about what they think works in the UK context.

Setting out the questions

What components of sport seem to be linked to good outcomes, and what do we know about the potential mechanisms?

Specifically:

- What do we know about the relationship between sport and mental health outcomes for young people aged 14-25 in the UK?
- Are there differences between using sport to prevent mental health problems, to promote resilience and wellbeing, or to treat existing mental health problems?
- What are the key components of sport and organised activities that have been linked to good outcomes for young people? And what do we know about the possible mechanisms?
- What kind of interventions should be encouraged, and how can we support their implementation?
- What kind of research do we need in the UK context if there are gaps in our knowledge?

Methods

Although the evidence on the associations between exercise and wellbeing is fairly well reviewed, less research directly addresses the relationship between young people's physical activity and mental health outcomes. We drew on existing reviews of the topic, searched electronic databases (e.g., MEDLINE, PubMed) and grey literature including policy reports, and consulted colleagues. We included all types of studies and took a broadly inclusive approach, with no time limit. Search terms included variations on 'adolescence', 'adolescent mental health', 'young people's mental health', 'exercise', 'sport' and 'mental health outcomes'. Preliminary findings from the review were discussed with a stakeholder group including representatives from academia, policy and practice, resulting in additional questions and new material for inclusion, and two focus groups with young people also fed into the direction of the review.

Key features of sport, organised physical activity and mental health

In this review our focus is on ***sport and organised physical activity***. According to the Council of Europe's European Sports Charter (1993), sport is all forms of physical activity that aim at expression or improving physical fitness and mental wellbeing, forming social relationships or obtaining results in competition. Within this broad definition, there are many different opinions as to what constitutes a sporting activity. For the purposes of this review we have defined sport as including individual or group activities with an element of competition and skill. Organised physical activity is a broader category that might involve exercise that is not competitive, such as social running clubs, but it still implies activities that are structured, repetitive and purposeful. This does not include exercise that happens as a by-product of everyday life, as doing chores or physical playing. The Chief Medical Officers' physical activity guidelines for children and young people (2011) suggest that all children and young people should engage in moderate to vigorous physical activity for at least 60 minutes per day, with vigorous intensity activities, including those that strengthen muscle and bone, being incorporated at least three days a week.

In searching the literature, we have concentrated on young people of secondary school age and older. In the USA, sports are the most popular organised activity among youth (Sabo and Veliz 2008). Rates of participation in sport are also high in the UK. Amongst young people aged 11-15 years, 95% report that they have taken part in sports in the last four weeks, the majority of which occurs at school (Department for Culture, Media and Sport, 2015). The proportion taking part in sport outside school is much smaller; around one third. The top activities for this age group include football, swimming, gym (gymnastics, trampolining etc), basketball and walking and hiking. Over one quarter of secondary school aged children (11-15) report that they have been a member of a formal club that plays sport. Any sport participation in the last four weeks falls to three quarters of the age group by age 16-24. It should be noted that these statistics represent the national average and that rates for young people in lower socio-economic (and other vulnerable) groups are likely to be considerably below the average.

There are many ways in which participation in sport and organised exercise can vary, and these may be significant when considering the benefits. For example, participation can vary according to the range of activities undertaken, the frequency or intensity of activities, and the length of involvement over time (Zarrett et al, 2009). Some young people may not participate often, but may have been doing a little for a long time. Others may have patches of more intense participation but then patches of inactivity. These dimensions need to be considered when we evaluate the outcomes of participation in sport.

By mental health we mean a broad range of disorders that affect thinking, feeling or mood, and have an impact on everyday functioning. Those most frequent problems for young people include anxiety and depression, eating disorders, conduct disorder (serious antisocial behaviour), substance use disorders, attention deficit and hyperactivity disorder (ADHD), and difficulties associated with the autistic spectrum disorders (Green et al, 2005). It has been estimated that three quarters of adult mental health disorders will be present before the age of 18 (Kim-Cohen et al, 2003), and so intervening in childhood and adolescence is critically important for preventing continuing problems in adulthood.

Associations between sport and organised physical activity and mental health outcomes for young people

Physical activity has been associated with a wide range of psychological benefits for young people. Associations between sport and physical activity and mental health outcomes for our age group have been considered in relation to preventing problems arising, promoting positive youth development, and using activity to treat pre-existing mental health conditions.

Preventing problems arising

As far as we are aware, there are no robust, experimental data on whether introducing exercise as a general population preventative intervention reduces the development of mental health symptoms in young people. But many researchers and commentators remain convinced there is a correlation. A number of studies show an association between exercise and lower levels of depression for young people, suggesting there may be a preventative effect. Parfitt et al (2009) found that active 9-10 year olds were less likely to suffer from depression, and Wiles et al (2012) reported participation in exercise in the ALSPAC ('Children of the 90s') study was associated with lower risk of depression in 14 year olds. Sibold et al (2015) reported that lower levels of physical activity were related to more severe measures of sadness and suicidality in adolescents. Some of these cross-sectional samples can be huge. In their study, Dinger et al (2013) report similar associations in a sample of 67,861 American college students, and Taliaferro et al (2010) do so for 43,499. There is also some evidence for what is known as a 'dose response' relationship; Rothon et al (2010) reported an association for secondary school pupils in an East London sample, where the likelihood of symptoms of depression decreased by 8% for every additional hour of exercise undertaken. In their review of reviews, Biddle and Asare (2011) concluded that there were associations with reduced depression and anxiety for adolescents but that the research designs were often weak and the size of the effect only small to moderate.

In one unusual longitudinal example, a Norwegian team studied 2,489 adolescents in schools in Oslo, assessing levels of physical activity at one point, and mental health (Strengths and Difficulties Questionnaire) three years later (Sagatun et al 2007). Adjustments were made for confounding variables such as mental health at baseline. An hour per week of physical activity at 15-16 years was

weakly associated with fewer mental health symptoms at three year follow-up. This still does not prove that introducing sports as a public health intervention would lead to a reduction in symptoms at a later stage, but it makes it more likely that it could.

Promoting positive youth development

Exercise has been associated with better self-rated health and higher life satisfaction in adolescents, particularly participation in team or individual sports for boys (Badura et al, 2015) and particularly in relation to self-concept, self-esteem and social competence (Donaldson and Ronan, 2006). It has been suggested, as a result, that participation, particularly in organised and team sports, may help young adolescents gain confidence and acquire social skills (Eime et al, 2013), potentially promoting resilience. In analysis of the Czech Republic Health Behaviour in School-aged Children study, Badura et al (2015) reported that participation in organised leisure-time activities (mainly sports) was associated with better self-rated health and higher life satisfaction.

But again, the studies drawing these conclusions tend to be cross-sectional and it is possible that more competent young people are drawn into competitive sport. Young people select themselves into positive youth development activities, or are selected in by sports coaches or managers, and thus may be a sample 'primed' to benefit. It is worth noting that children in the lowest income families are more likely to show 'low activity' levels (British Heart Foundation, 2015). They may not be able to take advantage of the opportunities and there may be additional challenges such as caring responsibilities, or prohibitive cost of equipment and travel. Promoting sport participation may be a route to improved life prospects. But this may require a particular, tailored coaching approach with socially vulnerable youth (Haudenhuyse et al (2012; Super et al 2014).

'Treating' mental health problems

There is a growing body of research on adults demonstrating that exercise may be effective at reducing symptoms of depression. (Craft and Perna 2004; Blumenthal et al 2007; Strohle, 2009; Trevidi et al 2011; Perraton et al 2010; Pinto Pereira et al, 2014;

Rosenbaum et al, 2015). If we only use data from the most rigorous randomised control trials the effect size becomes smaller (Cooney et al, 2013). A number of studies suggest exercise is as effective as psychological or pharmacological therapies (Cooney et al, 2013), which is a different point (effect sizes may be relatively small for all three types of intervention). In a widely cited study, Pinto Pereira et al (2014) found that taking up exercise led to a drop in adults' depression by 19% five years later. Studies of the effect of interventions on adolescent mental health symptoms are rarer. In their review of experimental studies, Brown et al (2013) concluded that physical activity had a small but statistically significant effect on depressive symptoms in children and young people aged 8 to 20 years, but placed a number of provisos around the conclusion to do with small effect sizes and the possibility that depression could have reduced anyway. A more focused review and meta-analysis, drawing on 11 randomized controlled trials with young people aged 13-17 years, concluded that physical exercise improved depressive symptoms in this age group, particularly in clinical samples, suggesting that it was a useful treatment strategy even though the effect was fairly small (Carter et al, 2016).

There are fewer data relating specifically to anxiety. Exercising regularly has been shown to reduce anxiety scores in adult patients with chronic illness (Herring et al 2010) and to reduce risk factors for the development of anxiety (Utschig et al, 2013), but again data on adolescents are rarer. Reviews have concluded that the research data are sparse, methodologically limited (Stonerock et al 2015), and mostly derived from college students who may not be representative (Nordheim et al, 2010). In a recent review of the effects of physical exercise on children with attention deficit disorder, Cerrillo-Urbina et al (2015) concluded that here short-term aerobic exercise might have a more significant effect on attention, hyperactivity and impulsivity, and they also noted a positive on anxiety.

Increasing exercise is not entirely risk free. The literature points to some risks that may be particularly salient for the adolescent and young adult age group. For example, negative effects may include associations with eating disorders, development of compulsive or addictive feelings, or risks of alcohol abuse in some particular competitive high-contact college sports (Bloodsworth et al, 2012; Klein et al, 2004; Veliz et al 2015). As usual it is difficult to determine causality but there is evidence that exercise dependence can be a reaction to an eating disorder, but does not cause the disorder in the first place (Bamber et al, 2003). There is also the risk of physical injury, which could then be associated with depressed mood. (and which may be a particular issue

during puberty and a period of fast growth (Michaud, Renaud and Narring, 2001).

As these results demonstrate, evidence varies on whether the associations indicate that sport can be used to preventing problems arising, to promoting positive youth development (ie, a more positive, resilience based approach), and to treat problems once they exist. We need to understand more about the mechanisms by which they might operate on mood and mental health.

What is it about sport and organised activities that conveys the benefit?

As we have seen, there are considerable shortfalls in the evidence base relating to causal links between exercise and mental health outcomes for adolescents and young adults. Overall effect sizes are very small because so many other things affect mental health. Sample sizes need to be large to avoid issues of clustering (if data are drawn from schools, for example). There is a real deficiency of longitudinal data, and far too much reliance on cross-sectional designs, even in studies that claim to be studying causality. Pickett et al (2012) for example, offers a multiple mediation analysis to study the relationship between physical activity and depression, but do so only with a sample of 164 participants completing a one-off postal questionnaire.

As with the whole of the positive youth development literature, there are issues of selection bias. Those more likely to have good health may be more likely to select themselves into positive activities. Indeed, deriving a sense of choice and agency from choosing an activity may be key part of the benefit for the young people. They may also be actively selected to represent schools or clubs. Competitive sport is not just about fun; it is also about performance.

Not only are some young people not opting in, they may face low mood as a result of being deselected, or not chosen for teams. It is also possible that depression leads to sports drop out and non-participation. Recent analyses of the 1958 birth cohort in the UK suggest the relationship between depression and exercise is bidirectional; taking up exercise led to a drop in depression by 19% five years later, but an increase in depression led to reduced exercise levels (Pinto Peirira et al 2014). The few longitudinal studies available indicate a complicated picture; Van Dijk et al, for example (2016) reported that a decline in physical

activity in adolescence was not associated with a corresponding decline in mental health.

However, there are hypotheses concerning the links between organised sport and benefits for mental health. Potential mechanisms that have been proposed include:

- **Pharmacological effects on the brain:** Exercise has extensive effects on metabolism, including on heart rate, breathing patterns, production of sweat and release of hormones. The physical changes affect the levels of certain brain chemicals such as dopamine and serotonin, both of which are associated with mood. Exercise may also promote brain growth and health in other ways, and may reduce harmful changes to the brain caused by stress hormones. Exercise enhances endorphins, natural chemicals that act like morphine, relieving pain and inducing euphoria. Any or all of these factors may account for some of the changes in mood. In addition, although levels of the 'stress hormone' cortisol rise during exercise because the body is being stressed, it has been suggested that regular training decreases the effect and may help with response to subsequent stress (Huang et al 2013; Hiller et al, 2011). It would be interesting to know if rhythmic activities such as running and swimming may have different physiological consequences than competitive sports such as football or netball in terms of managing moods and coping with stress.
- **Social effects.** Team sports seem to have particular associations with positive benefits for young people, and it has been suggested that there is something about the social nature of the participation that carries the benefit, over and above physiological consequences. The benefits may be quite subtle; even a lone runner may feel a positive connection and shared purpose with other runners. Positive effects may come from socialising or from other connections with adults and peers associated with the activity. There is a well-established literature on the general role of constructive community based activities in promoting social capital and wellbeing (eg, Putnam, 2001). As a result of their systematic review of the social benefits of sport, Eime et al (2013) recommended specifically that community sport participation is advocated as a form of leisure time activity for young people. Harvey et al (2010), in their study of 40,401 Norwegians, concluded that high

levels of social support and social engagement were important in explaining the relationship between physical activity and depression.

- **Behavioural associations:** The significance of exercise may simply be due to its relationship to other positive behaviours – eating differently, or sleeping better, for example. Physically active young people adopt other healthy behaviours, such as not smoking. In their huge study of American college students, Dinger et al (2013) found that meeting exercise recommendations was associated with adequate daily fruit and vegetable consumption, seatbelt use, abstaining from smoking, adequate sleep, lower binge drinking and less risk of multiple sexual partners. The link with wellbeing and mental health may be a consequence of the benefits of some of these other variables rather than just of exercise.

Finally, there are hints in the literature that different kinds of sport and organised activities may bring different benefits. Zarrett et al (2009) found that the benefits of sports' participation depended on the activities undertaken, the time spent on them and the duration of their participation. The literature does not answer the question about the role of competitiveness, or whether all the benefits to mental health can be attributed to actual physical activity and social contact. Some interesting studies have at least started to raise the question. In one review, Saeed et al (2010) looked at the association between high energy exercise or yoga in reducing symptoms of depression and anxiety and concluded that both have shown positive effects. However there were no effects for meditation, tai chi and qigong.

The importance of gender

There are also gender differences. Both sport and mental health show different patterns for young men versus young women. For example, girls' involvement in sport drops off much more markedly in adolescence than that of their male peers (Brooks et al, 2015). By age 13-15, only eight per cent of girls achieve one hour of exercise a day compared to 14% of boys (Craig and Mindell, 2012). While rates of walking and informal activity are broadly comparable for both genders, it is participation in formal exercise that drops away for the older girls (Health Survey for England, 2012). There is a longstanding literature on the gender differences, exploring the impact of puberty on participation in different activities (eg, Whittington et al, 2011; Jeanes, 2011; Hargreaves 1994). The recent Sport England 'This Girl Can' campaign (Sport England 2016) was designed to tackle some of these issues.

Mental health issues can also emerge at adolescence, and depression, social anxieties and eating disorders particularly affect girls. By adulthood, women are approximately twice as likely to have depression compared to men (Bebbington 1996). Age 15 is the point at which hospital admissions for eating disorders peak, and this predominately affects young women. Although young men are affected by depression and anxiety, they are more likely to have problems related to behaviour, including attention deficit and hyperactivity disorders.

Because of these differences, it may be that what works and does not work will vary by gender. For example, Badura et al (2015) reported that the relationship between organised activities and positive wellbeing varied by pattern of activity participation and gender. Team and individual sports were of benefit to boys, whilst girls benefited from creative activities.

Overall, the gender difference needs to be considered when proposing further research and drawing up recommendations.

The importance of equality of access and focus on vulnerable groups

Another consideration is the impact of economic hardship in restricting young people's access to organised exercise. Evidence suggests that people living in areas of economic deprivation are less likely to have equal access to environments that support physical activity, such as parks and gardens (Roberts et al 2013). There is a social gradient in sport participation, and low income is a barrier to exercise in men and women (Health Survey for England, 2008). In poorer areas, safety fears reduce use of local parks and sports facilities and parents are wary of allowing young people to attend clubs. Cost is also a deterrent to participation (Edwards et al, 2014).

Young people may be disadvantaged in other ways. Lesbian, gay, bisexual and transsexual young people may find sport a particular challenge due to homophobic abuse. Physical education classes have been cited as having higher levels of verbal and physical abuse than other settings (Symons et al, 2014). Disability is another barrier (eg, Fitzgerald, 2009) and some young people may have multiple disadvantages affecting their participation in sport. The need for particular kit and regular attendance or the requirement to stick to rules and regulations may not suit some young people.

Many of the vulnerabilities that may create issues in access to organised sport are also issues that correlate with mental health challenges such as anxiety and depression, making access to sport both more difficult but also even more important. Vulnerabilities may also be particularly salient at certain life stages such as the transition into secondary school, transitions out of secondary school or into further or higher education.

The research literature does not shed a great deal of light on these issues, especially if we restrict our focus to young people rather than adults. In addition, it is important to talk to young people facing different issues to discover what sport means to them and to test different approaches to meet their needs. Interventions to increase disadvantaged groups' access to green spaces must take into account local needs and cultures to work effectively and to have clear objectives and strong targeting, if they are not to misfire (Buck and Gregory 2013).

Conclusions

Most of the data point to a positive relationship between sport or organised activity and positive mental health outcomes for young people. Potential benefits range from preventing problems arising and promoting positive youth development, to treating problems once they exist. There are plenty of indications that sport may work in a positive way for this age group. The results are strongest for the use of sport to treat clinical depression. Providing evidence of its effectiveness in treating other disorders, or preventing development of mental health problems in the general population of young people has proved more difficult.

Because of methodological limitations in the available research, "positive but limited" seems to be the fairest description of the data. It is not possible to conclusively state that sport and organised exercise carry clear positive effects on mental health for 14-25 year olds across the board, but this is mainly because of an absence of longitudinal studies testing causality, and selection bias in many of the research examples. In addition, a number of key questions have not been fully addressed. For example, it is particularly important to calculate the role of participation in organised activities and whether informal sport has the same effect, and to establish what it is about the social aspects of sport that are may carry the benefit. We also need more information on the role of gender or marginalisation on participation.

It seems unlikely that there will be a 'one size fits all' solution. The category of organised sport and exercise is a broad one, and young people bring all sorts of expectations, strengths and weaknesses with them that may affect the outcomes. We also need more information on the role of quality and coaching in organised activities. There are also interesting questions around the combination of talking therapies and physical activity as part of a broader, integrated health and wellbeing offer, or the use of physical activity opportunities while waiting for therapy, but as far as we know there is no evidence on this topic for this age group.

However, it is important to note that there is little evidence that sport will have a negative effect on mental health in 14-25 year olds. The exception is that it may encourage alcohol use in very competitive American college students and that particular care should be taken with those with pre-existing eating disorders.

As Fischer et al note (2013), when there are small individual level benefits delivered to large populations, the classic randomised control model for testing clinical interventions is impractical as huge numbers will be necessary for sufficient statistical power. As a result, the evidence base for many public health interventions is weak. They suggest that key considerations are (1) is there evidence that the intervention does harm? (2) If so, does the evidence suggest that the intervention, on balance, does more good than harm? On this basis, the use of sport and organised exercise to promote better mental health for young people is recommended.

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More information

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