

The benefits of sport participation and physical activity in schools

A final report for the Youth Sport Trust and HMC (The Head's Conference)

Prepared by Dr Andrew Denovan and Dr Neil Dagnall of Manchester Metropolitan University

Executive Summary

Prior research documents that sport participation among secondary school children is associated with various benefits, including enhanced physical, cognitive, behavioural, social, and educational performance. However, only a relatively small number of studies have directly examined the relationship between sport participation and wellbeing in schools. Noting this, and previous academic work on participation in physical activity and sport, mental toughness, and wellbeing, the present project investigated relationships between these factors and allied psycho-social benefits (i.e., sense of school belonging, identity). These variables were selected because they were mutually beneficial, that is, they potentially strengthen relationships between pupils, school, and educational motivation/potential success. The project focused on a critically important year group: Year 9 (13 to 14 years, Key Stage 3) and Year 10 (14 to 15 years, Key Stage 4). The project objectives were to assess the impact of participation in sports upon belonging and wellbeing among Year 9 and 10 secondary school students (factoring in gender), and to scrutinise the role of hypothetically important factors to this relationship, namely mental toughness, and self-efficacy/self-belief. A total of 5481 pupils (2578 girls, 2727 boys, 83 preferred to self-describe, 93 preferred not to say) from 80 schools (61 private/independent, 19 state) took part. There were 2957 Year 9, and 2524 Year 10 pupils. Pupils completed a range of online questionnaires, focusing on sports participation and physical activity, mental toughness, self-efficacy, and wellbeing indicators (social identity, belonging, life satisfaction, and self-rated happiness). For analysis purposes, a sports index was created as a composite of sports participation, involvement, and perceived importance. Analysis progressed through several stages. Initially, mean differences were investigated relating to the sports index as a function of year group and gender (boys vs. girls). Subsequently, mean differences concerning wellbeing indicators relative to year group and gender were examined. The next stage of analysis tested a statistical model, which assessed whether the sports index predicted wellbeing and the degree to which non-cognitive skills (mental toughness and self-efficacy) were important variables in this relationship. Scrutiny of non-cognitive skills focused on indirect associations to reveal if the presence of these increased the sports index – wellbeing relationship. Findings demonstrated that sports participation was lower in Year 10 than in Year 9, with girls participating less than boys in Year 10. Wellbeing was also lower in Year 10 (vs. Year 9), and girls in Year 10 reported significantly lower wellbeing than boys. The statistical model indicated that the sports index was a significant predictor of mental toughness, self-efficacy, and wellbeing. Mental toughness and self-efficacy were significant positive ‘mediators’ of the sports index – wellbeing relationship, and greater indirect associations occurred via mental toughness. Subsequent analysis revealed that girls reported significantly lower mental toughness and self-efficacy than boys, and mental toughness scores were meaningfully lower in Year 10 (vs. Year 9). Results overall indicated that Year 10 pupils (in comparison with Year 9) scored lower on sports participation, wellbeing, and non-cognitive skills. Effects were greater for girls (vs. boys). It is concerning that wellbeing and sports participation were lower in Year 10, and this could be a function of the increased demands at Key Stage 4. Moreover, lower participation and wellbeing for girls corroborates the research documenting these trends. However, evidence from the statistical model suggested that sports participation is predictive of greater wellbeing, which is strengthened by sports participation being related with the acquisition of a confident, mental toughness mindset, which in turn can facilitate positive mental health. Therefore, this project offers strong evidence concerning the potential benefit of sports participation in secondary school at a critical stage of students’ education, and it would be significant for schools to continue to promote sports participation among later year groups (i.e., Year 10 and 11).

Introduction

General Background

Participation in school sport plays a positive role in youth development. This is true across physical, lifestyle, affective, social, and cognitive domains (Bailey, 2006; Oberle et al., 2019). Specific benefits are improved physical state (i.e., fitness, health, and coordination), and enhanced cognitive functioning (Mualem et al., 2018). Indeed, a review of literature undertaken by Stead and Nevill (2010) for the Institute of Youth Sport, concluded that academic achievement was maintained or boosted by increased regular sport and/or physical activity. In schools, this occurred when a significant proportion of curricular time (up to an extra hour per day) was allocated to physical education, exercise, or sport. Moreover, break times that facilitated physical activity improved classroom behaviour. However, it was noted that the existence of a causal effect was only demonstrated via a handful of well-controlled longitudinal studies. Indeed, many studies reporting links between sport/physical activity and academic achievement suffered from limitations involving lack of participant randomisation and methodological bias (e.g., academic performance results derived from subjective grading used by teachers).

Stead and Nevill (2010) also found that physical activity was positively associated with good mental health (i.e., emotional wellbeing, self-esteem, spirituality, and future expectations). Other psychological benefits allied to physical activity were improved affective state (e.g., reduced anxiety, and depression). Furthermore, participation in organised sport was associated with behavioural gains. These included lower rates of anti-social behaviour, better school attendance, and higher attainment. Collectively, the review determined that in addition to being associated with positive psychological, social, and behavioural outcomes, physical activity and sport participation within schools constructively influenced life perspective (i.e., helped pupils to connect with their school, facilitated their ambitions, enhanced social interactions, and encouraged the development of citizenship and leadership skills).

These findings aligned with general conclusions derived from related literature reviews (Moxon et al., 2019). Particularly, they were consistent with the notion that moderate levels of physical activity have a beneficial effect on psychological wellbeing. Psychological wellbeing is a core feature of mental health, which includes hedonic (enjoyment, pleasure) and eudaimonic (fulfilment, meaning) happiness and resilience (emotion regulation, coping, healthy problem solving) (Tang et al., 2019). Examples of objective indicators of wellbeing are educational status, environment, community, and economy. Subjective wellbeing is measured by assessing how individuals feel about life and is indicated by positive emotions/thoughts and the absence of negative affect (Trudel-Fitzgerald et al., 2019). Relatedly, Moxon et al. (2019) reported that moderate levels of physical activity were associated with higher levels of self-esteem, positive self-perception, cognitive function, and psychological adjustment, and reduced negative responses (i.e., stress reactivity, reduce anxiety moderate depression, and mood).

Despite research consistently linking physical activity to positive outcomes, only a relatively small number of studies have directly examined the relationship between physical activity and wellbeing in schools (Moxon et al., 2019). While this is surprising because the psychological welfare of students is a crucial issue for both education providers and government policy, the lack of research is understandable from a pragmatic and logistical perspective. Schools have resource constraints (time, finances, staffing, etc.) that limit their focus to priorities such as delivery, progression, and attainment. Nonetheless, the achievement of high levels of

psychological wellbeing within pupils is imperative because the absence of mental health issues and distress reflect contentment with the learning environment. Thus, even though there is limited conclusive evidence of a direct relationship between physical activity and academic performance, pupil wellbeing is of vital importance (Biddle & Asare, 2011; Booth et al., 2014).

Specific research

A recent report for HMC (The Head's Conference) by Professor Peter Clough (Clough, 2019) and an accompanying article by Moxon et al. (2019) further contextualised the link between school sport and physical activity to academic attainment and wellbeing. Moxon et al. (2019) sampled 1,482 Year 12 students (16–17 years) from independent schools and found that involvement in school sport was associated with higher levels of wellbeing and mental toughness and had no negative impact on academic achievement. In this context, wellbeing refers to affirming subjective judgments about life satisfaction and feelings of accomplishment. Hence, high levels of wellbeing indicate psychological happiness/health and wellness. Accordingly, high levels of mental toughness can facilitate/reflect positive mental health (Lin et al., 2017). Particularly, higher levels of mental toughness denote possession of efficacious psychological attributes such as self-belief, persistence, control, and effective mental skills (Perry et al., 2021), which are complemented by values, attitudes, emotions, and thoughts that assist goal achievement (Drinkwater et al., 2019).

Theorists regard these resources as non-cognitive because they draw upon facilities that are not directly related to intellectual capacity, particularly comprise a range of intrapersonal (motivations, learning strategies, and self-regulation) and interpersonal (interactions with others) attributes. Commensurate with this conceptualisation, possession of mental toughness within educational contexts aids achievement across a range of outcome measures (Clough et al., 2016). This is likely because mental toughness promotes adaptive responses to the type of demanding situations and events encountered within real-world settings (Dagnall et al., 2021).

The role of non-cognitive skills: mental toughness and self-efficacy

Accordingly, higher levels of mental toughness enable the ability to withstand and recover from adversity, and cope with the pressures of success and achievement. Corresponding with this classification, key features of mental toughness are the capacity to effectively manage stress and perceive demanding circumstances as opportunities for self-development.

Hence, mental toughness manifests as the capacity to thrive in difficult situations and manage adversity (i.e., actively approach, respond to, and appraise demanding conditions). Thus, in a practical setting such as education, mental toughness is as an adaptive psychological resource, which moderates the adverse consequences of pressure by mobilizing positive action and facilitating effective rebalancing following failure (Zalewska et al., 2019). Hence, high mental toughness is linked with psychological benefits such as stress resistance and reduced depression (Mojtahedi et al., 2021). This explains why higher levels of mental toughness can aid academic performance.

Noting these attributes, Gerber et al. (2012) examined differences in the mental toughness of adolescents and young adults as a function of self-reported exercise, physical activity, and recommended levels of physical activity. Individuals who fulfilled current physical activity recommendations reported elevated mental toughness scores compared to those who did not. This indicated that sport, physical activity, and exercise encouraged the acquisition of a mental toughness mindset, which in turn facilitated positive mental health. These studies demonstrated that sports participation in schools was inextricably linked to positive wellbeing and higher

levels of mental toughness. Mental toughness was beneficial because it protects against the negative effects of life pressures and increases attributes that aid academic success (Stamp et al., 2015). These are highlighted within the four Cs model, which view mental toughness as four related dimensions encompassing Challenge, Commitment, Control, and Confidence (Clough et al., 2002).

Although, limited evidence supports a direct link between participation in physical activity and academic performance in schools (Stead & Nevill, 2010), it is likely that these factors have indirect effects on scholarly endeavour and achievement (Clough et al., 2016). Students low on Commitment will be prone to distractions and accordingly find it difficult to complete tasks such as school projects and assignments. Furthermore, they may lack perseverance when confronted by obstacles. Similarly, students scoring low on Challenge may become psychologically overwhelmed by difficulties. Particularly, lack of stability and unpredictability will prove uncomfortable, and overload capacity to cope. This can express as a focus on the detrimental consequences of change and a reluctance to adapt. Potentially, this can result in failure to appreciate developmental opportunities. Over time, pupils low in Challenge will perceive sustained pressure as wearisome and become risk averse. This may mean they become unwilling to explore learning possibilities. Students scoring low on Confidence generally lack self-belief. This can display as an overreliance on others, and a reluctance to assume responsibility/show initiative. Low self-assurance often presents as concerns about capability, excessive worry, and the tendency to underestimate skills, knowledge, abilities, and personal importance. Finally, low levels of Control indicate perceived lack of volition, autonomy, and impact, which can result in a sense of powerlessness. Consequently, students are likely to feel unable to meaningfully influence factors. Relatedly, they may apply themselves to tasks haphazardly; devoting unnecessary effort and resources to aspects outside of their influence, and too quickly withdraw from matters they could affect.

Self-efficacy designates belief in capability to attain desired goals and is also an important stress management resource (Bandura, 1997; Livinți et al., 2021). While mental toughness and self-efficacy are overlapping constructs, they are psychometrically distinct (Denovan et al., 2022). Consistent with this delineation, Nicholls et al. (2015) postulated that mental toughness sustains and/or enhances self-belief in challenging situations (i.e., when tasks are unfulfilling or stressful). This view is consistent with studies that report that mental toughness is associated with strong belief in ability (Clough et al., 2002; Gucciardi et al., 2008).

Belonging

In addition to engagement with sport being beneficial, transition from non-participation to sports and activity is also associated with positive mental health (Oberle et al., 2009). This is especially true when accompanied by enhanced sense of belonging. Research directs that belonging has an important effect on life satisfaction, general wellbeing, clinical depression, cognitive performance, academic outcomes, and physical health (Allen & Bowles, 2012). In education, Libbey (2007) describes belonging as the process whereby students feel close to and are content at school. This includes perceiving that the school provides a safe environment, where teachers care about students, interact with pupils effectively, and treat them well. From this perspective, belonging is related to connectedness. A fundamental element of social connectedness is sense of togetherness with school and peers, and the absence of perceived social distance and isolation (Hurem et al., 2021). Hence, a strong sense of connectedness improves appreciation of the learning environment and positively influences student wellbeing (Hendrickson et al., 2011).

Other definitions of belonging include important concepts as student engagement (Finn, 1993) and social identity (Tajfel, 1972). Engagement denotes the degree to which students are actively involved in their educational institution and scholarly activities. Social identity refers to the individual's sense of who they are based on their group membership(s). In the case of students, higher belonging produces closer alignment between their personal identity (us) and their institution (them). This facilitates important educational facets such as interest, investment, and sense of reciprocal worth. More generally, belonging positively affects key factors that contribute to our overall health and wellbeing (Haslam et al., 2009).

From this perspective, participation in sport within school and physical activity can nurture pupil sense of belonging and community. Particularly, allowing students to engage in activities aligns individual perceptions ('I') with peers and school ('them') so that they become shared ('we'). Consistent with this notion, social identity theory observes that self-concept derives from membership of social groups. Social identity being the part of an individual's self-concept derived from perceived group membership. Hence, being a member of an in-group as defined by shared identity (e.g., school club or team), has a positive influence on perceptions of fellow participants and related constructs such as school. Moreover, the mental health benefits associated with participation in organized sports may vary according to levels of social identification, with the relationship being stronger among those with higher levels of social (sense of common purpose).

The present project

Despite previous research robustly reporting that participation in physical activity and sport play a positive role in youth development, there is currently a shortage of projects that have examined the underlying psychological processes that account for this association (Oberle et al., 2019). Noting this, and previous academic work on participation in physical activity and sport, mental toughness, and wellbeing, the present project investigated relationships between these factors and allied psycho-social benefits (i.e., sense of school belonging, identity, and self-efficacy). These variables were selected because they were mutually beneficial, that is, they strengthen relationships between pupils, school, and educational motivation/potential success. The project focused on Year 9 (13 to 14 years, Key Stage 3) and Year 10 (14 to 15 years, Key Stage 4) pupils. This period was selected because it spanned the shift in educational focus from compulsory and optional subjects (Year 9) to GCSE courses and the attainment of formal qualifications (Year 10). The transition from Key Stage 3 to 4 is demanding for both students and schools. Acknowledging this, participation in sport and physical activity during this period is likely to change as a function of contextual pressures (e.g., less perceived spare time and increased scholarly focus). Gender was additionally considered, due to frequently reported variations in sports participation between UK secondary school girls and boys (i.e., girls typically report lower participation) (Evans, 2006).

Considering these factors in combination, pupils who participate in physical activity and sport should have higher levels of mental toughness and wellbeing. These will manifest as a positive mindset that facilitates efficacious behaviours and enables educational performance and opportunities with school. This should encourage a sense of belonging to the school and reciprocally increase levels of educational involvement and engagement.

One way to assess this is by examining the effects that participation in sport and physical activity at school, mental toughness, self-efficacy has on wellbeing and belonging. Self-efficacy refers to the degree to which individuals believe in their capabilities to produce designated levels of performance that exercise influence over events that affect their lives

(Bandura, 1995). Self-efficacy is important because it determines personal feelings, thoughts, motivations, and behaviour.

Objectives

The objectives of the project were to:

- Assess the impact of participation in sports upon belonging and wellbeing among Year 9 and 10 secondary school students.
- Scrutinise the role of hypothetically important factors to this relationship, namely mental toughness, and self-efficacy/self-belief.

Research Methodology

Participants

Overall, 5481 secondary school pupils (2578 girls, 2727 boys, 83 preferred to self-describe, 93 preferred not to say) from 80 schools (61 private/independent, 19 state) participated in this study. There were 2957 Year 9 pupils (aged between 13-14; 1369 girls, 1496 boys, 41 preferred to self-describe, 51 preferred not to say), and 2524 Year 10 pupils (aged between 14-15; 1209 girls, 1231 boys, 42 preferred to self-describe, 42 preferred not to say).

Statistical analyses excluded categories with low response rates (i.e., ‘preferred to self-describe’ and ‘preferred not to say’) since these weaken comparisons with more larger categories (i.e., girls and boys). A final sample of 5305 existed.

Measures

Sports participation and physical activity

Sports participation was measured by asking pupils questions about their involvement at school. They indicated the number of sports they had participated in over the last 12 months by selecting from a list of fourteen sports (e.g., football, netball, badminton). Then using five-point Likert type scales, participants indicated their level of involvement in secondary school sports (1 not involved at all to 5 extremely involved) and how important they perceived sports at secondary school to be (1 not important at all to 5 extremely important).

Measurement of physical activity used a single item similar to the approach used by Sport England (2019). This asked pupils how often in the past week they had participated in 60 minutes or more of physical activity. Response options ranged from no days to seven days.

Non-cognitive skills (mental toughness and self-efficacy) and wellbeing (social identity, belonging, life satisfaction, and self-rated happiness)

Non-cognitive skills (mental toughness and self-efficacy) and wellbeing (social identity, belonging, life satisfaction, and self-rated happiness) were assessed using established, psychometrically validated instruments.

Non-cognitive Skills

The 10-item Mental Toughness Questionnaire (Dagnall et al., 2019) captured mental toughness using a response scale from 1 (strongly disagree) to 5 (strongly agree). Self-efficacy was assessed via the 3-item General Self-Efficacy Short Scale (Beierlein et al., 2013). Similarly, this also used a 5-point response format, from ‘does not apply at all’ to ‘applies completely’.

Wellbeing

Indicators of wellbeing included social identity, belonging, life satisfaction, and self-rated happiness. The In-Group Identification Scale (Postmes et al., 2013) captured social identity with a single item with a response scale of 1 (fully disagree) to 7 (fully agree). Sense of Belonging Scale (Anderson-Butcher & Conroy, 2002) measured belonging with five items, and a response format from 1 (strongly disagree) to 5 (strongly agree). The Satisfaction with Life Scale (Diener et al., 1985) assessed how satisfied participants were with their lives with five items and 1 (strongly disagree) to 7 (strongly agree) response options. Self-rated happiness used a single item, and an accompanying response scale from 1 (not at all happy) to 10 (completely happy), similar to Sport England (2019).

Procedure

Data were collected using an online survey (see Appendix 1 for the questionnaires that were used). This was distributed via schools to pupils in accordance with ethical protocols (i.e., school consent, parental consent, and assent from the pupils prior to survey completion). Following completion of the survey, participants were debriefed after taking part. Ethical approval was granted by the Manchester Metropolitan University.

Results

Descriptive statistics were computed for sports participation and physical activity. Regarding, sports participation (see table 1), the most frequently participated in sport was football ($n = 3251$) and the least was Trampolining ($n = 605$). Other sports ($n = 1810$) encompassed a range of activities (i.e., dancing, lacrosse, rowing, squash, table tennis, and volleyball). For physical activity, 97% of pupils engaged in at least 60 minutes of physical activity in the previous week that made them feel warmer and encouraged their heart to beat faster. Of the pupils engaging in physical activity, the majority (51%) participated between three and five days (1 day = 6%, 2 days = 13%, 3 days = 17%, 4 days = 17%, 5 days = 18%, 6 days = 13%, and 7 days = 13%).

Table 1. Number of sports participated in within the last 12 months ($N = 5305$)

Sports participation in the last 12 months	Frequency	% of total sample
Football	3251	61.3
Running/jogging/cross-country/daily mile	2844	53.6
Badminton	2817	53.1
Cricket	2523	47.6
Hockey	2507	47.3
Basketball	2319	43.7
Netball	2255	42.5
Track and field athletics	2154	40.6
Tennis	2083	39.3
Rugby	1986	37.4
Swimming/diving/water polo	1953	36.8
Other sports	1810	34.1
Rounders	1255	23.7
Gymnastics	705	13.3
Trampolining	605	11.4

Relationships

Sports participation and physical activity

To ensure that a breadth of sports participation was sampled a general index was created by combining frequency, level of involvement and perceived importance. This approach was adapted from Richman and Shaffer (2000) because it allowed the researchers to assess a broad range of sports participation related measures. Prior to amalgamation, relationships between frequency, level of involvement and perceived importance were assessed using correlation. All sports participation measures correlated positively: frequency and involvement, $r = .21$, $p < .001$; frequency and perceived importance, $r = .19$, $p < .001$; and involvement and perceived importance, $r = .73$, $p < .001$. The strength of these relationships is best quantified using effect sizes recommended by Gignac and Szodorai (2016) (i.e., .10, relatively small; .20, typical; and .30, relatively large).

Though the measures of sports were positively correlated, the observed relationships shared only 4.4%, 3.6%, and 53% respectively. This indicated that combining the measures was appropriate since they assessed related but distinct aspects of sports participation. The sports participation index correlated positively with physical activity, $r = .45$, $p < .001$ (relatively large effect). This suggested that there was a strong association between sports participation in schools and physical activity inside and outside of schools; as sports participation increased so did levels of physical activity. Subsequent inferential statistical analysis used the sports participation index because this was a school facing measure, whereas physical activity was a specific indicator of exercise intensity.

Sports participation index, non-cognitive skills, and wellbeing

Sports participation index, non-cognitive skills, and wellbeing were positively related (see table 2 for means, standard deviations, and correlations). Explicitly, the sports participation index correlated with non-cognitive skills (mental toughness and self-efficacy) and wellbeing (social identity, belonging, life satisfaction, and happiness). Relationships ranged from .16 (happiness) to .27 (self-efficacy) (these were in the typical range). Non-cognitive skills of mental toughness and self-efficacy were highly correlated (.60).

Wellbeing measures (social identity, belonging, life satisfaction, and happiness) were strongly associated, inter-correlations were large and ranged from .37 to .73. Finally, non-cognitive skills were strongly related to wellbeing measures, correlations ranged from .33 to .55. Mental toughness and self-efficacy were similarly related to wellbeing measures.

Table 2. Descriptive statistics and correlations among all variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Sports index	13.15	3.74							
2. Mental toughness	32.29	6.65	.26**						
3. Self-efficacy	10.91	2.34	.27**	.60**					
4. Social identity	4.54	1.65	.26**	.39**	.36**				
5. Belonging	19.20	4.21	.25**	.47**	.41**	.73**			
6. Life satisfaction	24.40	6.57	.20**	.55**	.43**	.47**	.58**		
7. Self-rated happiness	6.44	2.30	.16**	.49**	.33**	.37**	.45**	.56**	

Note. Raw average scores are displayed across variables; ** $p < .05$; *** $p < .001$

Inferential statistics: Analytical strategy

Inferential analysis progressed through three distinct stages:

The effects of year (9 vs. 10) and gender differences (boys vs. girls) on sports participation were examined using Analysis of Variance (ANOVA), which is a statistical procedure that compares mean (average) group differences. Effects of year (9 vs. 10) and gender differences (boys vs. girls) on measures of wellbeing (social identity, belonging, life satisfaction, and happiness) were investigated using multivariate analysis of variance (MANOVA). MANOVA is a procedure for comparing sample means, it is used when there are two or more outcome measures.

Finally, a statistical model based on the project objectives was tested. This assessed whether sports participation predicted wellbeing. This also examined whether non-cognitive skills (mental toughness and self-efficacy) were important variables. Mediation (using path analysis) enabled consideration of direct (between sports participation and non-cognitive skills) and indirect relationships (sports participation and wellbeing through mental toughness and self-efficacy). Mediation identifies the process that underlies an observed relationship between two variables by evaluating the contribution of a third variable.

The degree to which the model provided a good fit to observed data was determined by fit indices. Specifically, chi-square (χ^2), confirmatory fit index (CFI), root-mean-square error of approximation (RMSEA), and standardised root-mean-square residual (SRMR). Values of CFI $> .90$, SRMR $< .08$, and RMSEA $< .08$ reflect a good model (Browne & Cudeck 1993). Indirect relationships were computed using 95% bias-corrected confidence intervals (resampled 1000 times with bootstrapping).

Tests of difference

Effects of year and gender differences on sports participation index

ANOVA revealed a significant main effect for school year on sports participation index, $F(1, 5301) = 96.58, p < .001, \eta^2 = .02$ (small effect), and a significant school year x gender interaction, $F(1, 5301) = 5.22, p = .022, \eta^2 = .01$ (small effect). The gender main effect was not significant, $F(1, 5301) = 1.15, p = .284$.

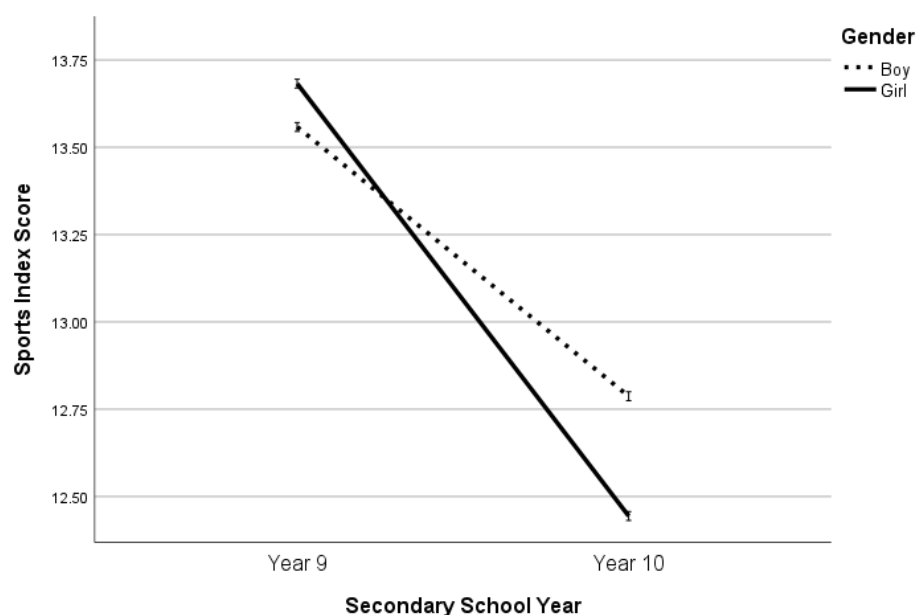


Figure 1. Interaction of Secondary School Year and Gender in relation to Sports Index Scores

With ANOVA if a significant interaction is observed it is necessary to ignore significant main effects and conduct further analysis (post-hoc). This is because differences arise from the contribution of two variables in combination (i.e., year and gender). Figure 1 displays this interaction.

Post-hoc comparisons (with Bonferroni correction) revealed that sports participation scores were similar for boys and girls in the Year 9 cohort. In the Year 10 (vs. Year 9) cohort both boys and girls scored lower. Boys in Year 10 scored higher than girls; meaning the difference (Year 9 vs. Year 10) for boys was less than for girls. Table 3 displays mean variations as a function of year and gender.

Effects of year and gender differences on measures of wellbeing

MANOVA (assessing well-being indicators) reported significant main effects of school year, Wilks' $\lambda = .99$, $F(4, 5298) = 6.01$, $p < .001$, $\eta^2 = .01$ (small effect), and gender, Wilks' $\lambda = .96$, $F(4, 5298) = 50.04$, $p < .001$, $\eta^2 = .04$ (large effect). No significant interaction existed. This indicated that Year 9 and Year 10 pupils differed in terms of scores on wellbeing indicators, and that girls and boys also differed in their scores. However, the lack of an interaction implied that these differences did not occur due to any shared link between school year and gender.

Table 3. Descriptive statistics for all variables relating to School Year and Gender

Variable	Year	Gender				Overall	
		Male <i>M</i>	<i>SD</i>	Female <i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Sports Participation Index	9	13.55	3.53	13.68	3.76	13.61	3.64
	10	12.78	3.69	12.44	3.86	12.61	3.78
	Overall	13.21	3.62	13.10	3.86	13.15	3.74
Mental toughness	9	34.22	6.25	30.58	6.64	32.48	6.69
	10	34.15	6.18	29.95	6.35	32.07	6.60
	Overall	34.19	6.22	30.28	6.51	32.29	6.65
Self-efficacy	9	11.36	2.20	10.48	2.38	10.94	2.33
	10	11.30	2.25	10.45	2.36	10.88	2.34
	Overall	11.33	2.23	10.46	2.37	10.91	2.34
Social identity	9	4.83	1.62	4.37	1.63	4.61	1.64
	10	4.64	1.65	4.28	1.66	4.46	1.66
	Overall	4.74	1.64	4.33	1.64	4.54	1.65
Belonging	9	19.94	4.01	18.72	4.16	19.36	4.12
	10	19.50	4.26	18.52	4.29	19.02	4.30
	Overall	19.75	4.12	18.63	4.22	19.20	4.21
Life satisfaction	9	25.71	6.18	23.77	6.74	24.78	6.52
	10	24.63	6.55	23.25	6.57	23.95	6.60
	Overall	25.22	6.37	23.53	6.66	24.40	6.57
Self-rated happiness	9	6.96	2.11	6.11	2.36	6.56	2.27
	10	6.71	2.29	5.90	2.29	6.31	2.33
	Overall	6.85	2.20	6.01	2.33	6.44	2.30

Note. *M* = mean score, *SD* = standard deviation

Univariate analyses demonstrated that Year 10 reported significantly lower results than Year 9 on social identity, $F(1, 5301) = 10.02$, $p = .002$, $\eta^2 = .01$ (small effect), belonging, $F(1,$

5301) = 7.65, $p = .006$, $\eta^2 = .01$ (small effect), life satisfaction, $F(1, 5301) = 19.83$, $p < .001$, $\eta^2 = .01$ (small effect), and self-rated happiness, $F(1, 5301) = 13.82$, $p < .001$, $\eta^2 = .01$ (small effect). Moreover, girls reported significantly lower results than boys on social identity, $F(1, 5301) = 82.49$, $p < .001$, $\eta^2 = .02$ (small effect), belonging, $F(1, 5301) = 91.86$, $p < .001$, $\eta^2 = .02$ (small effect), life satisfaction, $F(1, 5301) = 85.62$, $p < .001$, $\eta^2 = .02$ (small effect), and self-rated happiness, $F(1, 5301) = 176.23$, $p < .001$, $\eta^2 = .03$ (small effect).

Specifically, Year 10 pupils scored meaningfully lower than Year 9 pupils on the wellbeing indicators, and girls scored meaningfully lower than boys on the indicators.

Model evaluation

The mediation model (Figure 2) demonstrated good fit to the data, $\chi^2(4, N = 5305) = 135.51$, $p < .001$, CFI = .99, RMSEA = .07 (90% of CI of .06 to .09), SRMR = .03. Sports index was a significant predictor of higher mental toughness ($\beta = .26$, $p < .001$) and self-efficacy ($\beta = .27$, $p < .001$). Mental toughness and self-efficacy significantly predicted higher levels of social identity ($\beta = .28$, $p < .001$ and $\beta = .19$, $p < .001$), belonging ($\beta = .35$, $p < .001$ and $\beta = .20$, $p < .001$), life satisfaction ($\beta = .45$, $p < .001$ and $\beta = .16$, $p < .001$), and self-rated happiness ($\beta = .45$, $p < .001$ and $\beta = .06$, $p < .001$). These findings revealed that as sports index scores increased, mental toughness and self-efficacy also meaningfully increased as a function of the sports index increases. Moreover, the results indicate the strength of the predictive relationship between the variables. For instance, .27 between sports index and self-efficacy suggests that as sports index goes up by one unit/standard deviation, self-efficacy increases by .27. The results also specified that as mental toughness and self-efficacy increased, wellbeing indicators also meaningfully increased.

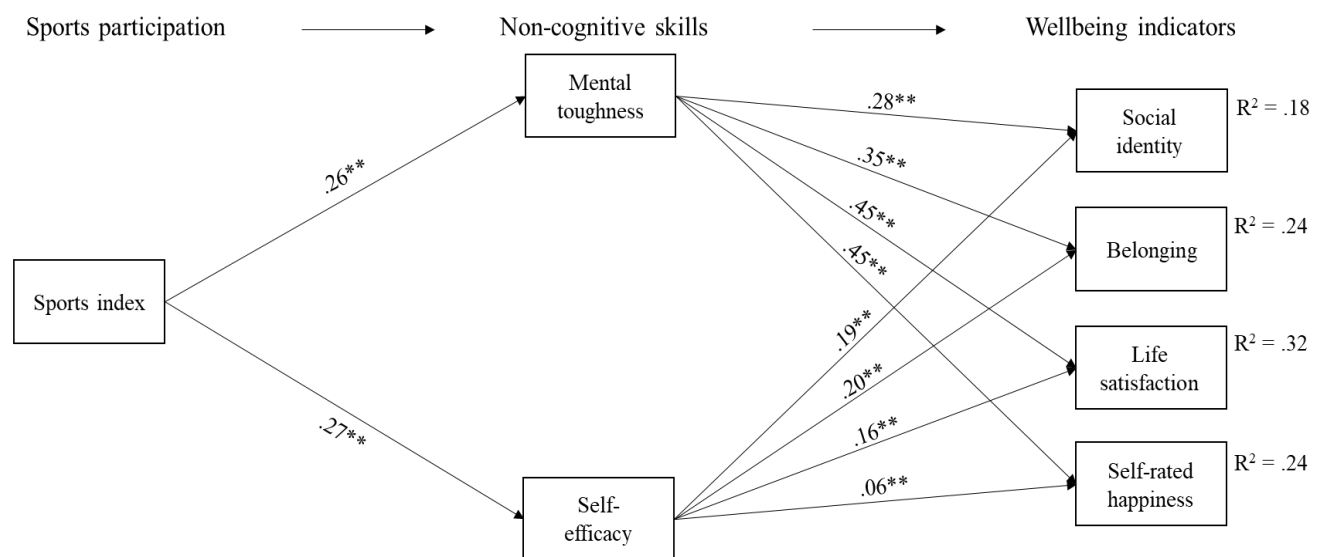


Figure 2. Mediation model depicting predictive relationships between sports index, mental toughness, self-efficacy, and wellbeing indicators. *Note.* standardized regression weights between variables are shown. These indicate the strength of the predictive relationships between variables (for instance, .27 between sports index and self-efficacy suggests that as sports index goes up by one unit/standard deviation, self-efficacy increases by .27). R^2 indicates how much variance is explained in a specific prediction path. Error is not indicated but was specified for all endogenous variables. $*p < .05$, $**p < .001$ using Bootstrapping significance estimates (1000 resamples)

Furthermore, sports index demonstrated a significant (positive) indirect association through mental toughness and self-efficacy on social identity ($.12$, $p = .002$, 95% CI = .11 to .14),

belonging (.14, $p = .001$, 95% CI = .13 to .16), life satisfaction (.16, $p = .001$, 95% CI = .14 to .18), and self-rated happiness (.13, $p = .002$, 95% CI = .12 to .15). R^2 values inferred that the model accounted for a reasonably high quantity of variance in the wellbeing indicators (i.e., social identity = 18%, belonging = 24%, life satisfaction = 32%, self-rated happiness = 24%). Specific indirect effects revealed sports index evidenced a significant indirect association through mental toughness on social identity (.06, $p = .002$, 95% CI = .05 to .07), belonging (.16, $p = .001$, 95% CI = .13 to .20), life satisfaction (.20, $p = .001$, 95% CI = .16 to .25), and self-rated happiness (.03, $p = .002$, 95% CI = .01 to .05). Moreover, sports index exhibited a significant indirect association through self-efficacy on social identity (.02, $p = .002$, 95% CI = .02 to .03), belonging (.06, $p = .001$, 95% CI = .05 to .07), life satisfaction (.07, $p = .001$, 95% CI = .06 to .09), and self-rated happiness (.01, $p = .002$, 95% CI = .01 to .02). Greater indirect associations occurred through mental toughness, suggesting that this possessed a relatively stronger indirect association with both sports index and wellbeing than self-efficacy.

A comparison of the relationships among the variables was examined in relation to the subgroups previously assessed (i.e., Year 9 vs. Year 10, girls vs. boys) using multigroup analysis. This necessitated a comparison of model fit between the baseline (original) model, and a model in which predictive (structural) paths between the variables were constrained to be equal. The constrained model for year demonstrated a non-significant difference in fit compared with the baseline model, $\Delta\chi^2(10) = 4.23$, $p = .936$. This suggested that predictive paths were similar in magnitude for Year 9 and Year 10. For gender, however, the constrained model revealed a significant change in model fit, $\Delta\chi^2(10) = 38.56$, $p < .001$, indicating that some predictive paths differed in strength between boys and girls. To ascertain where the differences for gender resided, critical ratios (with accompanying z-scores) were observed. A z-score > 1.96 or < -1.96 inferred that differences were significant (i.e., less than .05) (Byrne, 2010).

Table 4. Z-scores for differences in gender (girls vs. boys)

Model path	Z-score for differences
Gender	
Sports Index → mental toughness	-.01
Sports Index → self-efficacy	1.88
Mental toughness → social identity	1.11
Mental toughness → belonging	-1.08
Mental toughness → life satisfaction	3.48*
Mental toughness → self-rated happiness	2.63*
Self-efficacy → social identity	.94
Self-efficacy → belonging	1.51
Self-efficacy → life satisfaction	-.92
Self-efficacy → self-rated happiness	-.44

Note. * $p < .05$

Scrutiny of z-scores (table 4) revealed that the predictive path between mental toughness and life satisfaction ($z = 2.63$), and between mental toughness and self-rated happiness ($z = 3.48$) differed between boys and girls. Specifically, mental toughness demonstrated a stronger relationship for girls (i.e., mental toughness and life satisfaction = .49; mental toughness and self-rated happiness = .46) than for boys (i.e., mental toughness and life satisfaction = .40; mental toughness and self-rated happiness = .39).

Noting the importance of non-cognitive skills, further analysis was undertaken. This assessed differences in mental toughness and self-efficacy as a function of school year and gender. Significant main effects were observed for gender, Wilks' $\lambda = .91$, $F(2, 5300) = 250.23$, $p < .001$, $\eta^2 = .09$ (medium effect). Univariate analyses revealed that girls (vs. boys) reported significantly lower mental toughness, $F(1, 5301) = 499.78$, $p < .001$, $\eta^2 = .09$ (medium effect), and self-efficacy scores, $F(1, 5301) = 187.32$, $p < .001$, $\eta^2 = .03$ (small effect). A non-significant main effect existed for school year although there was a trend towards significance. Specifically, Year 10 reported significantly lower mental toughness than Year 9, $F(1, 5301) = 4.05$, $p = .044$, $\eta^2 = .01$ (small effect), but no significant differences occurred for self-efficacy relative to year group. The interaction between school year and gender was not significant. This suggested that girls reported meaningfully lower mental toughness and self-efficacy than boys, and mental toughness was significantly lower at Year 10 than Year 9.

Conclusions

Summary of findings

Findings revealed that 97% of pupils had engaged in at least 60 minutes of physical activity in the previous week, with 51% of pupils engaged in three to five days of physical activity. Sports participation measures of frequency, involvement, and perceived importance were positively correlated. To ensure the assessment of a breadth of sports participation a general index was created by combining frequency, level of involvement and perceived importance. Analysis used the sports participation index because this was a school facing measure, whereas physical activity was a specific indicator of exercise intensity.

The sports participation index correlated positively with physical activity suggesting that there was a strong association between sports participation in schools and physical activity inside and outside of school; as sports participation increased so did levels of physical activity. Sports participation index, non-cognitive skills, and wellbeing were positively related, showing that higher levels of sports participation in school were associated with higher levels of non-cognitive skills (mental toughness and self-efficacy) and wellbeing (social identity, belonging, life satisfaction, and happiness).

Further analysis demonstrated that sports participation in Year 10 was lower than in Year 9, with girls participating less than boys in Year 10. Wellbeing was also lower in Year 10 (vs. Year 9), and girls in Year 10 reported significantly lower wellbeing than boys.

A test of relationships indicated that the sports index was a significant predictor of mental toughness, self-efficacy, and wellbeing. Mental toughness and self-efficacy were significant positive 'mediators' of the sports index – wellbeing relationship, and greater indirect associations occurred via mental toughness. Moreover, a comparison of subgroups used in the analysis (Year 9 vs. Year 10, girls vs. boys) indicated that mental toughness was a significantly stronger predictor of life satisfaction and self-rated happiness among girls (in comparison with boys).

Subsequent analysis revealed that mental toughness and self-efficacy were lower among girls than boys, and Year 10 reported lower mental toughness than Year 9. Results overall indicated that Year 10 pupils (in comparison to Year 9) scored lower on sports participation, wellbeing, and non-cognitive skills (mental toughness). Effects were greater for girls (vs. boys).

Links to literature

Consistent with expectations, Year 10 pupils reported lower sports participation than Year 9. A potential reason for this result is due to the shift in educational focus from compulsory and optional subjects (Year 9) to GCSE courses and the attainment of formal qualifications (Year 10). The transition from Key Stage 3 to 4 is demanding for both students and schools. Accordingly, participation in sport likely changed as a function of contextual pressures (e.g., less perceived spare time and increased scholarly focus). In addition to lower sports participation, Year 10 reported lower wellbeing scores across indices. Prior research has demonstrated that belonging to a higher school year is a risk factor for lower wellbeing (Richards & Smith, 2015). It is possible that the increased pressure in Year 10 was a chief factor, but it would not be possible to effectively unpack the underlying reasons of lower wellbeing without the inclusion of additional explanatory variables (e.g., academic stress, fear of failure).

Moreover, lower sports participation existed for girls at Year 10 than for boys. It has been well documented that participation levels in physical education in the UK are lower for girls during adolescence (Evans, 2006), which is supported by international data (e.g., the United States). Specifically, the Women's Sport Foundation (2023) revealed that after 14 years of age (Year 10), girls are twice as likely to drop out of sports. Potential reasons for this include barriers to access (e.g., less opportunities at school), fear of being judged, lack of confidence (Women in Sport, 2019), and constructions of heterosexual femininity and masculinity (Evans, 2006). The lower levels of wellbeing for girls in comparison with boys aligned with Sammons et al. (2014) and the trends typically observed with older cohorts (Richards & Smith, 2015). Moreover, Yoon et al. (2022) identified that young people were at risk of wellbeing concerns including mental health problems between the ages of 11 and 14, with a yearly deterioration in wellbeing occurring, particularly among girls.

Similar to Moxon et al. (2019) and Stead and Nevill (2010), sports participation was positively associated with higher levels of wellbeing. Sports participation additionally predicted greater levels of wellbeing, through mental toughness and self-efficacy, in the statistical model. This indirect association can be explained by sports participation being related with the acquisition of a confident, mental toughness mindset, which in turn facilitates positive mental health (Gerber et al., 2012). Therefore, for schools to continue to promote sports participation among Year 10 and 11 would be important, given that the results of this project add to a body of literature indicating that sports participation is constructive due to benefits including the inherent physical activity, social connections, relationships with non-cognitive skills, and the sense of identity and belonging, which are affiliated with greater wellbeing (Ahn & Fedewa, 2011; Gerber et al., 2012; Graupensperger et al., 2020a; Graupensperger et al., 2020b). Indeed, sports participation exhibited the strongest predictive relationships with life satisfaction (cognitive wellbeing) and belonging in this project. Furthermore, the stronger predictive relationships of mental toughness in relation to life satisfaction and self-rated happiness for girls (vs. boys) suggests that it is critical to focus on promoting mental toughness among girls in particular, given the lower wellbeing that existed concerning this subgroup in the current project.

Limitations and future directions

Although sports participation was a significant predictor of wellbeing, a limitation relates to the cross-sectional nature of this project. Accordingly, conclusions relating to causation and temporal order cannot be established. In addition, school years were merely compared, as opposed to assessing trends among students as they progressed through different years.

Another cautionary point relates to the sample. Specifically, large samples (as in this project) can have the adverse effect of artificially inflating statistical significance (Faber & Fonseca, 2014). However, effect sizes were included, which are independent of sample size and provide an indication of relationship strength (Sullivan & Feinn, 2012). Furthermore, as a preliminary test of the sports participation – non-cognitive skills – wellbeing relationship among pupils, this project offers strong evidence concerning the potential benefit of sports participation in secondary school at a critical stage of students' education.

It would be useful for future research to corroborate these findings using a longitudinal design, in which the influence of sports participation on pupils are assessed over time. This would provide valuable insight concerning development trajectories and the degree to which sports participation facilitates wellbeing. Moreover, the 'mediating' role of mental toughness and self-efficacy could be more effectively scrutinised.

Declarations

Funding

This project was funded by the Youth Sport Trust and HMC (The Head's Conference).

Ethics approval

Approval was obtained from the ethics committee of Manchester Metropolitan University. The procedures used adhere to the tenets of the Declaration of Helsinki.

Consent

Informed consent was obtained from schools, parents, and the individual participants who took part in this project.

References

- Ahn, S., & Fedewa, A. L. (2011). A meta-analysis of the relationship between children's physical activity and mental health. *Journal of Pediatric Psychology, 36*(4), 385–397. [10.1093/jpepsy/jsq107](https://doi.org/10.1093/jpepsy/jsq107)
- Allen, K. A., & Bowles, T. (2012). Belonging as a Guiding Principle in the Education of Adolescents. *Australian Journal of Educational & Developmental Psychology, 12*, 108–119.
- Anderson-Butcher, D., & Conroy, D. E. (2002). Factorial and criterion validity of scores of a measure of belonging in youth development programs. *Educational and Psychological Measurement, 62*(5), 857–876. <https://doi.org/10.1177/001316402236882>
- Bandura, A. E. (1995). *Self-efficacy in Changing Societies*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511527692>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freedom and Company.
- Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *Journal of School Health, 76*(8), 397–401. <https://doi.org/10.1111/j.1746-1561.2006.00132.x>
- Beierlein, C., Kemper, C. J., Kovaleva, A., & Rammstedt, B. (2013). Short scale for measuring general self-efficacy beliefs (ASKU). *Methods, Data, Analyses, 7*(2), 28.
- Biddle, S. J., & Asare, M. (2011). Physical activity and mental health in children and adolescents: a review of reviews. *British Journal of Sports Medicine, 45*(11), 886–895. <https://doi.org/10.1136/bjsports-2011-090185>
- Booth, J. N., Leary, S. D., Joinson, C. L., Ness, A. R., Tomporowski, P. D., Boyle, J. M., & Reilly, J. J. (2014). Associations between objectively measured physical activity and academic attainment in adolescents from a UK cohort. *British Journal of Sports Medicine, 48*(3), 265–270. <https://doi.org/10.1136/bjsports-2013-092334>
- Browne, M.W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In: K. A. Bollen & J.S. Long (Eds.), *Testing structural equation models* (pp.136–162). Sage.
- Byrne, B. M. (2010). *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming* (2nd Ed.). Routledge.
- Clough, C. J. (2019) Brief summary of evidence linking physical activity and school sport to academic attainment and wellbeing. Available at: https://www.youthsporttrust.org/media/cgikv2mc/evidence_relating_to_school_sport_and_physical_activity.pdf (Accessed: 21 June 2023).
- Clough, P., Earle, K., & Sewell, D. (2002). Mental toughness: The concept and its measurement. In I. Cockerill (Ed.), *Solutions in Sport Psychology* (pp. 32–43). Thomson.
- Clough, P., Oakes, S., Dagnall, N., St Clair-Thompson, H., & McGeown, S. (2016). *The study of non-cognitive attributes in education: Proposing the mental toughness framework*. In M. S. Khine and S. Areepattamannil (Eds.), *Non-cognitive skills and factors in educational attainment* (pp. 315-329). Sense Publishers. https://doi.org/10.1007/978-94-6300-591-3_14
- Dagnall, N., Denovan, A., Papageorgiou, K. A., Clough, P. J., Parker, A., & Drinkwater, K. G. (2019). Psychometric assessment of shortened Mental Toughness Questionnaires (MTQ): factor structure of the MTQ-18 and the MTQ-10. *Frontiers in Psychology, 10*, 1933. <https://doi.org/10.3389/fpsyg.2019.01933>
- Dagnall, N., Drinkwater, K. G., Denovan, A., & Walsh, R. S. (2021). The potential benefits of non-skills training (mental toughness) for elite athletes: Coping with the negative psychological effects of the COVID-19 pandemic. *Frontiers in Sports and Active Living, 3*, 581431. <https://doi.org/10.3389/fspor.2021.581431>
- Denovan, A., Dagnall, N., & Drinkwater, K. (2022). Examining what Mental Toughness, Ego Resiliency, Self-efficacy, and Grit measure: An exploratory structural equation modelling

- bifactor approach. *Current Psychology*, 1–16. <https://doi.org/10.1007/s12144-022-03314-5>
- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13
- Drinkwater, K., Dagnall, N., Denovan, A., & Parker, A. (2019). The moderating effect of mental toughness: Perception of risk and belief in the paranormal. *Psychological Reports*, 122(1), 268–287. <https://doi.org/10.1177/0033294118756600>
- Evans, B. (2006). 'I'd feel ashamed': Girls' bodies and sports participation. *Gender, place & culture*, 13(5), 547–561. <https://doi.org/10.1080/09663690600858952>
- Faber, J., & Fonseca, L. M. (2014). How sample size influences research outcomes. *Dental press journal of orthodontics*, 19(4), 27–29. <https://doi.org/10.1590/2176-9451.19.4.027-029.ebo>
- Finn, J. D. (1993). *School engagement and students at risk*. National Center for Education Statistics.
- Graupensperger, S., Benson, A. J., Kilmer, J. R., & Evans, M. B. (2020a). Social (un)distancing: Teammate interactions, athletic identity, and mental health of student-athletes during the COVID-19 pandemic. *Journal of Adolescent Health*, 67(5), 662–670. <https://doi.org/10.1016/j.jadohealth.2020.08.001>
- Graupensperger, S., Panza, M. J., Budziszewski, R. M., & Evans, M. B. (2020b). Growing into 'us': Trajectories of social identification with college sport teams predicts subjective well-being. *Applied Psychology: Health and Well-Being*, 12(3), 787–807. <https://doi.org/10.1111/aphw.12207>
- Gerber, M., Kalak, N., Lemola, S., Clough, P. J., Pühse, U., Elliot, C., Holsboer-Trachsler E, & Brand, S. (2012). Adolescents' exercise and physical activity are associated with mental toughness. *Mental Health and Physical Activity*, 5(1), 35–42. <https://doi.org/10.1016/j.mhpa.2012.02.004>
- Gignac, G. E., & Szodorai, E. T. (2016). Effect size guidelines for individual differences researchers. *Personality and Individual Differences*, 100(102), 74–78. <https://doi.org/10.1016/j.paid.2016.06.069>
- Gucciardi, D. F., Gordon, S., & Dimmock, J. A. (2008). Towards an understanding of mental toughness in Australian football. *Journal of Applied Sport Psychology*, 20(3), 261–281. <https://doi.org/10.1080/10413200801998556>
- Haslam, S. A., Jetten, J., Postmes, T., & Haslam, C. (2009). Social identity, health and well-being: An emerging agenda for applied psychology. *Applied Psychology*, 58(1), 1–23. <https://doi.org/10.1111/j.1464-0597.2008.00379.x>
- Hendrickson, B., Rosen, D., & Aune, R. K. (2011). An analysis of friendship networks, social connectedness, homesickness, and satisfaction levels of international students. *International Journal of Intercultural Relations*, 35(3), 281–295. <https://doi.org/10.1016/j.ijintrel.2010.08.001>
- Hurem, A., Rowan, L., & Grootenboer, P. (2021). The link between social wellbeing, belonging, and connectedness of international students in Australian high schools. *Frontiers in Education*, 6, 681956. <https://doi.org/10.3389/feduc.2021.681956>
- Libbey, H. P. (2007). *School connectedness: Influence above and beyond family connectedness*. UMI.
- Lin, Y., Mutz, J., Clough, P. J., & Papageorgiou, K. A. (2017). Mental toughness and individual differences in learning, educational and work performance, psychological well-being, and personality: A systematic review. *Frontiers in Psychology*, 8, 1345. <https://doi.org/10.3389/fpsyg.2017.01345>

- Livingji, R., Gunnesch-Luca, G., & Ilescu, D. (2021). Research self-efficacy: A meta-analysis. *Educational Psychologist*, 56(3), 215–242. <https://doi.org/10.1080/00461520.2021.1886103>
- Mojtahedi, D., Dagnall, N., Denovan, A., Clough, P., Hull, S., Canning, D., Lilley, C., & Papageorgiou, K. A. (2021). The relationship between mental toughness, job loss, and mental health issues during the COVID-19 pandemic. *Frontiers in Psychiatry*, 11, 607246. <https://doi.org/10.3389/fpsy.2020.607246>
- Moxon, P., Clough, P., Dagnall, N., Clough, E., & Elstone, D. (2019). The potential benefits and costs of participation in school sport. *Physical Education Matters* (Autumn 2019), 26–28.
- Mualem, R., Leisman, G., Zbedat, Y., Ganem, S., Mualem, O., Amaria, M., ... & Ornai, A. (2018). The effect of movement on cognitive performance. *Frontiers in Public Health*, 100. <https://doi.org/10.3389/fpubh.2018.00100>
- Nicholls, A. R., Perry, J. L., Jones, L., Sanctuary, C., Carson, F., & Clough, P. J. (2015). The mediating role of mental toughness in sport. *The Journal of Sports Medicine and Physical Fitness*, 55(7-8), 824-834.
- Oberle, E., Ji, X. R., Guhn, M., Schonert-Reichl, K. A., & Gadermann, A. M. (2019). Benefits of extracurricular participation in early adolescence: Associations with peer belonging and mental health. *Journal of Youth and Adolescence*, 48(11), 2255–2270. <https://doi.org/10.1007/s10964-019-01110-2>
- Perry, J. L., Strycharczyk, D., Dagnall, N., Denovan, A., Papageorgiou, K. A., & Clough, P. J. (2021). Dimensionality of the mental toughness questionnaire (MTQ48). *Frontiers in Psychology*, 12, 654836. <https://doi.org/10.3389/fpsyg.2021.654836>
- Postmes, T., Haslam, S. A., & Jans, L. (2013). A single-item measure of social identification: Reliability, validity, and utility. *British Journal of Social Psychology*, 52(4), 597–617. <https://doi.org/10.1111/bjso.12006>
- Richards, G., & Smith, A. P. (2015). Risk factors for, and effects of, stress, anxiety and depression in adolescents. *British Journal of Education, Society & Behavioural Science*, 10(4), 1-10.
- Richman, E. L., & Shaffer, D. R. (2000). “If you let me play sports” How Might Sport Participation Influence the Self-Esteem of Adolescent Females? *Psychology of Women Quarterly*, 24(2), 189-199. <https://doi.org/10.1111/j.1471-6402.2000.tb00200.x>
- Sport England (2019). *Active Lives Children and Young People Survey Academic Year 2018/2019 pre pandemic*. <https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2020-01/active-lives-children-survey-academic-year-18-19.pdf?cVMsdnpBoqROViY61iUjpQY6WcRyhtGs>
- Stamp, E., Crust, L., Swann, C., Perry, J., Clough, P., & Marchant, D. (2015). Relationships between mental toughness and psychological wellbeing in undergraduate students. *Personality and Individual Differences*, 75, 170–174. <https://doi.org/10.1016/j.paid.2014.11.038>
- Stead, R & Nevill M (2010). *The impact of physical education and sport on education outcomes: a review of literature*. Youth Sport Trust & Institute of Youth Sport. [https://www.icsspe.org/system/files/Stead and Neville - The Impact of Physical Education and Sport on Education Outcomes.pdf](https://www.icsspe.org/system/files/Stead%20and%20Neville%20-%20The%20Impact%20of%20Physical%20Education%20and%20Sport%20on%20Education%20Outcomes.pdf)
- Sullivan, G. M., & Feinn, R. (2012). Using effect size—or why the P value is not enough. *Journal of graduate medical education*, 4(3), 279-282. <https://doi.org/10.4300/JGME-D-12-00156.1>
- Tajfel, H. (1972). Some developments in European social psychology. *European Journal of Social Psychology*, 2(3), 307–321. <https://doi.org/10.1002/ejsp.2420020307>

- Tang, Y. Y., Tang, R., & Gross, J. J. (2019). Promoting psychological well-being through an evidence-based mindfulness training program. *Frontiers in Human Neuroscience, 13*, 237. <https://doi.org/10.3389/fnhum.2019.00237>
- Trudel-Fitzgerald, C., Millstein, R. A., von Hippel, C., Howe, C. J., Tomasso, L. P., Wagner, G. R., & VanderWeele, T. J. (2019). Psychological well-being as part of the public health debate? Insight into dimensions, interventions, and policy. *BMC Public Health, 19*(1), 1–11. <https://doi.org/10.1186/s12889-019-8029-x>
- Women in Sport (2019). *Reframing Sport for Teenage Girls: Building Strong Foundations for their Futures*. <https://womeninsport.org/research-and-advice/our-publications/reframing-sport-for-teenage-girls-building-strong-foundations-for-their-futures/>
- Women's Sport Foundation (2023). *Our Research*. <https://www.womenssportsfoundation.org/what-we-do/wsf-research/>
- Yoon, Y., Eisenstadt, M., Lereya, S. T., & Deighton, J. (2022). Gender difference in the change of adolescents' mental health and subjective wellbeing trajectories. *European Child & Adolescent Psychiatry, 1-10*. <https://doi.org/10.1007/s00787-022-01961-4>
- Zalewska, A. M., Krzywosz-Rynkiewicz, B., Clough, P. J., & Dagnall, N. (2019). Mental toughness development through adolescence: Effects of age group and community size. *Social Behavior and Personality: An International Journal, 47*(1), 1–8. <https://doi.org/10.2224/sbp.7376>

Appendix 1. Survey

Demographic Questions

What school year are you in?

- Year 9
- Year 10

What is the name of your school?

Are you a...?

- Boy
- Girl
- Prefer to self-describe
- Prefer not to say

Sports Participation Questions

Which of these sports have you done in the last 12 months at school? This can include in lesson time and in extracurricular clubs. Please select all that you have done from the list below by ticking the box next to the sport. You can choose as many as you like.

- Football
- Rugby
- Cricket
- Basketball
- Hockey
- Netball
- Rounders
- Swimming / diving / water polo
- Tennis
- Badminton
- Trampolining
- Track and field athletics
- Gymnastics
- Running / jogging / cross country / the daily mile
- Other sports (please tell us these in the space below)

How involved are you in secondary school sports? By involved we mean actively take part and enjoy sport? Please choose an answer from below.

- Not involved at all
- Not very involved
- Slightly involved
- Very involved
- Extremely involved

How important are sports to you in secondary school?

- Not important at all
- Not very important
- Slightly important
- Very important
- Extremely important

In the past week, on how many days have you taken part in 60 minutes or more of physical activity that makes you feel warmer and makes your heart beat faster? It does not have to be 60 minutes in one go; you can add together different bits of activity you do in one day.

- No days
- One day
- Two days
- Three days
- Four days
- Five days
- Six days
- Seven days

Your Resilience

Please read the following statements and indicate how much you agree with them. For each statement, say how much you agree from 'strongly disagree' to 'strongly agree'. Please answer these statements carefully, thinking about how you are generally. Do not spend too much time on any one.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Even when under lots of pressure I usually remain calm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tend to worry about things well before they actually happen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is usually hard for me to find enthusiasm for the tasks I have to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I generally cope well with any problems that occur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I generally feel that I am a worthwhile person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I just don't know where to begin" is a feeling I usually have when given several things to do at once	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I make mistakes I usually let it worry me for days after	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I generally feel in control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am generally able to react quickly when something unexpected happens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I generally look on the bright side of life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following statements may apply to you more or less. Please say for each statement to what extent it applies to you personally, using the choices from 'does not apply at all' to 'applies completely'.

	Does not apply at all	Applies only slightly	Somewhat applies	Fairly applies	Applies completely
In difficult situations I can rely on my skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can deal with most problems using my own abilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Even difficult and complicated tasks I can successfully tackle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Your Sense of Belonging

Please read the following statement and say how much you agree or disagree with it, using the choices from 'fully disagree' to 'fully agree'.

	Fully disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Fully agree
I identify with my school (I feel close to my school and it's part of who I am)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please read the following statements and say how much you agree with them, using the options from 'strongly disagree' to 'strongly agree'.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I feel comfortable at my school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am a part of my school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am committed to my school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am supported at my school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am accepted at my school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

