Examining the effects of sport and exercise interventions on body image among adolescent girls: A systematic review

Sharon McIntosh-Dalmedo\textsuperscript{a}, Tracey J. Devonport\textsuperscript{b*}, Wendy Nicholls\textsuperscript{c}, & Andrew P. Friesen\textsuperscript{d}

\textsuperscript{a} Institute of Sport, University of Wolverhampton, Wolverhampton, UK
Tel: +44 7815 660 330; e: sharonymcintosh@gmail.com

\textsuperscript{b} Institute of Sport, University of Wolverhampton, Wolverhampton, UK
Tel: +44 1902313113; e: T.Devonport@wlv.ac.uk

\textsuperscript{c} Institute of Psychology, University of Wolverhampton, Wolverhampton, UK
Tel: +44 1902 321359; e: wendy.nicholls@wlv.ac.uk

\textsuperscript{d} Institute of Sport, University of Wolverhampton, Wolverhampton, UK
Tel: +44 1902323071; e: apfriesen@gmail.com

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*Corresponding author: Tracey Devonport

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Abstract

Body image dissatisfaction among females is suggested to be so widespread, that is has been described as normative discontent. Consequently, there is great interest in the development of interventions that may enhance body image perceptions. The aim of the present systematic review was to investigate the effects of sport and exercise interventions on body image among adolescent females. Following preferred reporting items for systematic reviews and meta-analyses guidelines (Higgins & Green, 2009; Petticrew & Roberts, 2005), a search of six electronic databases produced 4,210 records of which six met the inclusion criteria. The methodological quality of included articles was assessed using the Standard Quality Assessment (Kmet, Lee, & Cook, 2004). This yielded a mean score for quality of .90 (SD = 0.22), indicating poor quality of research. In two studies, significant and positive change was observed in body image following intervention (aerobics or self-selected sports activities) in comparison to a control condition. In four studies, no significant effect of intervention on body image was observed. We conclude that there is insufficient evidence to suggest that sport and exercise interventions can improve body image. Furthermore, due to the limitations of existing research highlighted within this review, findings suggesting positive influence should be interpreted with caution. Recommendations for improving the methodological quality of research examining the influence of sport and exercise interventions on body image are proposed. This includes considerations such as participant sampling, control conditions/groups, measurement of key variables, intervention features, and analysis of data.

Keywords: gender; measurement; body attitude; body dissatisfaction; physical education.
Examining the effects of sport and exercise interventions on body image among adolescent girls: a systematic review

Body image has been described as a person's perceptions, thoughts, and feelings about their body (Grogan, 2016). Body image is a multifaceted construct consisting of a variety of measured dimensions (Thompson, 2004; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). This includes perceptual, cognitive, affective and behavioral components (Bane & McAuley, 1998). Body image dissatisfaction (BID), defined as a subjective negative evaluation of one’s physical appearance (Presnell, Bearman, & Stice, 2004), has been the focus of much research to date. In Western societies, BID is suggested to be so widespread, particularly among females (Salk & Engeln-Maddox, 2012), that is has been described as normative discontent (Cash & Smolak 2011; Hardit & Hannum, 2012; Rodin, Silberstein, & Striegel-Moore, 1984; Tantleff-Dunn, Barnes, & Larose, 2011).

There is a wealth of research indicating that, across a lifespan, females are more likely to experience BID when compared to their male counterparts (Buchanan, Bluestein, Nappa, Woods, & Depatie, 2013; Elgin & Pritchard, 2006; Feingold & Mazzella, 1998; Sweeting & West, 2002). Indeed, girls as young as five years of age have been found to convey dissatisfaction with their body shape and (or) size (Davison, Markey, & Birch, 2000). As children transition from preadolescence into their next stage of maturity, adolescence becomes a significant phase in the development of body image (Fenton, Brooks, Spencer, & Morgan, 2010; Kostanski, Fisher, & Gullone, 2004). In the present study, we utilised the World Health Organisation (WHO) guidelines which describes adolescence as occurring between 10-19 years of age. Body image dissatisfaction has been reported to intensify during
adolescence, most notably amongst girls, due to the bodily changes that take place during puberty (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013; Calzo et al., 2012; Maxwell & Cole, 2012). Furthermore, an increasing regard for the opinions of others during adolescence exacerbates the potential for BID (Reber & Reber, 2001). Despite adolescence presenting a potentially volatile time for body image, previous research has typically focused on young adults, with studies of adolescents being less common (Mellor et al., 2013; Rubin, Gluck, Knoll, Lorence, & Geliebter, 2008; Williams, Ricciardelli, McCabe, Waqa, & Bavadra, 2006).

In looking to develop and deliver body image interventions, there is growing support for the notion that participation in sport and exercise can enhance body image perceptions (Abbott & Barber, 2011; Daniels & Leaper, 2006; Fox, 2000; Hausenblas, Cook, & Chittester, 2008; Langdon & Petracca, 2010; Slater & Tiggemann, 2011; Swami & Tovée, 2009). Three meta-analyses demonstrated small (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006) to moderate (Reel et al., 2007) effects of exercise on body image (based on 57, 121 and 35 studies respectively), whereby an exercise intervention had the observed outcome of improved body image. However, the design of any sport and/or exercise intervention must account for the complex nature of the association between body image and motivation to exercise, which may vary according to demographics. The above meta-analysis included broad demographic samples (males and females across a broad age range), and thus it is difficult to inform interventions for female adolescence with confidence. Whilst a desire to improve body image can act as a motivator to exercise in certain individuals, for others, it may present an obstacle for exercise participation (Focht & Hausenblas, 2004; Schuler et al., 2004). For example, Slater and Tiggemann (2010) noted that females (aged 13 to 15 years)
frequently reported appearance-based concerns as a reason for ceasing participation in sport and exercise. In a follow-up study, teasing and body image concerns appeared to contribute to reduced rates of participation in sports and other physical activities among adolescent girls (aged 12 to 16).

Within the present review, elucidating the outcomes of different sport and exercise interventions on body image may help identify effective strategies for enhancing body image. The aim of the present review is to provide a systematic evaluation of sport and (or) exercise interventions that seek to enhance body image among female adolescents. Specifically, this review will synthesize findings to address the following objectives:

(a) to examine the effects of sport and/or exercise interventions on female adolescent body image;

(b) to critique included studies highlighting the implications for future research practice.

Method

To ensure methodological rigor, objectivity and replicability, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA; Higgins & Green, 2009; Petticrew & Roberts, 2005) were applied. The review was registered on PROSPERO (CRD42016037225) and all aims, inclusion criteria, data extraction, and data quality evaluation were specified at the outset.

Procedure for Search Strategy and Study Inclusion

A primary systematic search of six electronic databases through EBSCO was conducted (Medline, PsycINFO, SPORTDiscus, Child and Adolescent Studies, Education Research Complete, and Psychology and Behavioral Sciences) from inception up to and
including March 2016. Search terms included “body image”, “adolescence”, “sport and exercise”, and “intervention” (see Appendix for the complete search strategy). For inclusion, there had to be consensus that the following criteria were met:

- (a) peer reviewed journal article published in the English language;
- (b) data were reported from female adolescents;
- (c) an exercise or sport intervention was delivered;
- (d) intervention had a measured attempt to affect positive body image change;
- (e) the outcomes were measured (quantitative or qualitative) with data at baseline and post-intervention;
- (f) study sample should not include clinical populations or subpopulations with known differences that could obscure the direct examination of the effect of sport and exercise (e.g., illnesses or disease; physical disabilities, elite adolescent athletes, young offenders, or statemented adolescents with educational or behavioral and emotional needs).

Reference management software was used to organize citations (Endnote X7). The primary search yielded 4,210 records (see Figure 1), which following deduplication reduced to 3,073. These titles were independently screened by three reviewers to identify studies. Following title screening, 3,015 titles were excluded. Where there was disagreement, the full text manuscript was consulted, and for a paper to be included, there had to be consensus that the above inclusion criteria were met.

A full screen of the remaining 58 papers resulted in a further 52 exclusions as follows;

- (a) sport and/or exercise was not delivered as a body image intervention ($n = 28$);
- (b) non-target population (e.g., wrong age, clinical population, coaches; $n = 17$);
- (c) results not
reported for females or male participants only \((n = 4)\); (d) technology or computer-based interventions \((n = 2)\) and, (e) a meta-analysis \((n = 1):\) Campbell & Hausenblas, 2009.

[Insert Figure 1 about here]

Data Extraction

Data extraction parameters were established in line with the research questions and data extraction was processed using Microsoft Excel. This facilitated the capture of pertinent information including sample, measures, intervention characteristics, body image outcomes, research limitations, and implications for future practice (see Table 1).

Data Quality

The methodological quality of the included studies was scored and assessed using the standard quality assessment for evaluating primary research papers (for details see Kmet et al., 2004). Kmet et al. (2004) provides comprehensive guidelines (pp. 14-22) to ensure that the scoring of quality within and between systematic reviews is completed to a given standard. Synthesizing data quality scores “provides a systematic, reproducible and quantitative means of simultaneously assessing the quality of research encompassing a broad range of study designs” (Kmet et al., 2004, p. 11). Studies were evaluated on 20 criteria spanning design, sampling, methodology, analysis, results and conclusions. For each criterion, benchmark statements are provided to guide scoring. Papers scored 2 (good), 1 (partial fulfilment), 0 (not fulfilled), or X (not relevant), possible score range was 0-2, with a higher score indicating better quality (Kmet et al., 2004). A mean score was calculated for each paper to give an overall rating of quality. In addition, a mean score for each of the sub-
criteria was used to indicate the relative strengths and limitations across included studies, with the mean scores (SD) for individual studies presented in Table 1.

Results

Characteristics of the Included Studies

Included studies (see Table 1) originated from the U.S.A. \((n = 2;\) Gehrman, Hovell, Sallis, & Keating, 2006; Waldron, 2007); U.K \((n = 2;\) Burgess et al., 2006; Daley & Buchanan, 1999); Canada \((n = 1;\) Boyd & Hrycaiko, 1997); and Sweden \((n = 1;\) Lindwall & Lindgren, 2005). One study included male and female participants but reported female data separately (Gehrman et al., 2006). The remaining studies had female only samples, with participant numbers ranging from 50 (Burgess et al., 2006) to 181 (Boyd & Hrycaiko, 1997). Mean age was reported in four studies, and ranged from 11.5 \((SD = 0.96;\) Gehrman et al., 2006) to 16.35 years \((SD = 1.56;\) Lindwall & Lindgren, 2005). Three studies failed to report ethnicity (Boyd & Hrycaiko, 1997; Daley & Buchanan, 1999; Lindwall & Lindgren, 2005), whilst two studies (Burgess et al., 2006; Waldron, 2007) simply reported ethnicity as predominately Caucasian. Gehrman et al. (2006) reported participants as 45% Caucasian, 38% Hispanic, 8% African-American, and 8% as ‘‘other’’ ethnic backgrounds. Social and economic data were presented in two studies reporting participants to be of lower socioeconomic status (Burgess et al. 2006; Lindwall & Lindgren, 2005).

[Insert Table 1 about here]

Sport and exercise interventions were delivered within schools \((n = 4;\) Boyd & Hrycaiko, 1997; Burgess et al., 2006; Daley & Buchanan, 1999; Lindwall & Lindgren, 2005)
or to the community ($n = 2$; Gehrman et al., 2006; Waldron, 2007). Of these, five prescribed exercise, those being weight circuits (Boyd & Hrycaiko, 1997), non-competitive games and weight-bearing activities (Gehrman et al., 2006), aerobics (Burgess et al., 2006; Daley & Buchanan, 1999) and an established 5km running training programme (Waldron, 2007). One study allowed self-selected exercise (Lindwall & Lindgren, 2005), with selected activities including: aerobics, water aerobics, step-up, spinning, dancing, yoga, badminton, kick-boxing, climbing, bowling, karate, jujitsu, and different ball-games. The duration of exercise and sport interventions ranged from five-weeks (Daley & Buchanan, 1999) to six-months (Lindwall & Lindgren, 2005). Five studies reported the session length, with interventions delivered through sessions varying from 40-minutes (Boyd & Hrycaiko, 1997) to 120-minutes (Gehrman et al., 2006), producing a mean of 72 minutes ($SD = 32.71$). Three studies combined taught or discussion-based components alongside exercise components (Boyd & Hrycaiko, 1997; Gehrman et al., 2006; Lindwall & Lindgren, 2005).

Six different measures of body image were utilized across included studies. Only one measure (Physical self-perception profile; Fox & Corbin, 1989) was common to two studies (Daley & Buchanan, 1999; Lindwall & Lindgren, 2005) and no further consistency in measurement of body image was observed. Other variables measured included; physiology ($n = 3$; Burgess et al., 2006; Gehrman et al., 2006; Lindwall & Lindgren, 2005), participation in exercise ($n = 2$; Burgess et al., 2006; Daley & Buchanan, 1999), and eating behavior ($n = 1$; Gehrman et al., 2006). Details of measures used are included in Table 1.

**Narrative Synthesis of Findings and Discussion**

Having first discussed data quality, the findings of this systematic evaluation are synthesized and discussed in accordance with the stated aims. These were (a) to examine the
effects of sport and/or exercise interventions on body image (b) to critique included studies highlighting the implications for future research practice.

**Data Quality**

The possible range of scores on the quality assessment was 0-2, with a higher score indicating better quality (Kmet et al., 2004). The mean scores (SD) for individual studies are presented in Table 1. The overall mean score for data quality was 0.90 (SD = 0.22), pointing to a poor quality of research on this topic. The range was 0.67 (SD = 0.69; Boyd & Hrycaiko, 1997) to 1.16 (SD = 0.83; Lindwall & Lindgren, 2005). One of the included studies scored more than one standard deviation below the sample mean (Boyd & Hrycaiko, 1997). The mean scores (SD) for individual indicators of quality across all quantitative studies are presented in Table 2 (n = 6). Of the indicators that were assessed, studies performed particularly poorly on experimental methodology. This was due to limitations such as failure to account for or control confounding factors, randomization not being performed rigorously, nor with the appropriate blinding of participants or investigators, and a failure by all included studies to collect long-term follow up data. Studies overall performed comparatively well on use of suitable and validated predictor and outcome measures, and specifying a clear hypothesis.

[Insert Table 2 about here]

**The effect of sport and exercise interventions body image**

Two studies revealed significant improvements in one or more sub measure of body image. Daley and Buchanan (1999) asked an experimental group to complete a one hour aerobics class, once a week, for five-weeks, in addition to compulsory physical education. The experimental group improved physical self-worth, sports competence, strength
competence, and body attractiveness over time when compared to a comparison group (partaking in compulsory physical education one-hour per week). Changes in exercise behaviors were not reported for either the experimental or comparison group. In a six-month intervention, Lindwall and Lindgren (2005) offered 45-minutes of self-selected exercise activities and 14-minutes of discussion on healthy lifestyles twice a week. A waiting-list control group had no organized activity. After the intervention, when conducting analysis that excluded participants with missing data, the intervention significantly reduced social physique anxiety and increased scores on three subscales from the physical self-perception profile (sport competence, physical conditioning and physical self-worth). However, when undertaking more conservative intent-to-treat analysis (i.e., including all participants that were originally allocated to conditions), no effect of intervention on the physical self-perception profile was observed, but effect of the intervention on social physique anxiety (over time and between groups) was still observed, with those in the intervention having an improved score post-intervention. These positive changes were not associated with changes in physiological variables.

No intervention effect on body image was found across four studies. Boyd and Hrycaiko (1997) found no significant main effect of a six-week intervention (comprised of physical activity (training, cardiovascular and agility), education (healthy lifestyle, weight management, healthy role models), and self-report (logbooks tracking own performance) on general self-esteem when compared with a control group doing regular PE lessons. Gehrman et al. (2006) delivered an eight-week intervention, providing sessions designed to teach the importance of physical activity in overall health and non-competitive games and weight-bearing activities designed to enhance bone health. The intervention did not have a significant
effect upon body dissatisfaction, drive for thinness, or weight concerns; with mean scores for
body dissatisfaction following the same pattern for the intervention group when compared to
the comparison group who completed training on injury prevention.

Burgess et al. (2006) utilized a cross-over design with two equivalent groups who
participated in a comparison condition (conventional British physical education swimming
program), and an experimental condition (aerobic dance). Both groups completed both
conditions in a counterbalanced order. Within the inferential analysis, the differences
between conditions were not reported, therefore for the purpose of comparing conditions, we
report the means. No differences were found between the experimental and comparison
condition in physical activity participation over time. Means show attractiveness was
marginally higher, and disparagement and feeling fat marginally lower in the aerobic
condition, when compared to the swimming condition. Waldron (2007) delivered a running
intervention comprised of 90 minute sessions, twice a week for 8-12 weeks. There was no
change in self-perception subscales observed post intervention. However, interviews
indicated that following intervention, the girls expressed greater acceptance of the self,
improved physical fitness, and enhanced knowledge of taking care of their body.

Critique of included studies and recommendations for future research practice

Analysis of the data quality assessment highlighted that included studies were poor in
their application of experimental method, which might have introduced bias or confounding
factors. In particular, none of the included studies detailed whether the aims of the study were
concealed from participants. This may mean that participants could guess the aims of the
study and be unduly influenced. Likewise, investigators were not blinded as to the group’s
activities when analysis took place, and again this may introduce bias. In addition, key details
were omitted from reporting. For example, only one study reported the level of attendance at the intervention (Lindwall & Lindgren), at a rate of 56% (SD = 19%). Where no effect is observed, poor attendance or adherence with the intervention may be an explanatory factor.

Sampling strategies used in the included studies present limitations that require consideration. The predominant strategies used were convenience samples from schools (Boyd et al., 1997; Daley & Buchanan, 1999), or the community (Waldron, 2007), or selectively sampled participants for characteristics such as low physical activity levels (Burgess et al., 2006; Gehrman et al., 2006; Lindwall & Lindgren, 2005). Two studies (Gehrman et al., 2006; Lindwall & Lindgren, 2005) randomly assigned participants to conditions. Daley and Buchanan (1999) acknowledge that random sampling is preferable, but state that this was impractical in a school setting where girls were asked to voluntarily stay behind after school for intervention activities.

Studies comprised of volunteers (e.g., Daley & Buchanan, 1999), selective sampling of participants scoring low at baseline testing on a variable of interest (e.g., body attitudes, Burgess et al., 2006), or selective sampling from a population hypothesized to be less physically active (e.g., low socioeconomic status communities; Burgess et al., 2006; Lindwall & Lindgren, 2005). Volunteer-based recruitment strategies might result in biased samples because participants might have an increased desire to take part (Lubans & Sylvana, 2006; Mauriello et al., 2010). Selective sampling of participants scoring low on a variable of interest increases the likelihood that improvements on this variable may be observed over time as compared to a sample scoring higher at baseline. This was illustrated by Walters and Martin (2000) who found no significant improvement in the self-concept of school children (male and female) following a 13-week aerobic exercise intervention. The authors suggested
that as pretest self-concept scores were generally high, this left limited scope for further increases (a ceiling effect). Similarly, Raglin (1990) found exercise did not decrease levels of depression in those whose initial scores fall within normal range, noting "exercise does not make normals more normal" (p. 325).

When evaluating control or comparison conditions, one study had a waiting list control group who were inactive (Lindwall & Lindgren, 2005), whilst one study employed a within subjects design (Waldron, 2007). Three studies included a comparison group participating in a different sport or exercise activity to the intervention group (Boyd & Hrycaiko, 1997; Burgess et al., 2006; Daley & Buchanan, 1999), whilst one study had a comparison group completing a non-sport activity (Gehrman et al., 2006). This presents a confounding factor, as if sport and exercise activities were to have an effect on body image, this effect should also be observed in any comparison group participating in a different sport or exercise activity to the intervention group. Comparison group activities are described in Table 1.

When choosing to utilize swimming as the comparison group activity, Burgess et al. (2006) rationalised that swimming has been reported to be one of the most disliked physical education activities for adolescent females, and may not benefit body image. Dislike for swimming is partially attributed to the tight, form-fitting, swimsuits that are associated with increases in self-consciousness and body image dissatisfaction (Reel, Petrie, SooHoo, & Anderson, 2013). Evidence for this contention was provided by Thøgersen-Ntoumanis, Ntoumanis, Cumming, Bartholomew, and Pearce (2011) who demonstrated that wearing tight/revealing exercise attire heightened physically active female university students’ levels of state self-objectification. Among individuals with low self-esteem, this heightened self-
objectification associated with low satisfaction with body shape and size. With regards, the findings of Burgess et al. (2006), they found that attractiveness was marginally higher, and disparagement and feeling fat marginally lower in the aerobic condition, when compared to the swimming condition.

There was little consistency in the physical activity offered as an intervention across included studies. An aerobics based intervention had a positive change on body image (Daley & Buchanan, 1999), with the authors noting that female participants may have greater confidence in their capacity to participate in gender typed ‘feminine’ activities (Clifton & Gill, 1994; Lirgg 1991). A second study delivering an aerobics intervention (Burgess et al., 2006) did not have a significant effect on body image, however, as previously noted, the poor methodology applied in this study, and the consequent lower data quality score mean that less emphasis should be placed on this study in the context of this review. Where a competitive element was implied in the intervention delivered (e.g., training for a 5k race, Waldron, 2007), no significant effect of intervention on body image was observed. It has been suggested that for female adolescents in particular, competitive sports may increase unrealistic expectations and have a negative influence on self-concept, self-esteem and self-confidence (Cox, Schofield, & Kolt, 2010).

Three included studies provided multiple physical activities as interventions. Where this involved self-selected activities along with a discussion component (Lindwall & Lindgren, 2005), positive change in body image was found. By contrast, two studies providing multiple physical activities alongside a logbook and education (Boyd, 1997; Gehrman, et al., 2006) had no significant effect on body image. It may be that presenting the opportunity to partake in self-selected activities was the key factor in determining the positive
change in body image observed following the intervention delivered by Lindwall and Lindgren (2005). Arguably self-selecting exercise activities supports self-determined behaviors, and may therefore create more opportunity to have a positive effect on body image (Thøgersen-Ntoumani & Ntoumanis, 2007). In the study by Lindwall and Lindgren (2005), activities were designed to encourage self-control, pride in their body, and competence through promoting their abilities to meet their needs, and where necessary to engage other resources. Exercise enjoyment was a key aim of this study.

An important consideration when undertaking body image research is the selection of measures used, with assessment errors characterizing much of the work in this area (Thompson, 2004). Thompson (2004) notes that it is vitally important that researchers clearly identify the dimension of body image they wish to investigate, and then select a measure that assesses this specific dimension. Attention to such detail is necessary to help understand which, if any, aspect of body image is responsive to sport and exercise interventions. It is quite plausible that some components may not change (e.g., body image investment), whereas, other components (e.g., weight-specific dissatisfaction) may improve. Thus, clearly articulating and adhering to dimensions of body image underpins the evaluation and advancement of theories of body image (Thompson, 2004). Whilst the measures used (see Table 1), along with the titles of included studies, infer a focus on body image perceptions across the majority of included studies (Burgess et al., 2006; Daley & Buchanan, 1999; Lindwall & Lindgren, 2005; Waldron, 2007), none of the included studies sufficiently acknowledged the dimension of body image assessed, or justify the measure(s) of body image used.
Similarly, measuring physical activity can be a complicated endeavour, as all measures have known limitations (Baranoski, Thompson, Durant, Baranoski, & Puhl, 1993). Failing to sufficiently control basic exercise variables (frequency, duration, and intensity) in order to account for fitness improvements and heterogeneity of outcome measures was a limitation of the included studies (Campbell & Hausenblas, 2009). Physical activity (frequency, intensity and type) was commonly recorded via self-report (Boyd & Hrycaiko, 1997; Burgess et al., 2006; Daley & Buchanan, 1999). This does not provide the most accurate form of recording information, particularly in both pediatric and adolescent populations, as this subjective technique may lead to inaccuracy, falsification, or over, or underestimation of actual physical activity levels (Godin, Jobin, & Bouillon, 1986; Sallis & Saelens, 2000; Shephard, 2003; Sirard & Pate, 2001; Welk et al., 2000). None of the included studies analyzed data pertaining to the intensity of the activity participants engaged with in the intervention. Exercise intensity is positively correlated with psychological benefits in adolescents (Biddle & Asare, 2011). This is therefore a variable to consider both in the design of the interventions, and as a covariate in assessing the effect of interventions on outcome measures that are salient. Usage of accelerometers in gathering data would enable physical activity to be measures with greater precision and confidence. In particular thigh-worn accelerometers support a more sensitive and specific evaluation of exercise frequency, duration, and intensity (Montoye, Pivarnik, Mudd, Biswas, & Pfeiffer, 2016).

With respect to the treatment of data, there were examples where the analysis undertaken was inappropriate, meaning that the findings could not sufficiently address the study aims. For example, Burgess et al. (2006) employed a counterbalanced design including two groups and two conditions across three time points. Whilst this was an example of good
Included studies reported a large number of analyses. The reporting was unclear in some cases, and did not allow for the number of analyses conducted to be discerned (e.g., Boyd & Hrycaiko, 1997). Conducting many analyses increases the possibility of a type one error, with only two studies controlling for this in their interpretation of findings (Daley & Buchanan, 1999; Waldron, 2007). In some cases, small sample sizes precluded the application of multivariate analysis, meaning that repeated paired t-tests (Waldron, 2007) or ANOVA (Boyd & Hrycaiko, 1997) were used. For other studies, it was unclear why some of the analyses were presented. For example, Gehrman et al. (2006) included gender as an independent variable, where it would have been more appropriate to their aims to include pre and post-intervention scores in the analyses as an independent variable, as their study aimed to examine the effect of the intervention on body image. Boyd and Hrycaiko (1997) applied a mean-split based on scores on self-concept, and used this as an independent variable in analyses, although the independent variables were described as the intervention condition versus control condition and the age of participants. Only one study reported a strategy for the imputation of missing variables (Lindwall & Lindgren, 2005). The same study also
reported intent-to-treat analyses, which include all participants who are randomized to a
treatment (including drop-outs) and are therefore more conservative than analyses of only
those who do not drop out.

Conclusion

The present review evidences two interventions which had a positive effect on body
image. These two studies indicate that the use of gender-aligned, or self-selected sport and
exercise activities, undertaken in conjunction with careful discussion around empowering
adolescent females, may have positive outcomes for body image. However, an ability to draw
conclusions regarding the potential for sport and exercise interventions to help promote
positive body image among female adolescents is presently limited by the overall poor
quality of research in this area. There is a need to undertake future research with greater
methodological rigor as detailed by the present systematic review. This includes more careful
attention to considerations such as participant sampling, control conditions/groups,
measurement of key variables, intervention features, and analysis of data.
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Figure 1. Selection of Studies for Inclusion in Review

Records identified through database searching
\((n = 4210)\)

Records screened
\((n = 3073)\)

Full-text articles assessed for eligibility
\((n = 58)\)

Studies included in synthesis
\((n = 6)\)

Duplicates excluded
\((n = 1137)\)

Records excluded (title screen & abstract screen)
\((n = 3015)\)

Full-text articles excluded, with reasons
\((n = 52)\)
1  Table 1
2  Characteristics of included studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Mean Age(^a) (sd)</th>
<th>Design</th>
<th>Sample</th>
<th>Intervention-sport/ exercise type</th>
<th>Frequency and Duration</th>
<th>Measures</th>
<th>Main findings</th>
<th>Mean data quality (sd)</th>
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<tr>
<td>Boyd &amp; Hrycaiko</td>
<td>1997</td>
<td>NR (range 9-16)</td>
<td>Experimental design</td>
<td>A non-random convenience sample of 181 school girls, described as pre, early, and mid adolescence. Subjects scoring in the 50th percentile or lower on the SDQ were assigned to the low self-esteem group.</td>
<td>Three components; (1) physical activity (strength training, CV and agility – precise activities were tailored to the group), (2) education (healthy life style, weight management, healthy role models), (3) self-report (log books tracking own performance).</td>
<td>40-minute sessions over six weeks. Pre-adolescent participants had nine sessions. Early and mid-adolescent groups had 12.</td>
<td>Self-Description Questionnaire I and II (Marsh, 1988) subscales; general self-esteem, physical self-concept, physical abilities, physical appearance.</td>
<td>No significant main effect of intervention on self-esteem (or the physical appearance subscale).</td>
<td>0.67 (0.69)</td>
</tr>
<tr>
<td>Authors</td>
<td>Year</td>
<td>Mean (SD)</td>
<td>Design Description</td>
<td>Sample Description</td>
<td>Measures Pre-, Mid-, Post-</td>
<td>Body Mass Index</td>
<td>Body Attitude Questionnaire</td>
<td>Results</td>
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</tr>
<tr>
<td>Burgess, Grogan, &amp; Burwitz</td>
<td>2006</td>
<td>13.5 (0.3)</td>
<td>Experimental design comparing intervention and comparison groups. Counterbalanced intervention delivery. Measures pre, mid, post-intervention, and 12-week follow up.</td>
<td>50 British school girls from a specialist sports college; selective sampling of participants with low physical self-perception and high body image dissatisfaction.</td>
<td>Fifty-minute classes, twice a week for six-weeks.</td>
<td></td>
<td>Body attitude questionnaire (Ben-Tovim &amp; Walker 1991) Children and Youth Physical Self-perception profile (Fox &amp; Corbin, 1989) Leisure time physical activity questionnaire (Aaron, Kriska, &amp; Dearwater, 1995). Body Mass Index.</td>
<td>Means show attractiveness was marginally higher in the aerobic condition, and disparagement, feeling fat and were marginally lower when compared to the swimming group. No significant differences in pre-to-mid, mid-to-post or pre-to-post BMI scores for both groups.</td>
<td></td>
</tr>
<tr>
<td>Daley &amp; Buchanan</td>
<td>1999</td>
<td>NR (range 15-16)</td>
<td>Experimental design comparing intervention (n = 43) and comparison condition (n = 70). Measures taken pre-and post-intervention.</td>
<td>113 British school girls (from a single-sex school)</td>
<td>Aerobics (warm up, aerobic workout, resistance, cool down and stretch).</td>
<td>One hour of physical education plus one hour of aerobics for five-weeks. Control group partook in one hour of physical education.</td>
<td>Physical self-perception profile (Fox &amp; Corbin, 1989) Participation in physical activity questionnaire (Daley &amp; Parfitt, 1996).</td>
<td>The experimental group improved physical self-worth, sports competence, strength competence, and body attractiveness over time when compared to the comparison group.</td>
<td></td>
</tr>
<tr>
<td>Gehrman, Hovell, Sallis, &amp; Keating</td>
<td>2006</td>
<td>11.5 (0.96)</td>
<td>Experimental design. Random allocation to intervention (n = 49) or comparison condition (n = 35). Measures at pre- and post-intervention.</td>
<td>84 American children (females n = 52, males n = 32). Participants were eligible if their BMI &lt;32, and they were not currently participating in organized sports for three or more days per week. Parent groups taught behavior modification techniques to increase activity and change dietary habits in children. Children participated in fitness sessions and provided information regarding nutrition. Children completed activity logs. The comparison group completed family sessions on the subject of injury prevention.</td>
<td>An eight-week physical activity and nutrition intervention. Frequency and duration of sessions not reported. Control condition was two-hour family sessions, delivered weekly for eight-weeks.</td>
<td>Eating Disorders Inventory-2 (Garner, 1991) Weight concerns scale (Killen et al., 1994), physical maturity – Tanner Scale Drawings (Morris &amp; Uldry, 1980), Body Mass Index, Parental Body Mass Index.</td>
<td>Mean scores for females on body dissatisfaction followed the same pattern for the intervention group when compared to the control group.</td>
<td>1 (0.77)</td>
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<tr>
<td>Lindwall &amp; Lindgren</td>
<td>2005</td>
<td>16.35 (1.56)</td>
<td>Experimental design with random assignment to intervention group (n = 27, or waiting list control group (n = 35). Measures at pre-and</td>
<td>Non-physically active Swedish adolescent girls recruited from schools. Eligible if they were active for less than 20 minutes per day, exercise less than once a Self-selected exercise activities and discussion on healthy lifestyles. Control group had no organized activity.</td>
<td>45-min exercise sessions followed by 15-min healthy lifestyle discussion delivered twice a week for six-weeks.</td>
<td>Physical self-perception profile (Fox &amp; Corbin, 1989), Social physique anxiety scale (Hart, Leary, &amp; Rejeski 1989) Body mass</td>
<td>No significant difference in physical self-perception observed between groups, both groups improved significantly over time. Improvement in social physique</td>
<td>1.16 (0.83)</td>
<td></td>
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<tr>
<td>Waldron</td>
<td>2007</td>
<td>11.51 (0.37)</td>
<td>Mixed design, with no control group. Measures at first and final week of the course.</td>
<td>An American community sample of 34 schoolgirls.</td>
<td>Structured coaching programme based on Harter’s model of competence motivation culminating in a 5km running race.</td>
<td>Ninety minute Girls on Track running sessions, twice a week for eight-12 weeks.</td>
<td>Self-perception profile for adolescents (subscales; physical competence, physical appearance competence, self-worth; Harter, 1988). Semi-structured interviews.</td>
<td>No change in self-perception subscales observed at follow up. Interviews indicated that following intervention, the girls expressed greater self-acceptance, improved fitness, and enhanced knowledge of body care.</td>
<td>0.72 (0.57)</td>
</tr>
</tbody>
</table>

1 Notes.

2 *Where mean age is not reported, age range is provided.

3 ^Mean age is reported from the whole sample, separate data were not available for females.

4 Group sizes NR for each condition.
Table 2

*Quality review scores*

<table>
<thead>
<tr>
<th>Item</th>
<th>Indicator of Quality</th>
<th>Mean</th>
<th>(SD)</th>
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<tr>
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<td>Quality of measures</td>
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<tr>
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<td>Study design</td>
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<tr>
<td>7</td>
<td>Describing those lost to follow up</td>
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<td>0.84</td>
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<td>6</td>
<td>Sample descriptions</td>
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<td>14</td>
<td>Methods of analysis</td>
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<td>Selection is unbiased</td>
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<td>19</td>
<td>Description of findings</td>
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<tr>
<td>10</td>
<td>Description of trial</td>
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<td>0.41</td>
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<tr>
<td>8</td>
<td>Sample size</td>
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<td>0.41</td>
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<td>20</td>
<td>Conclusions</td>
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<td>0.52</td>
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<td>15</td>
<td>Inclusion of effect sizes</td>
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<td>0.55</td>
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<tr>
<td>11</td>
<td>Concealment of randomization from participants</td>
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<td>1.03</td>
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<tr>
<td>4</td>
<td>Follow up</td>
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<td>0.52</td>
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<tr>
<td>9</td>
<td>Randomization</td>
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<td>0.84</td>
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<tr>
<td></td>
<td>Control for confounding variables</td>
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<td>0.41</td>
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<td>-----------------------------------</td>
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<tr>
<td>17</td>
<td>Concealment of randomization from investigators</td>
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</tbody>
</table>

*Note. Item 18 referred to adjustments in analysis made for the differences in timing of follow up data collection. Since none of the studies collected follow up data, this item has been omitted here. Item 12 was omitted as it was not relevant to the included studies.*
Appendix A: Example search strategy

1. Body?image
2. Self?image
3. Physical self?efficacy
4. Body?satisfaction
5. Body?shame
6. Physical self concept
7. Physical self-concept
8. Adolescen*
9. Young?adult
10. Teen*
11. Child*
12. Physical activity
13. Sport*
14. Exercis*
15. Interv*
16. Train*
17. 1 or 2 or 3 or 4 or 5 or 6 or 7
18. 8 or 9 or 10 or 11
19. 12 or 13 or 14
20. 15 or 16
21. 17 and 18 and 19 and 20