

Physical activity interventions targeting perceived body image among adolescent girls

CHIA-LIANG DAI¹, MANOJ SHARMA², CHING-CHEN CHEN³, HALEY LOCKLEY⁴

¹Department of Teaching and Learning, College of Education, University of Nevada, Las Vegas
UNITED STATES

²Department of Environmental and Occupational Health, School of Public Health
University of Nevada, Las Vegas, UNITED STATES

³Department of Counselor Education, School Psychology, and Human Services, College of Education
University of Nevada, Las Vegas, UNITED STATES

⁴University of Nevada, Las Vegas, UNITED STATES

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Abstract:

Background: regular exercise is associated with increased body image; however, several barriers have hindered physical activity participation among adolescent girls and the gender disparity persists through adulthood. The study aimed to review the impact of physical activity interventions on adolescent girls' body image and discuss implications for reducing the disparity. Methods: the articles were systematically searched and reviewed from Web of Science (including MEDLINE) and EBSCOHOST (including Academic Search Premier, Child Development & Adolescent Studies, CINAHL, Education Resource Information Center (ERIC), APA PsycInfo, and SPORTDiscus) databases. Inclusion criteria were studies that: (a) implemented physical activity components, (b) targeted girls aged 10-19 years, (c) measured body image as an outcome, (d) were published in peer-reviewed journals after 2007, (e) and were in the English language. The PRISMA standards were followed to identify included interventions. Results: a total of eight interventions met the inclusion criteria. There were four interventions that employed the randomized controlled trial design. Only one study included long-term follow-up data after interventions while the Physical Self-Perception Profile was the only measure used across different included interventions. Fitness-based physical activity ($n = 5$) was the most common component reported. The majority of included interventions were implemented in the school settings. Two interventions were designed and delivered specifically to adolescent girls who were residing in low-income families or enrolled in schools situated in culturally diverse areas. In terms of efficacy, a total of seven interventions demonstrated an improvement in participants' body image. Conclusions: it can be concluded that physical activity-based intervention seems to be a promising strategy for improving adolescent girls' perceived body image; yet, further studies utilizing rigorous research designs are warranted.

Key Words: - body satisfaction; physical self-perception; sports; exercise

Introduction

Adolescence, a pivotal transition from childhood to adulthood, features its development crisis-identity, in which adolescents search for a sense of self (Erikson, 1968). Body image is a person's perception of their physical self and the thoughts and feelings from the perception, which is developed through broad cultural factors and personal experiences (Gleeson & Frith, 2006). Body image is a predictor of health-related outcomes and psychological well-being in adolescents.

Poor perceived body image has been linked to a higher frequency of alcohol and cigarette use among adolescent girls (Andrew et al., 2016) and symptoms of multiple anxiety disorders during adolescence (Vannucci & Ohannessian, 2018). Body dissatisfaction and associated low self-esteem also have been linked to negative health conditions such as disordered eating (Brechan & Kvale, 2015; Francisco et al., 2015), and depression (Ambresin et al., 2012; Morken et al., 2018). Adolescent girls tend to be more dissatisfied with their body image than boys (Raich et al., 2014) that might be influenced by the perceived social pressure and ideal body appearance identified by specific cultural context (Kosmidou et al., 2015).

Furthermore, adolescent girls experienced varied challenges that may hinder their physical activity participation. Several perceived barriers to participating in physical activity among adolescent girls have been reported including: body dissatisfaction (Satija et al., 2018), feeling incompetent, "girls" school uniform (Watson et al., 2015), peer-influence, competition, concern about safety (Dwyer et al., 2006), insufficient time (Slater & Tiggemann, 2010), teacher attitudes and support, type of activities (Dudley et al., 2010), appearance concern (Standiford, 2013), and gender norms (Satija et al., 2018; Slater & Tiggemann, 2010; Spencer et al., 2015).

One way to improve body image is through exercise (McIntosh-Dalmedo et al., 2018). Abbott and Barber (2011) surveyed 1,002 girls aged 13-18 to examine the relationships between physical activity involvement and body image. Participants were split into aesthetic sports only participant, non-aesthetic, hybrid aesthetic, and non-participant groups. Results revealed that the functional body image was highest among sports participants. The study concluded that involvement in physical activity was associated with greater functional body image compared to those not participating. Similarly, Görner and Reineke (2020) examined the influence of a six-week endurance and strength training program on body composition and physical fitness among young women. The findings showed that the program reduced the circumferences and body fat, and increased physical fitness and muscle mass among the participating women. In another study, Fischetti et al. (2020) found that scores of two body image measures, body uneasiness test and contour drawing rating scale, were significantly lower among the trained group (who regularly practiced sports outside the school hours) than untrained groups (who did not practice any extracurricular physical activity).

Given the existing barriers to adolescent girls' participation in physical activity, perhaps it is not surprising that the amount of physical activity performed by adolescent girls tends to be lower compared to that of adolescent boys and that the disparity persists through adulthood (U.S. Department of Health and Human Services, 2018). Therefore, adolescent girls may need additional support in this specific transition point to facilitate them to maintain the habit of regular physical activity and benefit from engaging in this health-enhancing lifestyle.

McIntosh-Dalmedo et al. (2018) reviewed sports interventions ($n = 6$) conducted between 1997 and 2007 and found that only two interventions revealed significant improvements in one or more measures of body image. Researchers then concluded that there was insufficient evidence to suggest that physical activity interventions can improve body image. To investigate and provide an update on the impact of recent physical activity interventions on adolescent girls' body image, the current study aimed to provide a review of physical activity programs targeting body image among adolescent girls as well as discuss its implications for future programs in hopes to close the gender disparity and promote adolescent girls' health.

Material & methods

Data Extraction

The articles were searched and reviewed from Web of Science (including MEDLINE) and EBSCOhost including the following specific relevant databases: Academic Search Premier, Child Development & Adolescent Studies, CINAHL, Education Resource Information Center (ERIC), APA PsycInfo, and SPORTDiscus. The search was conducted during July 2020 using combinations of the following keywords: physical activity (OR exercise OR sport OR fitness) AND (body image OR body satisfaction OR body dissatisfaction OR physical self-perception) AND (teenager OR adolescent) And girl (OR female). Two researchers completed the extraction process. During the beginning stage of the literature search, titles and abstracts of studies were checked for inclusion. In the later stage, full-text articles were retrieved and examined for inclusion. Two authors independently assessed the eligibility of the studies, then the lists of included studies were compared and disagreements were resolved through discussion.

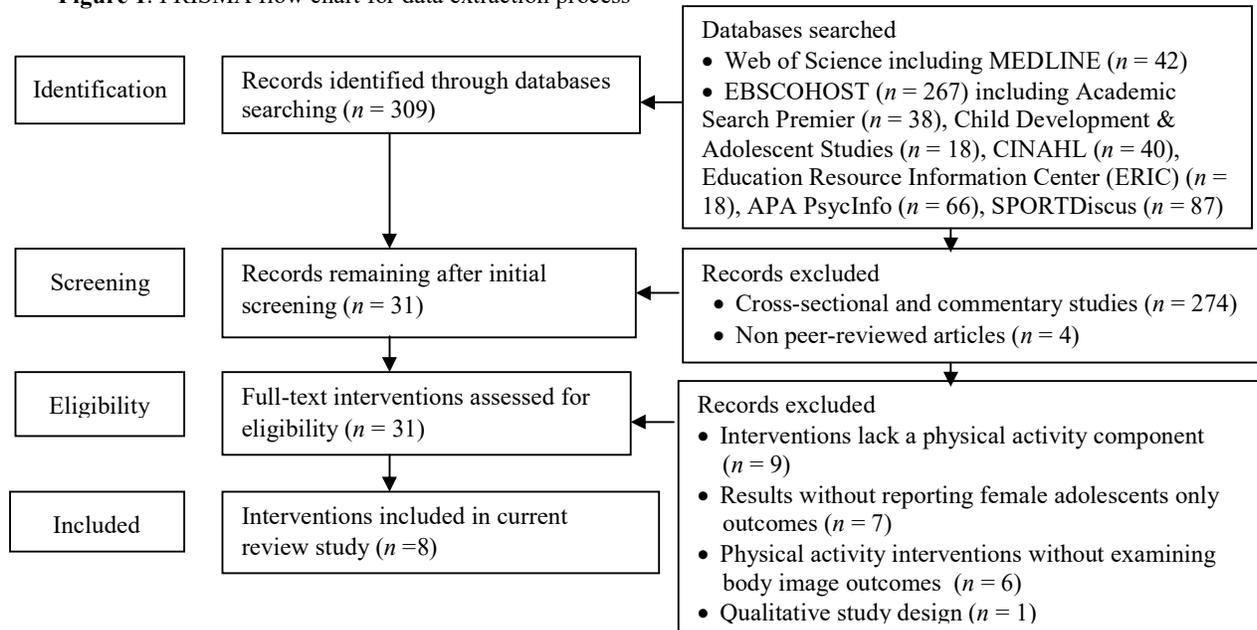
Inclusion and Exclusion Criteria

Inclusion criteria were studies that: (a) delivered physical activity components in the programs, (b) targeted adolescent girls aged 10-19 years old (World Health Organization's definition of an adolescent, an individual in the 10-19 years age group was followed for this inclusion criteria), (c) measured body image as a program outcome, (d) were published in peer-reviewed academic journals after 2007, and (e) were in the English language with full text available. The exclusion criteria included articles that targeted participants not between the ages of 10 and 19, were physical activity-based interventions without measuring body image outcomes, were not published in the English language, were dissertations, review studies, abstracts, conference proceedings, and book chapters. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, Moher et al., 2010) standards were used to identify included studies in this review (Figure 1).

Results

The researchers conducted the search applying inclusion criteria that a total of 309 articles were retrieved, 42 from Web of Science (including MEDLINE) and 267 from EBSCOhost including the following specific relevant databases: Academic Search Premier ($n = 38$), Child Development & Adolescent Studies ($n = 18$), CINAHL ($n = 40$), Education Resource Information Center (ERIC) ($n = 18$), APA PsycInfo ($n = 66$), SPORTDiscus ($n = 87$). After initial screening, cross-sectional and commentary/review studies ($n = 274$), and non-peer-reviewed articles (e.g., thesis, conference abstract) ($n = 4$) were excluded. Among the 31 remaining articles, intervention studies lack a physical activity component ($n = 9$), results without reporting adolescent girls only outcomes ($n = 7$), physical activity-based interventions without examining body image outcomes ($n = 6$), and qualitative study design ($n = 1$) were excluded.

Figure 1. PRISMA flow chart for data extraction process



Eight articles matched the inclusion criteria with four implemented in Australia, two in the United States, one in Poland, and one in Slovakia. Among eight included interventions, four employed the randomized controlled trial and four applied the quasi-experimental as the research design. Theories used in those interventions included social cognitive theory, and approaches that emphasized motivation, encouragement, goal-setting. A total of seven different measures were utilized to assess participants' body image in the studies reviewed. Physical Self-Perception Profile ($n = 2$, Fox & Corbin, 1989) was the only one measure used across different studies. Only one study included long-term follow-up data after interventions (Tirlea et al., 2016). Fitness-based physical activity ($n = 5$) was the most common component reported along with mixed physical activities and sports ($n = 3$). The sample sizes ranged from 17 to 171 participants. One study was implemented for female and male participants but data were reported separately (Contreras-Jordán et al., 2017). The majority of the studies ($n = 6$) were school-based interventions, except two were implemented in the community settings. The duration of intervention ranged from six weeks to six months. Two studies offered body image discussion sessions combined with the physical activity components (Cicomascolo & Grossi, 2008; Tirlea et al., 2016). Finally, seven interventions reported an improvement in participants' body image at post-intervention assessments. Table 1 presents an overview of those physical activity interventions targeting perceived body image among adolescent girls.

Table 1 Summary of Physical Activity Interventions Targeting Body Image among Adolescent Girls

Author(s)/ year/ country	Sampling frame/ demographics	Study design/setting	Intervention component/assignment, duration, number of sessions	Body image measures/timing of measurement	Highlighted outcomes
Lander et al., 2019/ Australia [23]	171 7th grade adolescent girls ($M = 12.48 \pm 0.34$); sample was largely Australian (74.3%)	Cluster randomized controlled trial design 12-week school-based teacher-led program during PE	Intervention ($n = 79$): 12 weeks with each session lasting 90 min delivered within regular PE sessions by the PE teacher. SAAFE (supportive, active, autonomous, fair and enjoyable) teaching principles (Lubans et al., 2017) and the Canadian Agility and Movement Skill Assessment were utilized to plan subsequent PE lessons. Teaching principles were informed by self-determination theory (Deci & Ryan, 1985), achievement goal theory (Nicholls, 1984), competence motivation theory (Harter, 1982; Weiss & Amorose, 2005), and Epstein's TARGET framework (Epstein, 1989). Control ($n = 92$): participated in usual 90 min PE lessons (e.g., soccer and softball).	Physical Self-Perception Profile (Fox & Corbin, 1989)	There were significant intervention effects on adolescent girls' physical self-perception ($t(168) = 7.10, p < 0.0001$).
Plevková & Peráčková, 2019/Slovakia [24]	35 adolescent girls aged 16 to 17 years old ($M = 17.05$); 2nd grade of	Quasi-experimental design: nonequivalent groups design	Intervention ($n = 15$): six-week strength and endurance circuit training (twice a week lasted 45 min). Control ($n = 20$): attended regular lessons of physical education and	Contour Drawing Rating Scale (Thomson & Gray 1995)	The significant intervention effect was noticed in the experimental group in the pre- and post-test

	secondary school in Bratislava	Six-week school-based program during PE	sport.		on Contour Drawing Rating Scale ($p = 0,003$).
Contreras-Jordán et al., 2017/Australia [25]	21 adolescent girls aged 12 to 15 years old; body mass index (BMI) higher than the 85th percentile	Quasi-experimental design: nonequivalent groups design Six-month school-based extracurricular physical activity program	Intervention ($n = 14$): 90 minutes/session included strength training and cardiovascular training thrice a week for six months. Control ($n = 7$): did not participate in the intervention.	Body Image Assessment Scale (Gardner et al., 1999)	The intervention group did show significant improvements in the ideal body variable ($p = 0.03$). The body distortion ($p = 0.06$) and body dissatisfaction ($p = 0.38$) variables also improved but not significantly. There were no significant differences found in the body image variables between intervention and control groups.
Kantanista et al., 2017/Poland [26]	82 adolescent girls aged 16 to 18 years old ($M = 17.25$)	Quasi-experimental design: nonequivalent groups design Eight-week school-based program	Eight-week walking-based intervention Do your best group ($n = 26$): participants were given one goal after the collection of baseline measurements. The only feedback was the information from pedometers regarding the number of steps the participants performed. Predetermined goals group ($n = 56$): using pedometers and a goal-setting strategy with steps goals. In the predetermined goals group, baseline steps were collected and a plan was developed for each participant. Participants with step goals predetermined by the researcher based on their baseline steps data. Participants in this group were divided into two groups, goal achieved group ($n = 28$) and goals not achieved group ($n = 28$).	Body Investment Scale (Orbach & Mikulincer, 1998)	Participants with predetermined goals that achieved those goals, had a higher satisfaction with body image as opposed to those who did not have goals or did not complete their goals ($F = 3.60, p = 0.03, \eta^2 = 0.08$).

Lander et al. (2019) implemented a school-based randomized controlled trial intervention for 171 adolescent girls in Australia. The 12-week intervention was delivered by teachers within regular physical education sessions. The intervention group received physical activity lessons informed by the Canadian Agility and Movement Skill Assessment data. The intervention also applied teaching principles featured SAAFE (supportive, active, autonomous, fair, and enjoyable) and was designed to create a supportive environment to facilitate participants to master their movement skills and enhance participants' autonomous motivation. The control group participated in regular physical education in which sports such as soccer and softball were offered. There were significant intervention effects on adolescent girls' physical self-perception. Next, a six-week strength and endurance circuit training intervention was delivered by Plevková and Peráčková (2019) during the physical education lessons in a school in Slovakia. In each 45-min lesson, the circuit training consisted of eight to 12 numbers of exercises and three circles. The duration of every exercise in the circles was 30 seconds, the recovery cycle between the two exercises was 15 seconds, the recovery cycle between the two circles was two min. The control group attended the regular lessons of physical education and sports. The study found that statistically significant positive changes in the results of perceived body image among the intervention group. To investigate the influence of a six-month physical activity program on adolescent girls' body perception, Contreras-Jordán et al. (2017) delivered the program for adolescent girls with a body mass index (BMI) higher than the 85th percentile in Australia. The physical activity component in the intervention consisted of strength training and cardiovascular training. After the physical activity intervention, the participants in the intervention obtained significant improvements in the ideal body variable. Although the effects of physical activity programs on body image have been studied, interventions implemented for overweight adolescent girls are scarce. This study offered information on the effects of a physical activity program targeting body image among overweight adolescent girls.

In Poland, Kantanista et al. (2017) assessed the effects of an eight-week walking intervention using goal-setting strategies with stepwise goals on adolescent girls' body image. The baseline steps were collected for all participants. In the predetermined goals group, the goals for the following week were predetermined progressively based on an additional percent increase (i.e., 10% in the second week, 15% in the third and fourth

week, 20% in the fifth and sixth week, to 25% in the seventh and eighth week) of the baseline number of steps. In the do your best group, participants were given one goal after the collection of baseline measurements. The only feedback was the information from pedometers regarding the number of steps the participants performed. At the end of the intervention, participants with predetermined goals who achieved those goals had higher satisfaction with body image as opposed to those who did not complete their goals or did not have the progressive goal planning.

In a community-based health club physical activity program, 35 sessions over 14 weeks were delivered by McNamee et al. (2017) off-campus in a studio that is one block away from the campus in the USA. The intervention received 90 min health-related fitness sessions with time distribution 40% in cardiovascular activities, 40% in muscular strength and endurance activities, and 20% in flexibility activities for 70 min; for the final 20 minutes of each session was instructor-led whole-group fitness activities (e.g. yoga, aerobic dance, pilates, physioball, low-organized games such as simple tag game variations, modified small-sided games such as ultimate frisbee, and cooperative games). The activities included were generated by asking participants about their preference in type of physical activity with a focus on cardiovascular and muscular fitness and flexibility in the first week of the intervention. To provide a degree of choice for the participants, two different activities (e.g. yoga, physioball, and Zumba) were offered during the group fitness time. After the intervention, participants reported greater improvements in their physical self-concept, more positive feelings about appearance, and positive global statements about their physical selves.

Another community-based program, Girls on the Go!, utilized a randomized controlled trial design that was implemented over a 10-week period by Tirlea et al. (2016) for 122 adolescent girls enrolled in schools situated in culturally diverse areas of high social disadvantage in Australia. Participants were referred by school staff, teachers, and parents and described to have poor body image, without participation in sports or exercise, or overweight or underweight. The intervention was underpinned by an empowerment model that involved interactive and experiential learning approaches. The control group was assigned to a waiting list to receive the intervention after the active treatment group. Participants' body satisfaction was not found significantly improved after the intervention, yet other psychological outcomes were found significantly increased and the gains were retained after six months of follow-up. What this study adds to the literature is that the intervention was offered for both underweight and overweight adolescent girls and those who are culturally disadvantaged, and the study was the first randomized control trial conducted outside the school environment setting.

Dudley et al. (2010) implemented an 11-week school-based randomized controlled trial physical activity program after Thursday lunch break in a school term in Australia. The school was located in south-west Sydney with a high proportion of students from low-income and linguistically diverse backgrounds. In a focus group prior to the intervention, participants discussed what physical activities they enjoyed or were interested in participating in. Then the physical activity program was designed to reflect those activities (including yoga, pilates, dance, tennis, and aquatic games) identified during the discussion. The control group continued with the existing school sport lessons. The intervention was based on Social Cognitive Theory emphasizing the importance of physical activity, perceived competence of physical activity, enjoyment of the physical activity, and the utilization of existing school sporting infrastructures. At follow-up assessments, girls in the intervention group showed greater improvement in body image compared with those in the control group.

Last, Ciccomascolo and Grossi (2008) examined the effect of an eight-week randomized controlled trial physical activity program-GoGirlGO! on urban adolescent girls' body image in the USA. Each session consisted of 40 min physical activity and 20 min discussion about a particular professional athlete's story (e.g., former soccer star Mia Hamm, Paralympian Aimee Mullins, and Olympic softball player Lisa Fernandez) and health-related lessons (e.g., body image, bullying, emotions, etc.). Various activities such as dance, basketball, soccer, softball, jump rope, badminton, volleyball, team-building games, and power walking were chosen to represent the interests of different ethnicities and cultures. New activities, badminton and power walking, were introduced in order to expose adolescent girls to experience diverse lifelong physical activity. The control group experienced the same 40 min physical activity as the intervention group did, but without the discussion part. The intervention group showed significantly lowered scores in weight dissatisfaction compared to the control group.

Discussion

There is a dearth of literature regarding the impacts of physical activity-based interventions on body image specifically targeting adolescent girls. Given the barriers to physical activity adolescent girls face today, which has prohibited them from receiving the overall health benefits of engaging in physical activity, adolescent girls may need additional support to facilitate them to maintain this health-enhancing lifestyle-physical activity, and subsequently improve their perceived body image. This review intended to investigate the effectiveness of recent physical activity intervention on body image in adolescent girls. Seven out of eight interventions reported a positive impact on body image measures among participating adolescent females.

A review study investigating the effects of sport and exercise interventions conducted between 1997 and 2007 on body image among adolescent girls, and found that only two studies utilized randomized controlled trial design while only two out of six interventions yielded a significant and positive change in body image outcomes compared to the control conditions. The researchers indicated that the quality of research design (e.g.,

lack control groups, and poor sampling strategies) should be improved and future studies were needed to examine the efficacy of sport or exercise programs on adolescent girls' body image (McIntosh-Dalmedo et al., 2018). Yet, the current study found that the majority of interventions from 2008 to 2020 ($n = 8$) yielded positive outcomes on participants' body image except for one study (Tirlea et al., 2016). Though most interventions reported positive program impacts on measured body image outcomes; nonetheless, limitations existed concerning the study design and assessment tools among these recent interventions in which half of interventions ($n = 4$) applied the quasi-experimental design and use of non-consistent measures across studies ($n = 7$). Thus, the results should be interpreted with caution.

Regarding intervention components, the most commonly utilized type of physical activity among included interventions was fitness-based physical activity (e.g., bodyweight exercise, aerobic training, strength, and endurance circuit; $n = 5$). Fitness-based physical activity, one type of lifelong physical activity, such as non-equipment, weight-based training and running/walking should be promoted in future programs because it can be modified and performed everywhere which may contribute to increased physical activity engagement. Besides, fitness-based physical activity usually requires the whole body movement, involves several fundamental body movements such as push, pull or jump squat movements, and can elevate breathing and heart rates. Findings of a previous study showed that moderate or vigorous physical activities produced greater effects on perceived body image compared to lower intensity activities (Hausenblas & Fallon, 2006). Improving an individual's overall fitness can also establish the basic foundation no matter what sports or physical activity she chooses to engage in. Research findings showed that greater actual and perceived fundamental movement competences were associated with higher physical activity participation (Bardid et al., 2016; McIntyre et al., 2015). With the barriers adolescent girls face, it is not surprising that adolescent girls performed lower on both actual and perceived fundamental movement competences than adolescent boys (Barnett et al., 2016; Lander et al., 2017). Future interventions should consider utilizing customized fitness-based physical activity which may facilitate adolescent girls to achieve recommended moderate and vigorous physical activity levels, better fundamental movement competences as well as enhanced perceived body image.

In the intervention delivered by Ciccomascolo and Grossi (2008), multiple physical activities were chosen that represented interests of different ethnicities and cultures. Likewise, in Dudley et al. (2010) and McNamee et al. (2017) interventions, physical activities were offered based on the participants' inputs regarding what activities they enjoyed or were interested in participating in. In these studies, the intervention groups showed an improvement in body image. It might be because it provides participants the opportunity of self-selected physical activities and physical activities representing interests of participants from a variety of different cultures. The participant ownership may also have helped maintain participants' motivation and confidence which may then contribute to the positive body image outcomes in their interventions.

Two studies reviewed included discussion sessions with topics on body image along with physical activity units in their interventions (Ciccomascolo & Grossi, 2008; Tirlea et al., 2016), yet only in Ciccomascolo and Grossi's (2008) intervention that participants' body image was improved at the end of the intervention. Interventions targeting body image by utilizing other components such as peer support (Mcvey et al., 2003), mental training (Najafabadi et al., 2017), counseling service (Huang et al., 2007), and body perception lessons (Richardson & Paxton, 2010) have demonstrated positive changes in body image outcomes. Future studies are needed that consider examining the impact of the multi-component intervention on adolescent girls' body image by integrating the aforementioned elements with physical activity.

Theories used in included studies were Social Cognitive Theory, and approaches emphasizing motivation, encouragement, and goal-setting. For example, in Kantanista and colleagues' intervention (2017), participants who recognized the predetermined goals and achieved those goals had a higher body image satisfaction compared to those whose goals were not adjusted based on their progress or those with adjusted goals but did not complete their goals. The goal-setting approach with the progress monitoring might have helped adolescent girls increase their motivation and self-confidence in performing physical activity and enhance their perceived body image. Multi-component interventions, specifically, embedded with a theory (e.g., goal-setting) (Stewart & Sharma, 2020) may be more effective to yield positive changes in adolescent girls' body image perceptions.

Two interventions were designed and delivered specifically to adolescent girls who were residing in low-income families or enrolled in schools situated in culturally diverse areas (Dudley et al., 2010; Tirlea et al., 2016). Among these two interventions, only one study found that the intervention group showed greater improvement in body image compared to control (Dudley et al., 2010). Moreover, only two interventions were implemented for adolescent girls who are overweight or underweight (Contreras-Jordán et al., 2017; Tirlea et al., 2016) in which only in one study the intervention group showed significant improvements in the body image. Future interventions should recognize the needs of this specific population given that adolescent girls experiencing high social disadvantage may suffer from accumulated disadvantages and need additional support to develop a healthy body image.

The majority of included interventions were implemented in the school settings. School teachers play a major role in influencing students' behaviors. Among six school-based interventions, two of them were teacher-

led programs in which school teachers delivered the programs and served as program facilitators. Both studies yielded positive body image outcomes. It might be because teachers participated in physical activity with their students and served as role models engaging in physical activity. Implementing health promotion programs in the school setting is fairly common which provides school students with access to engage in developing a healthy lifestyle. Therefore, expanding school-based physical activity programs such as before, during (e.g., before or after lunchtime), or after school, maybe a promising way to improve body image for a large number of students (Kennedy et al., 2019).

Several lessons were learned from these reviewed interventions, perhaps during regular physical education sessions, physical education teachers could consider incorporating multiple physical activity options and encourage adolescent girls to choose the type of physical activities they would like to involve in (Dai, 2019). Body image or healthy lifestyle discussion and the theory-based or motivational approaches should also be utilized in hopes of building a positive body image among school adolescent girls.

Finally, only one study applied longer-term follow-up assessments to examine the lasting impact of the program on outcomes measured (Tirlea et al., 2016). Future studies should also utilize different follow-up time points to assess the lasting impact of the program on body image. Moreover, the body changes during this period of life may have exacerbated adolescent girls' concerns about body image (Fernández-Bustos et al., 2019). Additional support is needed to facilitate girls to develop psychological and mental strengths and increase their subjective well-being during this critical life transition-adolescence.

Limitations of the Review. Several limitations exist in this review. The purpose of this study was to focus on reviewing the impact of physical activity programs specifically on adolescent girls in the hope of providing implications for future research and school health policies targeting this population. Thus physical activity programs implemented for both adolescent girls and boys without reporting data separately were excluded from this review. Another limitation of this study was its focus on the physical activity elements within an intervention, so an intervention including physical activity and non-physical activity components were included in this review; as other interventions targeting body image without the components of physical activity were excluded. Finally, we did not search the grey literature and all the databases, so some studies may have been left out.

Limitations of the Included Interventions. Limitations of those interventions reviewed pertained to the study design and assessment plan. Although seven out of eight interventions showed positive impacts on participants' body image at the post-intervention assessments, only half of interventions applied the randomized controlled trial design, and only one study collected long-term follow-up assessment data after the intervention. Also, there was a wide range of body image measures used across included interventions. This suggested the need for standardization of outcome measures and the need to utilize rigorous research designs with data collection at multiple time points. Finally, publication bias may have played a role in the interpretation of the results as the studies with negative outcomes may not have been published.

Conclusions

The current study intended to provide a review of the impact of programs with physical activity components on perceived body image among adolescent girls. The results of this review study indicated that being involved in the physical activity-based program may improve perceived body image in adolescent girls. This population is experiencing a dramatic decline in physical activity involvement and continually plagued by body image issues. Thus, additional support in the school and community levels should be provided to help adolescent girls maintain health-enhancing lifestyles and improve their personal health. Future theory-based interventions utilizing fitness-based physical activity with longer-term follow-up assessments are warranted to facilitate adolescent girls to develop a positive body image.

Conflicts of interest - The authors declare no conflict of interest.

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