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Biological and Sociocultural Differences in Perceived Barriers to Physical Activity

Amber Vermeesch
University of Portland, vermeesc@up.edu

Jiying Ling

Vicki R. Voskuil

Marion Bakhoya

Stacey M. Wesolek

See next page for additional authors

Abstract

Background: Inadequate physical activity (PA) contributes to the high prevalence of overweight or obesity among U.S. adolescent girls, but barriers preventing adolescent girls from meeting PA guidelines have not been thoroughly examined.

Objectives: The threefold purpose of this study was to: 1) determine pubertal stage, racial/ethnic, and socioeconomic status (SES) differences in perceived barriers to PA; 2) examine relationships between perceived barriers and age, body mass index (BMI), recreational screen time, sedentary activity, and PA; and 3) identify girls' perceived barriers.

Method: Girls (N = 509) from eight Midwestern U.S. schools participated. Demographic, pubertal stage, perceived barriers, and recreational screen time data were collected via surveys. Height and weight were measured. Accelerometers measured sedentary activity, moderate-to-vigorous PA (MVPA), and light PA plus MVPA (LMVPA).

Results: Girls of low SES reported greater perceived barriers to PA than those who were not of low SES (1.16 vs. .97, p = .013). Girls in early/middle puberty had lower perceived barriers than those in late puberty (1.03 vs. 1.24, p < .001). Girls' perceived barriers were negatively related to MVPA (r = -.10, p = .032) and LMVPA (r = -.11, p = .021). Girls' perceived top five barriers included lack of skills, hating to sweat, difficulty finding programs, being tired, and having pain.

Discussion: Innovative interventions, particularly focusing on skill development, are needed to assist girls in overcoming their perceived barriers to PA.

Key words: Adolescent, Female, Exercise, Puberty

Biological and Sociocultural Differences in Perceived Barriers to Physical Activity among 5th – 7th Grade Urban Girls

Inadequate physical activity (PA) contributes to the high prevalence of obesity in 12-19 year-old U.S. girls (20.7%) (Ogden, Carroll, Kit, & Flegal, 2014). The pervasive negative effect of inadequate PA participation on body weight status indicates an urgent need to reverse this disconcerting behavioral trend (Kann et al., 2014). Only 17.7% of adolescent girls in the U.S. report attaining recommendations proposed by both the U.S. Department of Health & Human Services (2008) and World Health Organization (2010) that call for at least 60 minutes of moderate-to-vigorous PA (MVPA) daily (State of Michigan, 2014). Consistently, studies support a sharp decline in girls' PA from ages 9 to 12 (Dumith, Gigante, Domingues, & Kohl, 2011). The decrease is particularly notable among urban-dwelling low socioeconomic status (SES) girls (Wang et al., 2007). Based on 2013 U.S. Youth Risk Behavior Survey data, the prevalence of PA participation for at least 60 minutes daily was higher among White (37.5%), Black (37.2%), and Hispanic (33.9%) adolescent boys than among White (18.7%), Black (16.0%), and Hispanic (17.4%) adolescent girls, respectively (Kann et al., 2014).

Attaining adequate PA during adolescence is critical for reducing risks associated with elevated body mass index (BMI), including the development of type 2 diabetes and cardiovascular disease (Belcher et al., 2010). Over a third (33.8%) of U.S. girls, 12-19 years old, are overweight or obese, and over a fifth (20.7%) are obese (Ogden et al., 2014). Racial and ethnic differences exist in weight status with more Black (22.8%) and Hispanic (19.2%) girls being overweight than White girls (14.3%), and more Black girls (16.7%) than Hispanic (11.2%) and White (9.7%) girls being obese (Kann et al., 2014). Because both PA and obesity can track

into adulthood, understanding perceived barriers that prevent girls from establishing a habit of regular PA is vital (Clarke, O'Malley, Johnston, Schulenberg, & Lantz, 2009).

Acquiring a comprehensive understanding of perceived barriers to PA can be challenging due to differences in noted among various subgroups of girls. For example, difficulty accessing PA programs or classes, is a noted perceived barrier for low SES youth (Humbert et al., 2006). Cultural considerations and peer opinion must be considered in perceived barriers to PA among various subgroups. Black and Hispanic girls are more accepting of larger body size than White girls, as evidenced by White girls with a BMI closer to obese were found to have less social desirability than White girls with a BMI closer to normal weight by their peers (Boyington et al., 2008; Lanza, Echols, & Graham, 2013). Peer social environment, including peer PA levels, especially among female friends, is another perceived barrier to PA for adolescent girls (Larson, Wall, Story, & Neumark-Sztainer, 2013). Kelly et al. (2010) reported that perceived barriers to PA were negatively associated with accelerometer-measured PA for White, but not Black, girls. Dishman, Dunn, Sallis, Vandenberg, and Pratt (2010) found that perceived barriers to PA were correlated inversely with accelerometer-measured PA for girls in 8th grade, but not 6th grade. One quantitative study with girls identified barriers to PA based on academic grade (6th, 7th & 8th) and race (Black and White; Robbins, Pender, & Kazanis, 2003). Although some differences were evident, the sample size was too small to draw any definitive conclusions (N = 77; Robbins et al. (2003)). These findings indicate that understanding the relationship between perceived barriers to PA and the behavior itself and identifying specific barriers to PA require subgroup analysis.

Despite a strong likelihood of increasing PA when relevant barriers are effectively targeted, gaps in the literature remain regarding the influence of biological and sociocultural factors on girls' perceived barriers to PA and the relationship between barriers and PA, as well as

sedentary activity (Camacho-Minano, LaVoi, & Barr-Anderson, 2011). Interventions designed to overcome perceived barriers to PA by providing access to PA programs or including strategies for promoting positive perceptions regarding PA have shown limited success, indicating that continued investigation of biological and sociocultural differences may offer important insights for tailoring interventions to address the unique needs of varied population subgroups (Camacho-Minano et al., 2011; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007). Because physical transformation of the body during adolescence can modify adolescents' self-perceptions, attitudes, and behavior, examination of pubertal stage differences in perceived barriers to PA is warranted (Waylen & Wolke, 2004). For example, White girls have identified embarrassment or self-consciousness as a barrier more than other races (Robbins et al., 2003). A thorough investigation of the barriers that may underlie the decline in girls' PA that begins around the onset of adolescence, particularly among adolescent girls of low SES and minority backgrounds, is also necessary to understand existing disparities. Therefore, the threefold purpose of this study was to: 1) determine pubertal stage, racial/ethnic, and SES differences in perceived barriers to PA; 2) examine relationships between perceived barriers and age, body mass index (BMI), recreational screen time, sedentary activity, and PA; and 3) identify girls' perceived barriers of the total sample and by pubertal stage, race, and SES.

METHODS

Study Design, Participants, and Setting

In the first intervention year (2012-2013) of a group randomized controlled trial (2011-2016), eight Midwestern U.S. schools were randomly assigned to either receive a multi-component PA intervention called "Girls on the Move" or serve as a control (Robbins et al., 2013). The trial was based on the Health Promotion Model and Self-Determination Theory

(Pender, Murdaugh, & Parsons, 2011; Ryan & Deci, 2000). The trial protocol is described elsewhere (Robbins et al., 2013). Girls meeting the following inclusion criteria were selected for participation on a first come first serve basis: (1) 5th-7th-grade girls; (2) available and willing to participate in the PA club 3 days/week for 17 weeks; (3) available for 9-month follow-up after intervention ends; and (4) able to read, understand, and speak English. Exclusion criteria included: (1) involved in or planning to be involved in school or community sports or other organized PAs that require participation 3 or more days/week after school; and (2) having a health condition precluding safe MVPA (Robbins et al., 2013).

Baseline data collected during fall 2012 from 5th-7th grade girls (N = 509) in the eight schools were used for this comparative and correlational study. The schools were located in four cities with 39.7%, 20.2%, 36.8%, and 27.1% of the population being below poverty level compared to 16.3% in the state, and the annual income per capita ranged from $14,454 to $20,891 compared to the state level of $25,547 (U.S. Census Bureau, 2014). Approximately 3.0-14.3% of the population was Hispanic, and 23.7-56.6% was Black (U.S. Census Bureau, 2014). The proportion of students involved in free or reduced-price lunch programs (financially disadvantaged) ranged from 59.7% to 95.0% (M = 74.0%; State of Michigan, 2014). On average, 30.3% of the students were White (min-max: 1.2-49.2%), 58.4% were Black (min-max: 23.2-100%), and 9.2% were Hispanic (min-max: 2.9-18.7%; State of Michigan, 2014) .

Measures

Demographic survey. The demographic survey had questions that addressed age, academic grade, race, ethnicity, and SES. Enrollment in the free or reduced-price lunch program served as a proxy for SES. Parents/guardians completed the survey in collaboration with their daughters.

Pubertal stage. Pubertal stage was categorized as early, middle, and late puberty, and was assessed by the Pubertal Development Scale (Peterson, Crockett, Richards, & Boxer, 1988). Validity and reliability have been established with girls as young as those in the 5th and 6th grade (Carskadon & Acebo, 1993; Peterson et al., 1988). Pubertal stage was computed by summing self-reported scores for underarm hair growth, breast development, and menarche. Response choices to measure hair and breast development included: (1) no; (2) yes, barely; (3) yes, definitely; and (4) development complete. For menarche, girls reported either: no menstruation (indicating early or middle puberty) or yes, menstruation started (indicating late puberty; Carskadon & Acebo, 1993). Girls reporting no menstruation with summed scores ≤ 3 for underarm hair growth and breast development were considered to be in early puberty, whereas those having summed scores > 3 were categorized as being in middle puberty (Carskadon & Acebo, 1993).

Body mass index (BMI). BMI was calculated with girls' height and weight (kg/m^2) without shoes using standardized procedures described elsewhere (Robbins et al., 2013).

Recreational screen time, sedentary activity, and physical activity. Recreational screen time was calculated as the amount of time spent viewing television (TV), talking on the phone or sending messages, and playing video games or using the computer or Internet for non-school-related work (Costigan, Barnett, Plotnikoff, & Lubans, 2013). Girls responded to six items when reporting number of hours that they spent engaging in each activity on a typical school day and weekend-day. Response choices ranged from 0 = *I do not* (the specific behavior) to 5 = *5 or more hours per day*. For this study, Cronbach's alpha was .82 with item-total correlation coefficients ranging from .52 to .63.

To assess minutes per hour of sedentary activity, MVPA, and light plus MVPA (LMVPA), the ActiGraph® GT3X-plus accelerometer was used. Girls were asked to wear accelerometers seven consecutive days except when showering, swimming, and sleeping at night. Data generated for at least eight hours daily on at least three weekdays and one weekend day were considered adequate for analysis (Patnode et al., 2011). Investigators downloaded and processed the data using the ActiLife® software program. Evenson, Catellier, Gill, Ondrak, and McMurray (2008) cut points for children were used to analyze data. Trost, Loprinzi, Moore, and Pfeiffer (2011) found Evenson et al. (2008) cut points to be acceptable among 5- to 15-year-old children and adolescents. Average minutes per hour were determined to account for variable wear time.

Perceived barriers to physical activity. A 9-item Perceived Barriers Scale was previously developed to measure perceptions of obstacles interfering with PA (Robbins, Wu, Sikorski, & Marley, 2008). Response choices included: 0 = *not at all true;* 1 = *not very true;* 2 = *somewhat true;* and 3 = *very true.* Higher scores indicated a more negative perception. Acceptable face, content, and construct validity, and reliability estimated by Cronbach's alpha of .78 have been reported (Robbins, Sikorskii, Hamel, Wu, & Wilbur, 2009; Robbins et al., 2008). Prior to this study, seven new items were added to the scale based on recommendations from 6th-8th grade girls (N = 25) participating in focus groups conducted by one of the authors (Robbins et al., 2013). Examples of items include: "I have some pain from activity", "The weather is bad", and "I am too busy". Additional items enhanced the comprehensiveness of the scale in this study, resulting in an increased Cronbach's alpha of .85 with item-total correlation coefficients ranging from .35 to .57.

Procedures

The University Institutional Review Board (IRB) and school district administrators approved the study. Recruitment procedures and response rates have been reported (Ling, Robbins, Resnicow, & Bakhoya, 2014; Robbins et al., 2013). During data collection, girls completed an iPad-delivered survey that included the perceived barriers to PA and recreational screen time measures. Data collectors measured height and weight to calculate BMI. Each girl completed the Pubertal Development Scale behind a privacy screen. Afterwards, girls watched an instructional video on wearing the accelerometer and received an accelerometer, along with written instructions to share with parents/guardians. Additional details are described elsewhere (Robbins et al., 2013).

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS 21.0). Independent samples t-tests and one-way ANOVA examined biological (e.g. pubertal stage) and sociocultural (e.g. race/ethnicity, SES) differences in BMI, recreational screen time, sedentary activity, PA, and perceived barriers. Pearson product-moment bivariate correlations were calculated to examine the associations among age, BMI, recreational screen time, sedentary activity, PA, and perceived barriers. Four-hundred-sixty-two (90.8%) girls provided acceptable accelerometer data for analysis. On average, they girls wore the accelerometer for about 14 hours per day (*SD* = 1.81, min-max: 10.25-23.29). Identification of the top five perceived barriers was based on percentages of girls selecting "somewhat true" or "very true." A mixed effects model was applied to examine the random nested effects of school and fixed effects of age, ethnicity, race, age, SES, puberty stage, BMI *z* score, and perceived barriers on MVPA.

RESULTS

Demographics

Almost four-fifths of the girls were 11-12 years old (n = 404, 79.4%), and slightly over half were in the 6th grade. Greater than half were Black, and the majority participated in the free or reduced-price lunch program. Due to the small number of girls in early puberty (n = 15, 2.9%), early and middle puberty were collapsed into a new category called early/middle puberty (n = 300, 58.9%). The remaining girls were in late puberty. All girls in late puberty, but none in early/middle puberty, had started menstruation. Table 1 presents additional sample characteristics.

BMI, Recreational Screen Time, Sedentary Activity, and Physical Activity

Over half of the girls were overweight (21.5%) or obese (32.3%). Significant racial differences in BMI [$F_{(504,2)}$ = 6.55, p = .002] and BMI z-score [$F_{(504,2)}$ = 3.77, p = .024] occurred. Specifically, Black girls had higher BMI (M = 23.55, SD = 5.64 vs. M = 21.39, SD = 4.45) and BMI z-score (M = 1.08, SD = 1.02 vs. M = .79, SD = .85) than White girls. Girls in late puberty had a higher BMI z-score than those in early/middle puberty (see Table 2). No SES differences in BMI occurred. BMI was positively correlated with age (r = .16, p < .001) and self-reported recreational screen time (r = .11, p = .014), but negatively correlated with MVPA (r = -.12, p = .012).

Girls reported an average of 6.21 hours of total daily recreational screen time, with a mean of 5.70 hours (SD = 3.44) on school days and 6.72 hours (SD = 3.64) on weekend-days. Average time in sedentary activity was 38.24 minutes/hour. Girls participated in 3.07 minutes/hour of MVPA with a maximum of 8.56 minutes/hour. Significant racial differences in recreational screen time emerged [$F_{(503,2)}$ = 6.90, p = .001] with Black girls reporting more recreational screen time than White girls (M = 6.64, SD = 3.40 vs. M = 5.35, SD = 3.06, p = .002). Early/middle puberty girls participated in more LMVPA and MVPA and had less

recreational screen time and sedentary activity than those in late puberty (see Table 2). Age was positively correlated with sedentary activity (r = .25, p < .001) and recreational screen time (r = .25, p < .001), but negatively correlated with MVPA (r = -.21, p < .001) and LMVPA (r = -.25, p < .001).

Table 3 presents the random and fixed effects of school, age, ethnicity, race, age, SES, puberty stage, BMI *z* score, and perceived barriers on MVPA. The two significant predictors for MVPA were puberty stage and age. Specifically, girls in early/middle puberty participated in an average of .47 minutes/hour higher of MVPA than peers in late puberty. With girls age increasing by one year, their MVPA decreased by .26 minutes/hour. The nested effects of school only accounted for about 2.9% of the variance in random effects, thus, the nested effect of school is not a concern in this study.

Perceived Barriers to Physical Activity

Low SES girls reported significantly greater perceived barriers to PA (M = 1.16, SD = .58) than those who were not of low SES [M = .97, SD = .57; p = .013]. Perceived barriers to PA were lower among early/middle pubertal girls than late pubertal girls (see Table 2). Age was positively correlated with perceived barriers to PA (r = .12, p = .008). No significant racial or ethnic differences emerged in perceived barriers. Perceived barriers were negatively related to LMVPA (r = -.11, p = .021) and MVPA (r = -.10, p = .032), but positively correlated with sedentary activity (r = .11, p = .021) and recreational screen time (r = .22, p < .001).

Table 4 presents the top five perceived barriers for the total sample and for each pubertal stage, race, and SES. The only barrier identified by over half of all girls (51.5%) was lack of skills. The majority of girls in late puberty (56.9%) also indicated that lack of skills was a major barrier followed by hating to sweat during the school day (56.5%) and difficulty finding PA

programs or classes they like (53.6%). The majority of Black girls (54.6%) considered hating to sweat during the school day as a barrier followed by lack of skills (51.0%). For low SES girls, the majority indicated that hating to sweat during the school day (54.2%) followed by lack of skills (52.5%) were major barriers. In contrast, percentages related to each barrier were all under 50% for girls in early/middle puberty, girls who were White or mixed race, and girls who were not of low SES.

DISCUSSION

This comparative and correlational study including 5th-7th grade urban Midwestern U.S. girls examined pubertal stage, racial/ethnic, and SES differences in perceived barriers to PA and the relationships among the following variables: age, BMI, recreational screen time, sedentary activity, PA, and perceived barriers to PA. Pubertal stage, racial/ethnic, and SES differences in girls' top perceived barriers to PA were also identified. A broad understanding of biological and sociocultural differences in perceived barriers to PA can be instrumental in designing interventions using systematic and meaningful personalized strategies to assist diverse groups of urban girls to overcome their perceived barriers to PA.

BMI, Recreational Screen Time, Sedentary Activity, and Physical Activity

The prevalence of girls who were overweight or obese in this study was 53.8%, higher than the U.S. percentage of approximately 33.8% reported for 12- to 19-year-old girls (Ogden et al., 2014). In addition, the study's urban sample was mainly comprised of girls of low SES. Consistent with previous research, Black girls had a higher BMI and reported more recreational screen time than White girls (Kann et al., 2014). Thus, effective interventions are urgently needed to control the obesity crisis in urban adolescent girls, especially among Black girls of low SES.

Findings that girls in late puberty had higher BMI and more recreational screen time and sedentary activities than those in early/middle puberty are comparable to other results noted in the literature. Brodersen, Steptoe, Boniface, and Wardle (2007) reported that as girls age, their sedentary behavior increases. Additionally, strong evidence indicates a positive association between recreational screen time and weight status, and a negative association between recreational screen time and participation in PA (Costigan et al., 2013).

Although this study demonstrated that girls in late puberty participated in less MVPA than those in early/middle puberty, conflicting findings concerning the relationship between pubertal stage and PA exist (Finne, Bucksch, Lampert, & Kolip, 2011; Smart et al., 2012). In a study involving 6813 adolescents, aged 11-17 years, pubertal stage correlated with boys', but not girls', self-reported PA (Finne et al., 2011). Another study with 222 adolescent girls demonstrated pubertal stage had a negative and indirect effect on self-reported PA through perceptions of sports competence, body attractiveness, and physical condition (Smart et al., 2012). Even though positive correlations between adolescent self-report of PA and accelerometer data have been noted, self-report of PA may be one explanation for the inconsistent findings concerning girls' pubertal stage and their PA (Chinapaw, Lidwine, van Poppel, van Mechelen, & Terwee, 2010). Reliable and valid measurements of PA are important for examining the relationship between pubertal stage and PA.

Perceived Barriers to Physical Activity

Findings that perceived barriers were negatively and weakly correlated with both LMVPA and MVPA are both similar and contradictory to results of other studies. Similar to this study's findings, Young et al. (2014) found a negative relationship between barriers to PA and accelerometer-measured MVPA among girls in 6th, 8th, and 11th grades. Although significant, the

low correlation of -.10 between perceived barriers and MVPA in this study may be due to the bias resulting from a common method artifact of self-report. Dishman et al. (2010) explains that low correlations are not surprising when a subjective and objective measure are employed because use of self-report to measure both girls' beliefs and their PA may lead to inflated relations between the two. Taking a different approach, Kelly et al. (2010) reported racial differences in the correlation between barriers to PA and accelerometer-measured MVPA, whereas Dishman et al. (2010) noted perceived barriers did not differ among girls of varied racial and ethnic backgrounds. Racial and ethnic influences on the relationship between perceived barriers and PA may need further investigation.

Consistent with previous studies, lack of skills followed by intrapersonal factors such as hating to sweat emerged as the most frequently reported perceived barriers among girls (Kelly et al., 2010; Rees et al., 2006). Similarly, among Canadian and Spanish adolescent girls, perceived incompetence in sports was found to be one of the top two barriers to PA (Bélanger et al., 2011; Zaragoza, Generelo, Julián, & Abarca-Sos, 2011). Interventions focused on skill development may be essential for girls to enhance their PA self-efficacy and other related factors to promote continued PA engagement (Humbert et al., 2006). Expressions of not being good enough to participate in PA figured prominently in previously conducted focus group discussions among Australian adolescent girls and face-to-face interviews among British adolescent girls (Stanley, Boshoff, & Dollman, 2013; Wetton, Radley, Jones, & Pearce, 2013). In the current study, because over 50% of the girls who were Black, in late puberty, and of low SES reported lack of skills as a barrier, identifying ways to help girls, particularly those in these three subgroups, increase their PA skills is important for assisting them to achieve PA recommendations.

Several studies support that embarrassment, body image concerns, and physical discomfort, including sweating or fatigue, are barriers frequently reported by girls (Kelly et al., 2010; Wetton et al., 2013). Rees et al. (2006) found that barriers, such as body insecurity, were more concerning for girls than boys. Despite conflicting prior reports, racial or ethnic differences were evident in this study with the majority of Black girls, but not White girls, reporting sweating, as well as lack of skills, as barriers (Dishman et al., 2010; Kelly et al., 2010). Similar to findings reported by Robbins et al. (2003), the highest percentage of White girls in this study (46.9%) identified embarrassment or self-consciousness as a barrier. Consistent with these results, hating to sweat during the school day emerged as the second most prevalent barrier in our study. This information underscores the importance of assisting girls to avoid negative body image and self-esteem issues, while simultaneously helping them to attain adequate PA, particularly as they progress through puberty.

Although finding PA programs or classes did not emerge as a major problem for girls who were not of low SES, 49.0% of low SES girls reported difficulty in this area. Though research examining SES and perceived barriers to PA among girls is limited, access issues, such as lack of PA facilities and cost of programs, have previously been reported as barriers to PA participation for youth of low SES (Humbert et al., 2006). Lack of access is also a major barrier to PA for Canadian adolescent girls (Bélanger et al., 2011). McCarron et al. (2010) found that across demographics, community members identified the need for external sources, such as schools, to contribute to a built environment that is supportive of PA for adolescents, especially girls, through collaborative partnerships with the community. Therefore, assisting girls of low SES to access PA programs or classes that they like should be a primary focus of future interventions.

Although lack of time for PA, often resulting from school-related academic responsibilities, emerged as a major barrier to PA among British girls participating in a prior study, the majority of girls in either the total sample or any subgroup in this study (e.g., pubertal stage, race, or SES) did not identify lack of time as a barrier to PA (Wetton et al., 2013). A high percentage of girls in late puberty (46.4%), however, did report that others want them to do tasks other than PA with their time, perhaps resulting from having greater family obligations than those of early/middle pubertal girls. This barrier, identified in low SES adolescents, presumably increases with advancing maturity, and increased ability to participate in family obligations (Humbert et al., 2006). Researchers may need to consider unique family responsibilities and ways to improve time management skills when aiming to improve the PA of late pubertal girls.

Similar to lack of time, lack of motivation is consistently identified in the literature as a perceived barrier to PA among girls, indicating that interventions focused on enhancing motivation may lead to increased PA (Robbins et al., 2003; Robbins et al., 2009). Contrary to this information, lack of motivation was not reported by the majority of girls in this study. Consistent with prior studies showing that being tired interferes with PA among both male and female adolescents, ages 11 to 14, all subgroups in this study, except for those in late puberty, identified this barrier as a major problem (Robbins et al., 2009). Qualitative research may be needed with urban adolescent girls, particularly those in early or middle puberty, to explore reasons underlying this barrier as well as social determinants of PA so that they can be adequately addressed in interventions.

Implications

Future research is needed to design and test interventions that are specifically tailored to meet the needs of various subgroups of girls to target their perceived barriers to PA (Camacho-

Minano et al., 2011; Robbins et al., 2003; Robbins et al., 2009). Tailoring interventions based on biological and sociocultural characteristics, particularly pubertal stage and SES, may be a promising approach. Interventions that focus on skill development, offer some measure of privacy for PA, provide access to showers and personal hygiene products, and include activities not likely to induce profuse sweating (i.e. brisk walking), may be more appealing to girls and efficacious in increasing their PA.

Adolescents in general and adolescent girls in particular, need to be presented with opportunities to provide input regarding the design of programs to increase their PA (Stanley et al., 2013). This approach may help uncover unique barriers and assist girls in being more invested in PA programs (Humbert et al., 2006; Stanley et al., 2013). Allowing girls to provide input regarding their PA programs may also lead to an increase in activities being offered that they find enjoyable and a decrease in those in which girls feel unskilled. This effort may result in a reduction of several major perceived barriers, including lack of skills, sweating during the school day, and an inability to find enjoyable PA programs. Humbert et al.(2006) suggest that, in interventions for low-SES youth in particular, emphasis needs to be placed on offering enjoyable PA and increasing students' skill development and confidence, while considering environmental factors. Girls of low SES may not have the resources, financial or otherwise, associated with PA participation away from the school venue; thus, physical education, after-school PA programs with transportation home afterward, and other school-based approaches (e.g., before-school PA programs, recess, class breaks for PA) are critical for assisting them to attain adequate PA. Perhaps, increasing parental support for PA by assisting parents to encourage and monitor their daughter's PA throughout the adolescent period may be one solution to overcoming some perceived barriers. Although increasing girls' PA continues to represent a major challenge for

researchers, assisting girls to reduce their perceived PA barriers certainly can aid in overcoming this challenge.

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