Correlates of Participation in Physical Activity for Adolescent Girls: A Systematic Review of Recent Literature

Stuart J.H. Biddle, Sarah H. Whitehead, Toni M. O’Donovan, and Mary E. Nevill

Background: Many adolescent girls have low levels of physical activity and participation declines with age. This review identifies recent correlates of physical activity in adolescent girls. Methods: Systematic review of papers published 1999 to mid-2003. Papers (k = 51) reporting a measure of physical activity and at least one potential correlate of physical activity in adolescent girls were analyzed. Results: Demographics related to physical activity were female gender (–), non-white ethnicity (–), age (–), and socio-economic status (+). Psychological correlates positively associated with physical activity were enjoyment, perceived competence, self-efficacy, and physical self-perceptions. Behavioral correlates showed that smoking was associated with lower and organized sport involvement with greater activity. Physical activity was associated with parental and family support but we found no consistent trends for environmental variables. Effects were small-to-moderate. Conclusions: Modifiable correlates for adolescent girls clustered around “positive psychology,” organized sport involvement, and the family.

Key Words: adolescence, exercise, motivation, positive psychology, family support, sport

Participation in physical activity by children and youth has been a topic of interest for many years. Despite the difficulties showing evidence for clear health-enhancing effects of physical activity in this age group, it is widely accepted that we need to know more about factors associated with physical activity and how to change low levels of participation. The “determinants” (“correlates”) of physical activity in youth need to be understood in order that effective interventions can be developed. To this end, Sallis et al. reported a review of correlates of physical activity for children and adolescents. Valuable though this review has been, it does not allow for clear identification of correlates for girls. The purpose of the present review, therefore, is to focus only...
on the key population segment of adolescent girls. To build on prior more generic reviews and to better understand current correlates, however, we focused only on studies since those reviewed by Sallis et al. With some significant changes in lifestyles of young people, such as rapidly increased use of new technologies, we felt justified in reviewing only the most recent literature.

It is a highly consistent finding in national surveys that girls are less active than boys and their participation rates decline clearly throughout the adolescent age span. The present review, therefore, has two main objectives:

• To identify key modifiable correlates of physical activity for adolescent girls with a view to recommending possible interventions.

• To clarify the relative importance of different types of correlates, such as demographic, psychological, social, and environmental variables, in adolescent girls’ physical activity.

Methods

We undertook a systematic review of the literature by conducting computer searches of MEDLINE (First Search), Web of Science, PsycInfo (BIDS), and SportDiscus for articles in the English language from 1999. Manual searches through journals and personal files were also carried out. Key words included: physical activity, sport, youth, adolescent/adolescence, teenage, girl, female, gender, correlates, determinants, motivation, adherence, barriers, enjoyment, importance, and support.

Criteria for including a research paper in the review were:

• subjects in the age range of 10 to 18 y, or the mean age in this range;

• for studies investigating males and females, results were included only when reported separately by gender: male-only samples were excluded;

• articles published in the English language, therefore excluding unpublished articles, dissertations, and conference proceedings;

• all quantitative research designs were included, thus allowing an assessment of impact of research design. The quality of the physical activity measure was coded in line with Sallis et al. (see Table 1);

• to allow for strength and direction of correlates to be assessed, only quantitative studies were included. Nevertheless, qualitative studies were reviewed and used, where appropriate, to provide further background and context.

• owing to the project’s focus on mass participation in physical activity by adolescent girls, studies were included that examined variables for their association with physical activity, sport, or exercise from the perspective of mass participation rather than elite performance.

As in the case of Sallis et al., variables were classified as being related or not related to physical activity, and the direction and strength of association were noted. Strength of association was classified as “none,” “small,” “moderate,” or “large” according to conventions proposed by Cohen. Where insufficient data
were presented, strength of association was based on qualitative judgment, levels of significance, or confidence intervals.

Potential correlates were classified into 5 categories of demographic/biological, psychological, behavioral, social/cultural factors, and physical environmental. Consistent with Sallis et al., variables were only included if they were studied on three or more occasions. Large-scale studies were checked to see if variables studied less than 3 times were important.

Results

A total of 50 published papers yielding 51 independent samples were reviewed. Samples were the unit of analysis. Other descriptive data for the papers are shown in Table 1. The majority of studies were conducted in the US, used a cross-sectional design, assessed physical activity through self-report, and had quite a large average sample size. We could detect no systematic effect for geographical location. The

Table 1 Descriptive Statistics for Studies Used in the Systematic Literature Review

<table>
<thead>
<tr>
<th>Variable</th>
<th>Summary statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>US: 32</td>
</tr>
<tr>
<td></td>
<td>UK: 3</td>
</tr>
<tr>
<td></td>
<td>Canada: 4</td>
</tr>
<tr>
<td></td>
<td>Estonia: 5</td>
</tr>
<tr>
<td></td>
<td>Taiwan: 1</td>
</tr>
<tr>
<td></td>
<td>Other European: 6</td>
</tr>
<tr>
<td>Sample sizes$^a$</td>
<td>Total: $n = 124,857$; range = 48 to 17,766; mean $n = 2448$</td>
</tr>
<tr>
<td></td>
<td>Female: $n = 60,164$; range = 22 to 9039; mean $n = 1280$</td>
</tr>
<tr>
<td>Ethnicity$^b$</td>
<td>Reported in 30 studies (59%). Samples included white, African American, Asian American, Mexican American.</td>
</tr>
<tr>
<td>Study design</td>
<td>Cross-sectional: 41 (80.4%)</td>
</tr>
<tr>
<td></td>
<td>Longitudinal or prospective: 10 (19.6%)</td>
</tr>
<tr>
<td>Measurement of physical activity$^b$</td>
<td>a. Self-report of poor or unknown reliability/validity: 9 (17.6%)</td>
</tr>
<tr>
<td></td>
<td>b. Self-report with acceptable reliability/validity: 31 (60.8%)</td>
</tr>
<tr>
<td></td>
<td>c. Acceptable objective measure: 4 (7.8%)</td>
</tr>
<tr>
<td></td>
<td>a &amp; c: 4 (7.8%)</td>
</tr>
<tr>
<td></td>
<td>b &amp; c: 3 (5.9%)</td>
</tr>
</tbody>
</table>

Notes: $^a$Three studies by Gordon-Larson et al. include analyses of the 1995 and 1996 National Longitudinal Study of Adolescent Health but each paper reports on different sub-samples. These have been treated as 3 samples. $^b$“Self-report” measures typically are checklists or questionnaires. “Acceptable” reliability/validity was ascertained if prior measurement studies were cited in support of the scale. Usually, scales developed specifically for the study were of “unknown reliability/validity” unless, of course, validation data were provided. Objective measures included heart rate monitors or movement sensors.
methodological bias towards cross-sectional studies, however, is a limitation. Such designs do not allow for the testing of causal directions of relationships. Results will be reported using the 5 types of correlates identified. Table 2 provides a summary and full list of reference citations.

### Demographic and Biological Variables

Findings on gender and age are consistent and robust in the literature and our own review confirmed this with 22 studies of 24 samples (92%) showing girls to be less active than boys, with 2 studies showing no difference. The strength of effect

<table>
<thead>
<tr>
<th>Category of variable</th>
<th>Correlates</th>
<th>Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic and biological</td>
<td>Female gender</td>
<td>– S/M</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>– S/M</td>
</tr>
<tr>
<td></td>
<td>White ethnicity</td>
<td>+ S</td>
</tr>
<tr>
<td></td>
<td>Increased body-mass index</td>
<td>– S</td>
</tr>
<tr>
<td></td>
<td>Family income</td>
<td>+ M</td>
</tr>
<tr>
<td></td>
<td>Higher parental education</td>
<td>+ M</td>
</tr>
<tr>
<td>Psychological</td>
<td>Perceived competence</td>
<td>+ S</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>+ S/M</td>
</tr>
<tr>
<td></td>
<td>Enjoyment</td>
<td>+ S/M</td>
</tr>
<tr>
<td></td>
<td>Perceived body attractiveness</td>
<td>+ S/M</td>
</tr>
<tr>
<td></td>
<td>Physical self-worth</td>
<td>+ S/M</td>
</tr>
<tr>
<td></td>
<td>Appearance importance/concerns</td>
<td>+ S/M</td>
</tr>
<tr>
<td></td>
<td>Perceived barriers</td>
<td>– S/M</td>
</tr>
<tr>
<td></td>
<td>Lack of time barrier</td>
<td>– S</td>
</tr>
<tr>
<td>Behavioral</td>
<td>Smoking</td>
<td>– M</td>
</tr>
<tr>
<td></td>
<td>TV/video viewing</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Participation in organized sports</td>
<td>+ M/L</td>
</tr>
<tr>
<td>Social &amp; cultural</td>
<td>Peer involvement and support</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Family &amp; parental support</td>
<td>+ S/M</td>
</tr>
<tr>
<td></td>
<td>Mother’s physical activity</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Father’s physical activity</td>
<td>+ S/M</td>
</tr>
<tr>
<td>Physical environmental</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

*Note: 0, zero association; +, positive association; –, negative association; ?, indeterminate; S, small; M, moderate; SM, small-to-moderate; L, large. Variables indicated with * are considered “modifiable” correlates (see text for clarification). All studies are cited, including those showing no association.*
was small-to-moderate. Samples assessing age and physical activity confirmed a small-to-moderate age-related trend of less activity for older youth in 7 of 11 studies (64%).

Ethnicity classified as “white” was associated with higher levels of physical activity for girls in 6 of 7 of the samples (86%), but the effects were mainly small. Increased body-mass index (BMI) was found to be negatively related to physical activity in all but 2 of 8 samples (75%), with all effects being small. This trend is likely to be quite robust because it included very large data sets. This is important because Sallis et al. found only inconsistent results for BMI. Socio-economic variables showed trends with participation in physical activity, whereas Sallis et al. found no such trends. Only family income and parental education were studied more than once, however. In all 3 samples, higher family income/socio-economic status (SES) was associated with higher physical activity for girls, showing a moderate effect. Higher parental education was also positively associated with girls’ physical activity in 3 of 4 studies, with effects being a mixture of small (2) and large (1).

Psychological Variables

Perceived competence was associated with physical activity in 4 of 5 studies, with most effects being small. Similarly, a small-to-moderate association was found between self-efficacy (belief in one’s ability to be physically active) and participation (10 of 10 samples). Seven of 8 studies assessing enjoyment in the present review showed a positive relationship with physical activity with effects being small-to-moderate.

We found that physical activity was consistently associated with more positive perceptions of one’s body attractiveness and overall physical self-worth (all 3 studies and a small-to-moderate effect for each variable), but there were too few studies to draw conclusions concerning global self-esteem. Moreover, concerns and importance expressed about body weight and appearance showed a small-to-moderate positive association with activity in 3 of 4 studies.

Perceived barriers showed a small-to-moderate negative relationship with physical activity (all 3 studies), with the specific barrier of lack of time showing a small association in all 4 studies. If barriers were collapsed into larger categories, there were trends for “other activities” (including school work), lack of interest and motivation, and too much effort required.

Behavioral Variables

We located three behavioral variables that were studied three or more times. Smoking was found to be related to lower levels of physical activity (3 of 4 samples). The effects were mixed, with studies showing zero, small, moderate, and large effects. Television and video viewing/internet use had an indeterminate relationship with physical activity across 6 studies, with three suggesting a negative relationship, one positive, and two having no association. This is consistent with a recent meta-analysis showing a very small negative association between TV viewing and physical activity.

We also found a moderate-to-large effect for more active girls to be involved in organized competitive sports (4 of 4 studies). One large study in Iceland showed that this variable accounted for much of the gender difference in overall physical
activity such that girls taking part in organized sport were as active as boys, both overall and in vigorous physical activity.

Social and Cultural Variables

Six studies reported data on peer-related variables (peer support, influence, and acceptance) but the association was classified as indeterminate (3 were positive and 3 zero). Family support, however, showed a small-to-moderate effect in 7 of 8 studies. Participation in physical activity by the mother showed an indeterminate relationship with the physical activity of their female adolescent offspring (7 studies, 3 with zero effect). For the father, 3 of the 5 studies showed a small-to-moderate effect, with 2 showing no relationship. This falls just within the margin of 60% of studies showing an association suggested by Sallis et al.\textsuperscript{3} to be classified as a positive association. With so few studies, however, conclusions are necessarily cautious.

Physical Environment Variables

Despite locating 18 environmental variables, each was studied only once or twice, thus precluding firm conclusions to be drawn. More needs to be known about the role of environmental variables in adolescent girls’ physical activity participation. For example, large-scale ($n = 17,766$) population data from Gordon-Larson et al.\textsuperscript{10} suggest that higher levels of physical activity are associated with use of a community recreation center and lower levels of crime. These results, however, combined boys and girls.

Discussion

Our purpose in reviewing recent papers of correlates is so that variables consistently associated with physical activity in adolescent girls can be identified and used for interventions, policy initiatives, and practical guidelines. It is important, however, to distinguish between correlates we consider to be modifiable and those that are not modifiable. For interventions to be effective, correlates that are modifiable need to be identified (see Table 2). Correlates that are not considered modifiable, such as age and ethnicity, can be used to guide targeted interventions and policies. It is likely that some variables are less easily modified than others and, as such, might be a lower priority for policy initiatives and interventions. In addition, if older girls have the lowest rates of sports participation, this might constitute a suitable “at risk” group to target for a concerted campaign.

Our review shows that lower levels of physical activity are associated with being older and female. These are highly consistent findings that one can now accept as extremely robust in young people.\textsuperscript{11} Of course, the key issue is to identify other correlates that might explain why older adolescents and girls are less likely to be active. This is altogether a more difficult problem that will require the consideration of several correlates in combination.

Other non-modifiable correlates, according to our results, are family income and ethnicity. Previously, socio-economic status has been largely unrelated to physical activity in youth, probably because of the role that school activities can play in the
total physical activity of young people. Our findings, however, are such that socio-economic status variables do need further consideration, and this is likely to be most relevant for activities requiring access to sport through transport or money. In addition, access to sedentary pursuits, such as computers and motorized transport, could vary as a function of SES.\textsuperscript{10,12}

Concerning psychological correlates, physical activity was clearly associated with what psychologists view as “intrinsic motivation”—that is, motivation for its own sake and for enjoyment and pleasure. For example, activity was associated with enjoyment, perceived competence, and higher self-efficacy. In addition, more active girls had more positive physical self-perceptions. This is a positive profile that can be targeted through interventions that emphasize the choice of physical activities that are enjoyable and that allow the subject to demonstrate or reinforce some competence. By creating a “task” climate in school physical education, whereby the emphasis is on some element of student choice, personal effort, and rewards for improvement, girls are more likely to show enhanced levels of intrinsic interest and motivation.\textsuperscript{13}

Greater perceived barriers inevitably seem to inhibit physical activity. Our review suggested that perceived lack of time might be important and, although the evidence was not extensive, there is an indication that school work and other commitments are perceived as priorities over physical activity. Indeed, qualitative research\textsuperscript{14} has shown that many barriers emerge during the time of transition to secondary school such as perceived time pressure from homework, and the time spent in homework could be increasing.\textsuperscript{4}

Smoking was found to be inversely related to sport and physical activity. Smoking is likely to act as an inhibitor from a physiological point of view, but might also reflect social and cultural values towards lifestyle. TV viewing/internet use, on the other hand, had an indeterminate association with activity. Indeed, more extensive reviews suggest that physical activity is not related in a strong way to TV viewing.\textsuperscript{9,15}

A consistent finding was that girls who were active in organized sport had higher physical activity levels than others. This is unsurprising given the choices that such people have made for an active leisure-time pursuit. It might be a mistake, however, to think that “the answer” is to have all adolescent girls playing organized sport. There are many forms of physical activity and these all need to be exploited to maximize participation. For those who wish to play organized sport, they must be provided with opportunities and suitably encouraged. For others, we must provide either a sporting environment that is more appealing than at present or seek other opportunities for physical activity, such as active transport.

Regarding social factors, we found some studies that supported the role of peers but overall this association was indeterminate. Wold and Hendry\textsuperscript{16} provide support for the view that some peer influence is likely, arguing for a link via friendship patterns. This is supported by the qualitative findings of Mulvihill et al.\textsuperscript{14} In addition, Wold and Hendry reported that for countries where gender equality was more apparent, participation for girls seemed to be higher. Our results were more supportive of the role of the family, mainly through aspects of family support rather than parental participation. This remains an understudied area, however. For example, there appear to be no physical activity social support interventions for youth that include family-based methods.\textsuperscript{17}
It was surprising to find that no one environmental variable had been studied sufficiently to draw firm conclusions. Physical environmental variables are likely to increase in importance as our built environment, in particular, develops at a pace. This could have significant effects on our physical activity and can create what might be referred to as “activity toxic environments” in which personal transport is less likely to involve much energy expenditure. Much more needs to be known about the perceptions of adolescent girls concerning their physical environment and how this might impact physical activity levels.

**Correlates: Which Are the Best Buy?**

In conclusion, we found 21 variables where three or more contemporary studies located associations with physical activity in adolescent girls. Most are modifiable and provide the basis for interventions and policies. The literature, however, while reporting studies of some magnitude, is replete with weak designs and measures of weak or unknown validity. In addition, there are potentially some very important correlates, such as some environmental factors, that have yet to be studied sufficiently to allow firm conclusions. None of the large-scale studies available reported on such variables for girls only. Notwithstanding such weaknesses, the variables identified in Table 2 provide a suitable basis from which to study and promote physical activity for adolescent girls. Of the correlates identified, which would give us the best value? Three clusters of correlates appear worthy of scrutiny:

1. **Positive psychology.** The most extensive and consistent evidence suggests we should ensure that all physical activity environments for adolescent girls allow for choices and the development of perceptions of competence and confidence. This is likely to lead to higher levels of enjoyment, better physical self-worth, and stronger persistence.

2. **Organized sport.** Despite the view that many adolescent girls are “turned off” sport, the evidence suggests that physical activity levels will be higher for those girls involved in organized sport. One large study in Iceland showed that this accounted for much of the gender difference in overall physical activity.

   Efforts to further mobilize children and adolescents and reduce gender disparities in physical activity should consider ways in which organized sports clubs and programs cater to and enroll children and youth. By reflecting girls’ and women’s as well as boys’ and men’s perspectives and interests, offering a broader array of sports and exercises, and developing linkages with the primary school system, we believe organized sport programs could recruit more children and adolescents into sport and exercise, and reduce or eliminate gender disparities.

Results from Glasgow, Scotland, when compared to Dunedin in New Zealand, also support the view that opportunities for sport participation, particularly through extra-curricular school sport, are important in explaining some of the gender differences in physical activity so often found. The study concluded by suggesting that the dramatic decline in participation in later adolescence “testifies to the importance of the school in maintaining participation up to the time of school-leaving. In the post-school period, continued involvement is principally a function both of community based opportunity structures and cultural values. In both these respects the Glasgow cohort, and particularly Glasgow females, fared badly.”
3. **Family support.** The evidence points to the importance of a cluster of variables centered on the family, including family support, involvement, and paternal participation in physical activity. Although the evidence leading to this conclusion is disparate, and the factor of peer support was indeterminate, there appears to be merit in promoting the importance of physical activity for adolescent girls to parents, as well as family units and peer groupings.

In conclusion, our “best buys” on correlates of physical activity for adolescent girls, based on the evidence available, are to promote 1) positive psychology, 2) organized sport opportunities and participation, and 3) family support. It is likely, however, that important physical environmental variables have yet to be clearly identified.

Future studies need to look at the interaction of correlates rather than variables in isolation. In addition, greater emphasis is needed on the combined effects of physical activity and sedentary behaviors on health in young people. As such, we need to know more about the correlates of sedentary behaviors, such as TV viewing, computer use, homework, and motorized transport. Data so far suggests that young people’s behaviors can be clustered around both physical activity and sedentary behavior, thus future study of correlates must also look at both behaviors.

**Acknowledgments**

Funding to the Institute of Youth Sport for this element of a larger project was provided by SportScotland. Thanks are extended to Jon Best (SportScotland), Professor Fred Coalter and Dr. Jessica MacBeth (University of Stirling), and members of the project Steering Group.

**References**


*The term “best buy” is attributable to Professor Jeremy Morris; see reference 21.*


