Changes in Physical Activity, Self-Efficacy and Depressive Symptoms in Adolescent Girls

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The purpose of this study was to examine the longitudinal relationships between naturally occurring changes in leisure-time physical activity, depressive symptoms and self-efficacy in adolescent girls. We also aimed to test whether depressive symptoms would moderate the self-efficacy-physical activity relationship. Participants were 181 urban adolescent girls. Physical activity was measured using the 3-Day Physical Activity Recall. Self-efficacy and depressive symptoms were assessed using questionnaires. Body height and body mass were measured and body mass index (BMI) was calculated. Data were collected on three occasions over a 2-year period. There was a decrease in physical activity and self-efficacy and increase in depressive symptoms across three measurement occasions. There were statistically significant and negative relationships between initial level and change for physical activity and depressive symptoms. Initially higher levels of physical activity were related with initially lower levels of depressive symptoms, and change in physical activity across time was inversely associated with change in levels of depressive symptoms across measurements. There were statistically significant and positive relationships between initial level and change for physical activity and self-efficacy after controlling effect of BMI. Latent growth modeling (LGM) also indicated a moderating effect of depressive symptoms on the self-efficacy-physical activity relationship. Girls who had high initial levels of self-efficacy and smaller increases in depressive symptoms had the lowest decline in physical activity participation. Our results encourage the design of interventions that reduce depressive symptoms and increase self-efficacy as a possible of means of increasing adolescent girls’ physical activity.

It has been recognized that children and youth need regular physical activity for normal growth and development, maintenance of good health, and development of physical activity that will carry into adulthood (6). Although it is frequently assumed that physical activity is an integral part of growing up, several studies show that children and adolescents are often physically inactive (12,20,37). Population
estimates indicate that participation in leisure time physical activity among girls declines by about 45% between ages 12 and 17 (12). There is a particularly sharp decline through early adolescence, with ages 11–12 thought to be a critical age at which physical activity begins to diminish (10,15). Thus, a longitudinal study offers unique insights into antecedents of adolescent physical activity participation and potential opportunities for early intervention (32).

One theoretical construct that has been featured prominently in physical activity research with adolescents is self-efficacy (13). Self efficacy can be defined as the beliefs an individual has about his or her ability to engage in behaviors that lead to expected outcomes. These beliefs influence decisions about whether a behavior will be adopted and maintained and are therefore important in the promotion of physical activity (33). Although a comprehensive review of physical activity correlates among youth found that the evidence for self-efficacy was indeterminate (34), a more recent review of correlates among adolescent girls found that self-efficacy was an important correlate (8). Ryan and Dzewaltowski (33), for example, found that different types of self-efficacy (physical activity efficacy, environmental-change efficacy) were significantly related with adolescents’ physical activity. In addition, Spence et al. (36) reported that self-efficacy was found to be a significantly stronger correlate of physical activity for adolescent girls compared with boys. However, the aforementioned studies did not include a longitudinal design that is necessary for examining the association between naturally occurring changes in physical activity and self-efficacy.

It has been suggested that to improve the effectiveness of physical activity interventions, theoretically based moderating effects should be tested when predictors (e.g., self-efficacy) and outcomes (e.g., physical activity) have been shown to have associations (17). Baranowski et al. (7) suggest that studying physical activity determinants within population subgroups may be beneficial in gaining a more in-depth understanding of the impact of proposed determinants on physical activity across the potential moderator of subgroup membership. One subgroup of adolescents that may be particularly important to target are those who are experiencing depressive symptoms (35). The results of most cross-sectional studies of adolescents have shown associations between high levels of physical activity and low levels of depressive symptoms (34). However, other studies have reported no such relationships (1). Because depressive symptoms can obviously lead to reduced activity levels, cross-sectional studies can tell us little about the temporal relationship between depression and physical activity. Only a few studies have addressed such relationships longitudinally. In a 2-year follow-up study, Motl and collaborators (27) found that changes in physical activity were inversely related to changes in levels of depressive symptoms. Recently, Sund et al. (38) found that low levels of vigorous exercise and high levels of sedentary activities (boys only) constituted independent risk factors for the development of high levels of depressive symptoms in a 1-year study of young Norwegian adolescents.

Given the fact that adolescence has been cited as one of the primary times during which depressive symptoms begin to emerge and physical activity levels decline throughout adolescence (15), the main purpose of the current study was to examine the longitudinal relationships between naturally occurring changes in physical activity, self-efficacy, depressive symptoms in adolescent girls. To date, no studies have included measures of leisure-time physical activity, depressive symptoms and
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self-efficacy together with an important confounding variable (BMI) longitudinally in early adolescent girls. In addition, we examined the aforementioned relationships accounting for the influence of BMI because obesity may play a role in the development of psychopathology and depressive symptoms (15). Finally, we tested whether depressive symptoms would moderate the self-efficacy-physical activity relationship. Three hypotheses were tested. First, based on earlier work (33,36), we expected a positive relationship between changes in self-efficacy and changes in physical activity behavior. Second, we hypothesized an inverse relationship between changes in physical activity and changes in depressive symptoms across a two-year period. Third, it was expected that the presence of depressive symptoms would moderate the self-efficacy-physical activity relationship.

Methods

Participants and Study Design

Participants were 181 girls ranging in age at the beginning of the study from 11 to 12 years. Girls were recruited from four high schools in city Tartu, Estonia. The high schools were randomly selected from the complete list of the schools of the city. These four schools included 289 potential participants for the study, 256 (89%) of which agreed to participate. Data were collected on 3 occasions over a 2-year period. The 3 occasions were fall of 2006 (baseline data), fall of 2007 (interim data), and fall of 2008 (follow-up data). The sample initially had a mean age of 11.4 years (standard deviation 0.4). At baseline, there were a total of 256 girls who completed the questionnaires. There were 221 adolescents in interim measurement and 181 adolescents in follow-up measurement who provided complete data. There were no statistically significant ($p > .05$) differences in mean physical activity, depressive symptoms and self-efficacy between dropouts and participants at baseline measurement. In total 68% of the participants are from two-parent families. Consent letters were sent to the parents, informing them of the study and giving them the option to exclude their child from the project. Each student was given a written consent form and was informed of her right to withdraw from the study. All procedures were approved by the University of Tartu Medical Ethics Committee.

Measures

Depression

Depressive symptoms were measured using 20 items from the CES-D (29), which has established predictive validity for the screening of adolescent depression. The 20 items were rated on the basis of frequency of occurrence during the past week using a 4-point scale. The verbal anchors were “Rarely or none of the time” (less than 1 day), “Some or little of the time” (1–2 days), “Occasionally or a moderate amount of time” (3–4 days), and “Most or all of the time” (5–7 days). The positively worded items were reverse-scored. Higher CES-D scores reflected elevated depressive symptoms. The summation and comparison of the composite scores across time were supported by previous analyses that confirmed the factorial validity and multigroup and longitudinal invariance of the CES-D, a recommended precursor to the analysis of change over time (21). In this study, adolescents’ depression was
not represented by a single variable but as a latent factor reflecting three variables of depressive symptoms (hopeful about the future, lonely and sad).

**Self-Efficacy**

Self-efficacy was measured by nine items. One item was generated based on current public health recommendations (37), assessing children’s confidence to “Do physical activity for 60 min each day”. Eight items were used from the questionnaire previously validated with adolescent girls (25). Example items were “I can be physically active during my free time on most days”, “I can ask my best friend to be physically active with me during my free time on most days”, and “I can be physically active during my free time on most days even if I have to stay at home”. The measure of self-efficacy has conformed to a unidimensional model that was invariant across 1 year (25). All items rated on a 5-point scale ranging from 1 (Disagree a lot) to 5 (Agree a lot). The internal consistency of the efficacy measured based on Cronbach coefficient alpha, was .82.

**Physical Activity**

Physical activity was assessed using the 3-Day Physical Activity Recall (3DPAR; 26). The 3DPAR required participants to recall physical activity behavior from 3 previous days of the week (first Tuesday, then Monday, then Sunday); the instrument always was completed on Wednesday. Those 3 days were selected to capture physical activity on 1 weekend day and 2 weekdays. To improve the accuracy of physical activity recall, the 3 days were segmented into 34 30-min blocks, beginning at 7.00 a.m. and continuing through to 12.00 p.m. To further aid recall, the 34 30-min blocks were grouped into broader time periods (i.e., before school, during school, lunchtime, after-school, supper time, and evening). The 3DPAR included a list of 55 commonly performed activities grouped into broad categories (i.e., eating, work, after school/spare time/hobbies, transportation, sleeping/bathing, school, and physical activities and sports) to improve activity recall. For each block of each day, participants entered the main activity in which they participated during each 30-min time period. Participants also rated the relative intensity of the designated activity as light, moderate, hard, or very hard. The validity of the 3DPAR as a measure of usual activity has been established based on correlations with the objective measures (CSA 7164 accelerometer) of physical activity. Self-reported total METs, 30-min blocks of moderate and vigorous physical activity, and 30-min blocks of vigorous physical activity were all significantly correlated with analogous CSA variables in adolescent girls (26). To help participants select the correct intensity level, the instrument provides pictorial representations of the four levels of relative intensity.

**Body Mass Index**

Body height was measured using Martin’s metal anthropometer to the nearest 0.1 cm; body mass was measured with the medical scales to the nearest 0.1kg. Test-retest reliability was high for both body height (Spearman \( r = .99 \)) and body mass (Spearman \( r = .99 \)). Girls’ body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters) was then calculated as a measure of adiposity.
Procedure

Questionnaires were distributed during physical education and health education classes and filled out at homes. Questionnaires containing a majority of missing information ($n = 19$) were excluded from the analysis.

Statistical Analysis

We used LGM to examine: 1) the patterns of change in physical activity, depression and self-efficacy separately; 2) the consequence of a change in depressive symptoms and self-efficacy on a change in physical activity; 3) moderating effects of depressive symptoms on self-efficacy-physical activity relationship. The LGM analyses were conducted using AMOS (Version 6.0 Small Waters Corp., Chicago, IL, 2003) with full-information maximum likelihood estimation. Conceptually, LGM is a 3-stage process that invokes a confirmatory factor analytic framework on variables measured longitudinally. In the first stage, individual-level growth models are fit to represent change on measures of the same construct obtained on multiple measurement occasions. The second stage involves an examination of additional variables as consequences and predictors of longitudinal growth trajectories. The third stage of LGM simultaneously examined whether self-efficacy had a direct relation with change in physical activity and/or an indirect relation, mediated through change in depressive symptoms. Moderating effects of self-efficacy were examined using standard LGM procedures (22). Several indices of model fit were used. The chi-square statistic assessed absolute fit of the model to the data. Values for the root mean square error of approximation (RMSEA) of 0.06 or less are indicative of good model fit (18). Finally, we calculated the comparative fit index (CFI) for which a value of 0.95 or greater indicates a good model-fit.

Results

Descriptive Statistics

Means and variances for physical activity and covariates (depressive symptoms, self-efficacy and BMI) across the 3 time points are provided in Table 1.

Estimating Growth in Physical Activity

The growth in physical activity was best described by an optimal growth function with a heteroscedastic residual structure. This model provided a perfect fit for the physical activity data ($\chi^2 = 5.21$; root mean square error of approximation [RMSEA] 0.0013, nonnormed fit index [NNFI] 0.962, comparative fit index [CFI] 0.967). The mean scores provided in Table 1 illustrate the curvilinear change in physical activity across time. There was a large initial decrease in physical activity at time 2 followed by a smaller decrease in physical activity in time 3.

Estimating Growth in Depressive Symptoms

The growth in physical activity was best described by an optimal growth function with a homoscedastic residual structure. This model provided a perfect fit for the
Table 1  Physical Activity, Depressive Symptoms, Self-Efficacy and BMI Across Three Measurement Points (N = 281)

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical activity</strong></td>
<td><strong>M</strong></td>
<td><strong>SD</strong></td>
<td><strong>M</strong></td>
</tr>
<tr>
<td>3DPA (METs ∙ day⁻¹)</td>
<td>71.8</td>
<td>6.9</td>
<td>65.6</td>
</tr>
<tr>
<td>MPA (blocks/day)</td>
<td>4.2</td>
<td>2.4</td>
<td>3.5</td>
</tr>
<tr>
<td>VPA (blocks/day)</td>
<td>2.1</td>
<td>1.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Depression (0–60)</td>
<td>18.6</td>
<td>3.1</td>
<td>19.7</td>
</tr>
<tr>
<td>Self-efficacy (9–45)</td>
<td>27.3</td>
<td>3.8</td>
<td>26.4</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>19.7</td>
<td>2.2</td>
<td>20.4</td>
</tr>
</tbody>
</table>

3DPA= 3-day physical activity; MPA= moderate physical activity; VPA= vigorous physical activity.

Depressive symptoms data ($\chi^2 = 4.18$; RMSEA 0.0008, NNFI 0.972, CFI 0.977). The mean scores provided in Table 1 illustrate the curvilinear change in depressive symptoms across time. There was a larger initial increase in depressive symptoms followed by a smaller increase in depressive symptoms in time 3.

**Estimating Growth in Self-Efficacy**

The growth in self-efficacy was best described by an optimal growth function with a heteroscedastic residual structure. This model provided an excellent fit for the self-efficacy data ($\chi^2 = 3.99$; RMSEA 0.0019, NNFI 0.975, CFI 0.982). The mean scores provided in Table 1 illustrate the quadratic change in self-efficacy across time. There was a large initial decrease in self-efficacy at time 2 followed by a slight decrease in self-efficacy in time 3.

**Relationship Between Growth in Physical Activity, Depressive Symptoms and Self-Efficacy**

The previous analysis provided a representation of growth in physical activity, depression and self-efficacy across three measurements. Next, we tested a model in which initial status and change factors for physical activity were related with initial status and change factors for depressive symptoms and self-efficacy (second stage LGM). Figure 1 showed path coefficients between physical activity, depressive symptoms and self-efficacy. This model provided an excellent fit to the data ($\chi^2 = 162.54, p < .001$; RMSEA 0.0034, NNFI 0.982, CFI 0.988). There were statistically significant and negative relationships between initial status factors (completely standardized $\beta = -0.26$) and change factors (completely standardized $\beta = -0.37$) for physical activity and depressive symptoms. Thus, initially higher levels of physical activity were related with initially lower levels of depressive symptoms, and change in physical activity across time was inversely associated with change in levels of depressive symptoms across measurements. In addition, there were statistically significant and positive relationships between initial status...
Figure 1 — Model linking depression, self-efficacy and physical activity. Note. The path coefficients are presented in completely standardized units. Y1-Y4 represents indicators of depressive symptoms; Y5-Y8 represents indicators of self-efficacy and Y9-Y12 represents indicators of physical activity. PA = physical activity.
factors (completely standardized $\beta = 0.34$) and change factors (completely standardized $\beta = 0.44$) for physical activity and self-efficacy. Thus, initially higher level of physical activity was associated with initially higher level of self-efficacy and lower depressive symptoms and change in physical activity across time was positively associated with a change in self-efficacy and negatively associated with a change in depressive symptoms.

Next, we tested a model that examined the relationships among self-efficacy, depressive symptoms and leisure-time physical activity and controlled for initial status and change in BMI. Based on first-stage LGM analyses, BMI was modeled with a linear change function and heteroscedastic residuals. This model that included BMI as covariate provided an excellent fit to the data ($\chi^2 = 151.21, p < .001; \text{RMSEA} 0.0038, \text{NNFI} 0.978, \text{CFI} 0.983$). Thus, change in leisure-time physical activity across time was inversely associated with change in depressive symptoms and positively associated with change in self-efficacy. There were direct negative effects on the physical activity initial status factor from initial status for BMI (completely standardized $\beta = -0.11$). With the physical activity change factor, there was a statistically significant and negative direct effect from change in BMI (completely standardized $\beta = -0.16$). Thus, initially higher level of BMI was associated with lower levels of physical activity and change in BMI over a 2-year period was inversely associated with a change in physical activity.

Finally, the latent interaction of initial self-efficacy with change in depressive symptoms was significantly related to change in physical activity ($p < .05$), independently of BMI. The relation between depressive symptoms differed according to whether girls had a high or low self-efficacy. Girls who had high initial levels of self-efficacy and smaller increases in depressive symptoms had the lowest decline in physical activity participation. In addition, girls with initial high self-efficacy had a greater decline in physical activity if they reported greater increase in depressive symptoms. Thus, the moderating effect of depressive symptoms was independent of relations of depressive symptoms with initial status and change of self-efficacy.

Recognizing the complexity of the LGM and results, we provide a brief summary that highlights the results of the study. The first-stage LGM analyses showed that there was (1) a large initial decrease in physical activity at the interim measurement, followed by a smaller decrease in physical activity at the follow-up measurement; (2) a larger initial increase in depressive symptoms followed by a smaller increase in depressive symptoms at the follow-up measurement; and (3) a large initial decrease in self-efficacy at the interim measurement, followed by a slight decrease in self-efficacy from interim to follow-up; depressive symptoms had a moderating effect on the self-efficacy-physical activity relationship—higher initial levels of self-efficacy and smaller increases in depressive symptoms resulted in the lowest decline in physical activity. Girls with initial high self-efficacy had a greater decline in physical activity if they perceived greater increase in depressive symptoms. These associations were independent of BMI.

**Discussion**

The current study used latent growth modeling to assess the relationships between naturally occurring changes in self-efficacy, depressive symptoms and leisure-time physical activity in adolescent girls. We also tested whether the relationship between
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self-efficacy and physical activity was moderated by the depressive symptoms. As hypothesized, the results of the study indicate that initial level and changes in physical activity participation were inversely associated with depressive symptoms and positively related with initial level and changes in self-efficacy, and this effect was independent of BMI. Therefore, this investigation extended prior longitudinal research of determinants of physical activity (9,28,37) and encouraged development of interventions that attempt to increase self-efficacy and reduce depressive symptom levels in adolescent girls. In addition, the current study showed that depressive symptoms had a moderating effect on the self-efficacy-physical activity relationship in adolescent girls.

Self-efficacy, a central component of Bandura’s social cognitive theory, has been advanced as an important personal determinant of human behavior (5). The application of self-efficacy to research on physical activity centers on the hypothesis that strong belief in one’s ability to be physically active relates to participation in physical activity. Among adults, there has been a relatively consistent relationship between self-efficacy and physical activity (24). However, results among children and adolescents had not been consistent to support this hypothesis (2,34). Spence et al. (36), for example, found that self-efficacy was an important correlate of physical activity among adolescent girls, but not among boys. On the contrary, recent longitudinal study conducted with Portuguese adolescents found that self-efficacy did not contribute to the prediction of physical activity (2).

In the current study, the self-efficacy was positively associated with physical activity in adolescent girls. Thus, the first hypothesis of the study was supported. The results of LGM analyses demonstrated that initial status and change in self-efficacy were independently associated with initial status and change in physical activity. The present findings provide evidence that the cross-sectional association between self-efficacy for physical activity and girls’ physical activity was weaker ($\beta_{5,3} = 0.34$) than the longitudinal association ($\beta_{6,4} = 0.44$). The stronger longitudinal association between changes in self-efficacy and adolescent girls’ physical activity has greater health importance than the weaker cross-sectional association. The longitudinal association demonstrates that naturally occurring changes in self-efficacy have a positive relationship with naturally occurring changes in leisure-time physical activity. Thus, health promotion and health education interventions should pay more attention to the behavior-specific self-efficacy (e.g., self-efficacy for physical activity, self-regulatory efficacy) during early adolescence. In addition, Dishman et al. (14) reported that in the absence of effective intervention, girls’ self-efficacy about overcoming barriers to physical activity is mainly formed by the 6th grade. If so, physical activity interventions to enhance different types of self-efficacy (barriers efficacy, regulatory self-efficacy) might even be needed before adolescence.

One subgroup of adolescents that may be particularly important to target physical activity interventions is those who are experiencing depressive symptoms. Adolescence has been cited as one of the primary times during which depressive symptoms, including fatigue, apathy, lack of interest, disrupted sleep patterns, anxiety and low confidence, begin to emerge (3). Consistent with previous longitudinal research (27,38), an inverse relationship has been found between changes in physical activity and depressive symptoms. Although we assumed that change in physical activity preceded change in depression symptoms, it is not possible to infer the direction of causality from our results. It is also possible that increases in
depression symptoms contribute to the decline in girls’ physical activity observed during early adolescence. There are probably several mechanisms by which physical activity influence depressive symptoms including both biological pathways and social and psychological factors. It is possible that physical activity act as resilience factors mitigating depression. Supporting evidence was found in a study of inpatient adolescent girls aged 14 years (11).

Maddux and Meier (23) suggested that perceiving depressive symptoms may weaken the influence of self-efficacy as a predictor of achievement behavior. Specifically, Frazier et al. (17) suggested that to improve the effectiveness of physical activity interventions, theoretically based moderating effect should be tested when self-efficacy and physical activity have been shown to have associations. Our results showed that depressive symptoms moderated the relation between changes in physical activity and self-efficacy. Girls who had high initial levels of self-efficacy and smaller increases in depressive symptoms had the lowest decline in physical activity participation. In contrast, girls with initial high self-efficacy had a greater decline in physical activity if they reported greater increase in depressive symptoms. The moderating effects of depressive symptoms on the self-efficacy-physical activity relationship were also found in a recent study conducted by Shields et al. (35). Interestingly, it was found that self-regulatory efficacy had a stronger relationship with physical activity among those adolescents experiencing depressive symptoms as compared with asymptomatic adolescents.

The magnitude of change in physical activity was medium and reflected the relative unstable pattern of self-reported physical activity among adolescent girls. That unstable pattern of physical activity during early adolescence is consistent with our previous longitudinal research where a moderate differential stability of the physical activity during early adolescence was found (30,31). On the contrary, several studies conducted with North-American adolescents found that leisure-time physical activity was relatively stable during adolescence (12,27). A possible explanation for the controversial findings may be differences in study populations, sampling and measures. Consistent with previous research, the pattern of change in depressive symptoms demonstrated that even at the ages of 11–13 years there was an accelerated prevalence of depression (3). Because of beneficial role of regular exercise and physical activity participation in the prevention and treatment of depressive symptoms has been demonstrated (11), future interventions should concentrate on increasing physical activity participation already during late childhood. For example, Jerstad et al. (19) found that girls’ physical activity significantly reduced the risk for future increases in depressive symptoms and risk for the onset of depression. Further, they also found that depressive symptoms significantly reduced future physical activity. Therefore, a bidirectional relation between exercise and depression was demonstrated in adolescent girls.

Some limitations of the current study should be mentioned. First, the present findings do not provide us with any information about the cause of the change in physical activity in adolescent girls. The decrease in physical activity might have been caused by other factors than self-efficacy beliefs or experiencing depressive symptoms. These possible factors included environmental, social, familial or psychological processes during childhood and adolescence. Raudsepp et al. (31), for example, found that changes in sedentary behaviors (playing video games, using
computer) across adolescence were inversely associated with changes in physical activity. In addition, four major information sources of adolescents’ self-efficacy (e.g., performance accomplishments, vicarious learning, verbal encouragement, physiological and affective states) were not measured in current study (4). It is possible that information obtained from these sources would affect individual’s persistence and efforts toward physical activity. Secondly, previous studies showed that self-reported physical activity measurements underestimate differences between groups and that their reliability and validity, particularly among children and adolescents, are questionable (26). Thirdly, the data are not representative on a national level, and the sample, although randomly selected, was only from one Estonian city. And finally, although longitudinal associations between self-efficacy for physical activity, depressive symptoms and physical activity were found, additional research is needed to determine the causal influence of self-efficacy and depressive symptoms in explaining change in youth physical activity. Randomized intervention studies are needed to establish if these factors do or do not play a causal role in changing adolescents’ physical activity.

The present study has also several strengths. Previous research on children and adolescents’ health-related behavior has been conducted largely with Western European and North American children and adolescents, and there are no research data on this topic from Baltic and East European countries. Therefore, it is important to note the cross-cultural importance of our results. In addition, longitudinal data across two years were collected and analyzed using LGM. One of the advantages of LGM in describing change was the capability of modeling and analyzing change at the individual level. This does not mean that a LGM estimates the change parameters of every person, but rather than that a LGM estimates the etween-person variation as well as the mean of individual change (28).

In summary, leisure-time physical activity was inversely associated with initial level and change in depressive symptoms and self-efficacy was positively related to initial level and change in physical activity across a 2-year period among adolescent girls. These relationships were medium in magnitude and independent of girls’ BMI. Experiencing of depressive symptoms had a moderating effect on self-efficacy-physical activity relationship. We recommend that future studies on determinants of physical activity in children and adolescents include also features of social and physical environments, cognitive influences as well as objectively measured physical activity participation. Given the decline in adolescent physical activity and the current crisis of both national and international childhood obesity, determining the important sociocultural, physical and cognitive factors in predicting physical activity is essential to enable the development of normative and control-based interventions to combat youths’ inactivity.

References


