Physical Activity, Gender, Weight Status, and Wellbeing in 9- to 11-Year-Old Children: A Cross-Sectional Survey

Gavin Breslin, Diana Gossrau-Breen, Naomi McCay, Gillian Gilmore, Lindsay MacDonald, and Donncha Hanna

Background: The aim of this study was to examine the relationship between physical activity and wellbeing in children, and to further explore the extent to which this may vary by gender and weight status. Method: A representative sample of 1424 9- to 11-year-olds completed a self-report measure of physical activity, the Child Health and Illness Profile, KIDSCREEN, and a self-esteem scale. Body Mass Index (BMI) measurements were also obtained. Results: 24% of children achieved the recommended level of 60 minutes of moderate-to-vigorous intensity physical activity (MVPA) per day, with more boys than girls achieving this level. Children achieving the recommended level of MVPA scored significantly higher on measures of the Child Health and Illness Profile ($F(5, 1354) = 5.03; P < .001$), KIDSCREEN ($F(3, 1298) = 4.68; P = .003$), and self-esteem ($F(1, 1271) = 18.73; P = .003$) than less active children although the effect sizes were small ($η^2_p = .01$). Substantial gender differences in wellbeing were found reflecting gender specific behaviors and socialization. Weight status had negligible influence on wellbeing. Conclusions: Children who meet the recommended guidelines of MVPA were more likely to have better wellbeing. When attempting to raise children’s physical activity levels consideration should be given to the specific relationships between wellbeing and physical activity.

Keywords: quality of life, exercise, KIDSCREEN, health

In adults, physical activity has an important role in improving physical and mental health. For children and young people the evidence for such a positive association between physical activity and wellbeing is weaker, yet the promotion of physical activity in children is considered important to establish healthy lifestyles which may be maintained into adulthood. In children, physical activity has been shown to benefit bone density, aerobic endurance and muscular strength, and positively changes risk factors for cardiovascular disease such as body mass index (BMI). Such physical health benefit is best achieved by children through engaging in 60 minutes of moderate-to-vigorous intensity physical activity (MVPA) each day.

According to 2 British health surveys, using parental reports of physical activity, large proportions of 8- to 10-year-olds meet the recommended physical activity guidelines: 68% to 72% of boys and 62% to 66% of girls in England and 77% and 75% of boys and girls, respectively, in Scotland. Using an accelerometer, a device that monitors the intensity and duration of physical activity, a different picture emerges. In a study of 6- to 7-year-olds in England, Basterfield and colleagues found that only 3% of boys and 2% of girls met the physical activity guidelines, suggesting that parental report grossly overestimates activity levels. A further English study of 11-year-olds reported that only 5.1% of boys and 0.4% of girls (overall 2.5%) met the recommended activity guidelines. Independent of measurement type, these findings consistently show that boys are more likely to be active than girls.

In adults, physical activity has been shown to be beneficial for improving mood states, emotion, and self-esteem and for alleviating symptoms of mild forms of anxiety and depression. For children, the role of physical activity in preventing and treating anxiety and depression is less clear but a similar trend to that of adults has been proposed. For example, a cross-sectional study of 8- to 12-year-olds showed active children were less likely to have depressive symptoms than nonactive children. In a separate study of 9- to 14-year-olds, those scoring high on physical activity intensity and frequency also scored high in vigor and lower in depression, tension, and fatigue. A large positive association has also been reported between physical activity and global self-esteem and an inverse relationship with depression and
The relationship between physical activity and self-esteem is considered to be more complex given the findings from a longitudinal study of 9-year-old girls who were followed up at ages 11 and 13. No significant effects for self-esteem on physical activity were found over time. However, physical activity was predictive of subsequent global self-esteem (lagged effect), with the positive effect being stronger for girls at age 11 and with higher BMI.

Weight status differences have also been reported, though not consistently, for physical activity and wellbeing measures. Many studies, but not all, found that overweight/obese children were less active than their normal weight counterparts. Overweight/obesity has consistently been associated with higher body dissatisfaction and physical functioning scales within health-related quality of life (HRQOL) measures, yet not for depression, self-esteem, and psychological and social aspects of HRQOL. These findings suggest that children's weight status requires consideration when examining the links between physical activity and wellbeing.

Moreover, findings from previous studies are limited by small, nonrepresentative samples, a narrow focus on psychological wellbeing measures (eg, depression, self-esteem), and often rely on parental reports of children's physical activity. Wellbeing is multifaceted and is conceptualized as a subjective evaluation of physical, mental and social aspects of health by using HRQOL measures that assess self-rated health, happiness, global life satisfaction and the presence of distress. This study explores the relationship between achieving the recommended level of 60 minutes of MVPA each day and child wellbeing. Specifically, we hypothesize children who achieve the recommended level of MVPA will score higher on wellbeing measures than those not achieving this level. In addition, we further explore the extent to which this relationship may vary by gender and weight status.

Methods

Design

A cross-sectional survey of primary school children aged 9 to 11 years was conducted. The study used self-completion questionnaires to assess children's wellbeing and physical activity levels, followed by weight and height measures being taken. The principals of 40 primary schools in Northern Ireland were contacted, with the sample being quota stratified by the 5 Education and Library Boards and school size. Overall, 32 primary schools agreed to participate in this survey (school response rate: 80%). Given the self-report nature of the questionnaire, only the higher year groups—years 5 (aged 8 to 9 yrs), 6 (aged 9 to 10 yrs), and 7 (aged 10 to 11 yrs)—were targeted for inclusion in the study. One class from each year group was drawn from each school. For each class chosen to participate, letters and opt-out consent forms were issued to all parents (via the school) to inform them about the study.

Sample

One thousand, nine hundred, thirty-nine children were approached for participation, of which 11.9% were non-responders due to parental refusal (2.7%), pupil refusal (1%), or absence on the day (8.1%), thus resulting in a response rate of 88.1% (n = 1708). For the analysis of the physical activity questions, children who classified themselves as having a 'disability or condition which stops them from taking part in physical activity all of the time' were excluded (n = 66). A further 218 cases were excluded due to missing data. The sample for analysis therefore contained 1424 children (male = 643; female = 781), aged 9 to 11 years (χ² = 9.98; SD = 0.81).

Procedure

Ethical approval was obtained from the National Health Service Research Ethics Committee. To assess the readability, clarity and comprehension of the questions for the target sample, a pilot study was conducted with 500 children from 20 schools in the top and bottom 5% of reading ability. Trained interviewers carried out the fieldwork with teachers and teaching assistants being present during the survey session to assist with reading difficulties. Children were asked to complete 2 questionnaires: the Child Health and Illness Profile Child Edition, followed by a second questionnaire containing physical activity questions and further wellbeing measures. A 10-minute break was allowed between questionnaires to reduce fatigue and boredom. Anthropometric measures of weight and height were taken afterward using standardized and calibrated scales.

Measures

MVPA. Physical activity levels were assessed by asking children, 'Which days last week did you do any activities that made you warm up, get out of breath or sweaty (like playing hard, sports, dancing, or physical education classes)生产设备' Each weekday was listed and children were asked to tick the days they were active and then answered, 'How long on average did these physical activities usually last for?' One of four categories could be selected: 'I didn't do any,' 'Less than 1 hour,' 'About 1 hour,' or 'More than 1 hour.' The question was adapted from the Physical Activity in Scottish Schoolchildren (PASS) project, based on the Health Behavior in School-aged Children (HBSC) study. The original question was found to be reliable and to correlate with accelerometer measurements. For this study the question’s wording was changed to assure it is comprehensible among primary school children (as compared with adolescents). Children's responses were dichotomized as either meeting the recommended 60
Weight Status. BMI was calculated by taking weight and dividing by height squared. Each participant was then allocated into 1 of 4 BMI-for-age-and-gender categories using the international classification for childhood obesity: Thin, Average weight, Overweight, and Obese. 

Child Health and Illness Profile Child Edition (CHIP-CE). The CHIP-CE is a self-report measure of HRQOL suitable for children aged 6 to 11 years, containing 45 items across 5 separate domains. These domains include: Satisfaction (self-assessed wellbeing and self-esteem; 8 items), Comfort (emotional and physical symptoms and limitations in activity as a result of illness; 12 items), Resilience (supportive resources provided by families and activities indicative of physical fitness that promote future health; 8 items), Risk Avoidance (risky behaviors that impair future health; 8 items), and Achievement (perceived performance both academically and socially with peers; 9 items). Items were answered on a 5-point Likert scale and recall period was the past 4 weeks. Domain scores were calculated as average scores and, to create a valid domain score, at least 70% of a domain’s items needed to be answered. Scores were then standardized according to the CHIP-CE manual to have a mean score of 50 and a standard deviation of 10. Higher scores indicate the positive end of the scale. KIDSCREEN dimensions were shown to have acceptable psychometric properties and reliability. Internal consistency of the 3 dimensions (Cronbach’s alpha coefficients shown in Table 1) was satisfactory and similar to previous reports. 

Global Self-Esteem Measure. The Rosenberg Self-esteem Scale (RSES) was modified for use with a sample of children for the current study. The RSES measures global self-esteem in adolescents via 10 questions relating to self-worth and self-acceptance. Considerable pilot testing with children in schools was conducted to ensure the items were suitable. This modified version demonstrated good reliability (see Table 1 for Cronbach’s alpha coefficient). Individual questions from the measure were rated on a 4-point Likert scale ranging from ‘strongly disagree’ to ‘strongly agree.’ Total (sum) scores for all items range from 10 to 40, with higher scores indicating higher self-esteem.

Statistical Analysis

To test the differences between physical activity levels and BMI categories on the 3 measures multivariate analysis of covariance (MANCOVA) and 1 analysis of covariance (ANCOVA) were conducted controlling for gender. Gender was used as a covariate as gender differences exist for the physical activity level, the wellbeing measures, and weight status in this sample; this was consistent with previous research. A 2-factor MANCOVA

Table 1: Descriptive Statistics for Each of the Subscales

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
<th>No. of items</th>
<th>Cronbach's alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>50.33</td>
<td>9.84</td>
<td>9</td>
<td>0.81</td>
</tr>
<tr>
<td>Comfort</td>
<td>50.56</td>
<td>9.84</td>
<td>12</td>
<td>0.79</td>
</tr>
<tr>
<td>Resilience</td>
<td>50.32</td>
<td>9.90</td>
<td>8</td>
<td>0.70</td>
</tr>
<tr>
<td>Risk avoidance</td>
<td>49.99</td>
<td>10.17</td>
<td>8</td>
<td>0.74</td>
</tr>
<tr>
<td>Achievement</td>
<td>50.22</td>
<td>9.88</td>
<td>8</td>
<td>0.71</td>
</tr>
<tr>
<td>Social acceptance</td>
<td>50.33</td>
<td>9.88</td>
<td>3</td>
<td>0.79</td>
</tr>
<tr>
<td>Support</td>
<td>50.16</td>
<td>9.84</td>
<td>6</td>
<td>0.81</td>
</tr>
<tr>
<td>Self-perception</td>
<td>50.21</td>
<td>10.01</td>
<td>5</td>
<td>0.74</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>30.45</td>
<td>5.37</td>
<td>10</td>
<td>0.78</td>
</tr>
</tbody>
</table>
with the 5 CHIP-CE domains as dependent measures and a separate 2-factor MANCOVA with the 3 KIDSCREEN dimensions as dependent measures were conducted; in both cases, weight category and recommended physical activity level achieved were the independent factors. MANCOVA was chosen to control for the family-wise error rate and take account of the relationships between the subscales within each questionnaire. Differences within self-esteem levels were estimated by a 2-factor ANCOVA with weight category and recommended physical activity level achieved as the independent factors. All dependent variables demonstrated acceptable skewness and kurtosis statistics. All analyses were computed using the Statistical Package for the Social Sciences (SPSS Version 17).

Results
Meeting the Recommended Physical Activity Level

In total, 24% of children had reached the recommended level of 60 minutes MVPA each day of the week; the remaining 76% had not achieved this level. Categorization for weight status based on BMI and standardized for age and gender resulted in 70.3% of the sample being of average weight and 18.4% being overweight, while 6.9% were categorized as obese and 4.5% as thin.

There was a small but significant association between gender and whether the recommended physical activity level had been reached ($\chi^2 = 8.90; df = 1; P = .003$), with more males (27.9%) than females (21.0%) achieving the recommended MVPA levels. A small but significant association between gender and weight status also emerged ($\chi^2 = 8.42; df = 3; P = .038$), with more males (74.1%) than females (67.1%) being classified in the average weight category while more females were classified as overweight (20.6%) than males (15.7%). No difference emerged for MVPA level by weight status.

Table 1 presents the overall means and standard deviations for each wellbeing measure by gender, weight category, and whether the recommended level of MVPA was achieved as shown in Table 2.

Child Health and Illness Profile

A 2-factor MANCOVA with the 5 CHIP-CE domains as dependent measures revealed the covariate gender was significantly related to the domains ($F(5, 1354) = 79.57; P < .001; \eta^2_p = .23$). Furthermore, there were significant multivariate main effects of weight category ($F(15, 4068) = 1.81; P = .028; \eta^2_p = .01$) and recommended MVPA level achieved ($F(5, 1354) = 5.03; P < .001; \eta^2_p = .02$). No significant interactions were found.

Gender had a significant main effect on the domains of Comfort ($F(1, 1358) = 28.82; P < .001; \eta^2_p < .01$), Resilience ($F(1, 1358) = 28.22; <.001; \eta^2_p = .02$), Risk Avoidance ($F(1, 1358) = 243.37; P < .001; \eta^2_p = .15$), and Achievement ($F(1, 1358) = 23.37; P < .001$). Females had higher mean scores on Resilience, Risk Avoidance, and Achievement, but lower scores on Comfort compared with males.

MVPA level achieved had a significant main effect on each of the 5 CHIP-CE domains: Comfort ($F(1, 1358) = 8.30; P = .004; \eta^2_p < .01$), Satisfaction ($F(1, 1358) = 7.42; P = .007; \eta^2_p < .01$), Resilience ($F(1, 1358) = 15.12; P < .001; \eta^2_p = .01$), Risk Avoidance ($F(1, 1358) = 4.63; P = .032; \eta^2_p < .01$), and Achievement ($F(1, 1358) = 16.91; P < .001; \eta^2_p = .01$). Children who had reached the recommended MVPA level had significantly higher mean scores on Comfort, Satisfaction, Resilience, and Achievement, yet, lower mean scores on Risk Avoidance compared with those children who had not reached this activity level.

There was 1 significant main effect of weight category on the Risk Avoidance domain ($F(3, 1358) = 2.66; P = .047; \eta^2_p < .01$). Children of average weight had the lowest score, followed by obese and overweight children, with thin children scoring highest on Risk Avoidance.

KIDSCREEN

A 2-factor ANCOVA with the 3 KIDSCREEN dimensions as dependent measures revealed a significant covariate effect of gender on the dimensions ($F(3, 1298) = 22.76; P < .001; \eta^2_p = .05$) and a significant multivariate main effect of recommended physical activity level achieved ($F(3, 1298) = 4.68; P = .003; \eta^2_p = .01$). No significant multivariate main effect of weight category and no significant interactions emerged.

Gender had a significant main effect on each of the 3 dimensions: social acceptance ($F(1, 1300) = 8.34; P = .004; \eta^2_p = .01$), social support and peers ($F(1, 1300) = 20.79; P < .001; \eta^2_p = .02$), and self-perception ($F(1, 1300) = 19.53; P < .001; \eta^2_p = .02$). Females had significantly higher mean scores for the dimension of social support but lower scores on self-perception and social acceptance than males.

Significant main effects emerged for recommended MVPA level achieved on the dimensions of social acceptance ($F(1, 1300) = 12.03; P = .001; \eta^2_p = .01$) and social support and peers ($F(1, 1300) = 5.08; P = .024; \eta^2_p < .01$). Those children who had reached the recommended MVPA level reported significantly higher mean levels of social acceptance and social support compared with those children who had not reached this activity level.

Global Self-esteem

A 2-factor ANCOVA with self-esteem as the dependent variable revealed a significant covariate effect of gender ($F(1, 1271) = 3.96; P = .047; \eta^2_p < .01$) and a significant main effect of recommended MVPA level ($F(1, 1271) = 18.73; P = .003; \eta^2_p < .01$). There was no effect for weight category and no interaction. Males reported higher mean
### Table 2  Means and Standard Deviations of the Subscales for Each of the Independent Variables

<table>
<thead>
<tr>
<th>Gender</th>
<th>Satisfaction</th>
<th>Comfort</th>
<th>Resilience</th>
<th>Risk avoidance</th>
<th>Achievement</th>
<th>Social acceptance</th>
<th>Support</th>
<th>Self-perception</th>
<th>Self-esteem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>50.40 (10.26)</td>
<td>52.01 (8.78)</td>
<td>49.02 (10.57)</td>
<td>45.51 (10.50)</td>
<td>49.03 (10.03)</td>
<td>51.19 (9.55)</td>
<td>48.98 (9.60)</td>
<td>51.63 (9.66)</td>
<td>30.82 (5.21)</td>
</tr>
<tr>
<td>Female</td>
<td>50.07 (9.55)</td>
<td>49.23 (10.45)</td>
<td>51.28 (9.28)</td>
<td>53.62 (8.21)</td>
<td>51.06 (9.70)</td>
<td>49.64 (10.11)</td>
<td>51.14 (9.96)</td>
<td>49.04 (10.15)</td>
<td>30.07 (5.49)</td>
</tr>
<tr>
<td>Weight category</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Thin</td>
<td>49.55 (10.15)</td>
<td>49.61 (9.77)</td>
<td>48.99 (11.28)</td>
<td>51.06 (9.24)</td>
<td>49.73 (9.24)</td>
<td>49.60 (9.04)</td>
<td>47.96 (10.09)</td>
<td>49.91 (10.14)</td>
<td>29.79 (5.22)</td>
</tr>
<tr>
<td>Average weight</td>
<td>50.76 (9.79)</td>
<td>50.53 (9.83)</td>
<td>50.51 (9.78)</td>
<td>49.62 (10.13)</td>
<td>50.58 (9.82)</td>
<td>50.57 (9.84)</td>
<td>50.67 (9.83)</td>
<td>50.86 (9.79)</td>
<td>30.71 (5.29)</td>
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<tr>
<td>Overweight</td>
<td>48.94 (9.65)</td>
<td>50.52 (9.91)</td>
<td>50.11 (9.80)</td>
<td>50.85 (10.06)</td>
<td>49.21 (9.64)</td>
<td>49.93 (10.19)</td>
<td>49.43 (9.79)</td>
<td>49.07 (9.90)</td>
<td>30.06 (5.25)</td>
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<tr>
<td>Obese</td>
<td>48.88 (10.82)</td>
<td>50.40 (10.13)</td>
<td>48.58 (11.11)</td>
<td>50.23 (11.27)</td>
<td>48.27 (10.81)</td>
<td>49.52 (10.21)</td>
<td>48.93 (10.01)</td>
<td>47.68 (11.36)</td>
<td>28.99 (6.06)</td>
</tr>
<tr>
<td>Recommended PA level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achieved</td>
<td>52.05 (9.44)</td>
<td>51.50 (9.97)</td>
<td>53.05 (9.31)</td>
<td>49.09 (10.84)</td>
<td>52.39 (9.91)</td>
<td>51.02 (9.93)</td>
<td>52.11 (10.28)</td>
<td>51.26 (10.31)</td>
<td>31.58 (5.47)</td>
</tr>
<tr>
<td>Not achieved</td>
<td>49.63 (9.94)</td>
<td>50.16 (9.77)</td>
<td>49.39 (9.97)</td>
<td>50.24 (9.90)</td>
<td>49.44 (9.79)</td>
<td>50.12 (9.86)</td>
<td>49.53 (9.63)</td>
<td>49.87 (9.89)</td>
<td>30.02 (5.29)</td>
</tr>
</tbody>
</table>
self-esteem scores compared with females and children who had reached their recommended physical activity level also had higher mean self-esteem scores than those who had not achieved the MVPA level.

**Discussion**

This study examined the relationship between physical activity and wellbeing, and the extent to which this relationship varied by gender and weight status. Less than a quarter of 9- to 11-year-olds achieved the recommended level of 60 minutes of MVPA per day. Boys were more likely to achieve this level of MVPA than girls, thus confirming previously reported gender differences in levels of physical activity. The proportion of 8- to 10-year-olds meeting the recommended level of MVPA was lower than the proportion reported in the health surveys for England and Scotland. However, our findings were consistent with a small study conducted in Wales that reported 25% of boys and 30% of girls achieved the recommended physical activity levels measured via pedometry.

Children who met the recommended level of MVPA showed generally higher scores in wellbeing measures than children who did not achieve this activity level. Specifically, active children scored higher on domains of Satisfaction, Comfort, Resilience, and Achievement, and also reported higher global self-esteem, social acceptance and more social support/better peer relations. Thus, our study expands previously reported findings of better wellbeing for MVPA. The authors decided to keep the items included that may have inflated the association between these domains and wellbeing measures add to the strength of this study. Furthermore, the Resilience and Comfort domains each had a negligible main effect on child wellbeing and no moderating effect on MVPA.

However, the cross-sectional design does not permit causal attribution of MVPA increasing wellbeing. Although one study showed that physical activity lead to higher self-esteem over time, others raised concerns that low self-esteem can act as a barrier in engaging in physical activity. In addition, children’s social relationships, reflected in 4 domains, can act as crucial motivators or barriers to physical activity. Parents facilitate children’s activity by providing direct support such as transporting children to and from organized activities, joint family activities (eg, walking the dog, going to the playground), and travel to/from school (eg, walking, cycling). Resilience has a strong focus on good parent-child relationships which might be the basis for children being active. Although the opposite could also be true, as some parents might limit children’s activity opportunities due to safety concerns (eg, busy roads), time, expense, or school work (eg, preparing for tests). Much physical activity among children seems to be embedded in interaction with friends and peers which may be indicated by the found association between MVPA and Achievement (capturing the ability to make friends and maintaining friendships), social acceptance, and social support and peers. Participating in sports (eg, football), games (eg, chases), and playground activities might result from and contribute to being socially accepted, popular, and having friends to be active with.

Much enjoyment of physical activity is drawn from the social aspects of these activities, which could be reflected in better wellbeing.

Although gender was included as a covariate, its effects particularly on the wellbeing measures were large, the effect-sizes for gender generally far exceeded those for MVPA. Girls scored higher on Resilience, Achievement and, particularly, on Risk Avoidance (highest mean score difference for all CHIP domains), while boys scored higher on Comfort; this is consistent with the previously reported gender pattern. Moreover, boys reported better social acceptance, self-perception and self-esteem but less social support/peer relations than girls. These findings confirm previous reports of better psychological wellbeing among boys than girls and the gender pattern found in the Irish KIDSCREEN national survey. Gender differences in social acceptance and social support/peer relations seem to reflect gender specific socialization patterns. The large gender difference in Risk Avoidance, measuring involvement in troublesome behaviors, might suggest a bias toward male-typical rather than female-typical risky behaviors. As regards weight status, this had a negligible main effect on child wellbeing and no moderating effect on MVPA.

**Limitations**

In addition to the cross-sectional design which does not permit disentangling the direction of effects, child self-report of MVPA may limit the reliability of the employed physical activity measure due to the spontaneous, unstructured nature of children’s physical activity and their ability to recall periods of activity. Although avoiding the grossly overestimating parental report, objective measurement via accelerometers brings other challenges such as determining the appropriate cut-off points for MVPA levels, increased costs and the logistics of fitting accelerometers to a large sample of children. Many studies employing accelerometers used smaller samples, while the large sample size and use of validated and tested wellbeing measures add to the strength of this study. Furthermore, the Resilience and Comfort domains each included 2 items referring to physical activity which may have inflated the association between these domains and MVPA. The authors decided to keep the items included as eliminating the items could have impaired the validity and reliability of the overall domain scores.

**Conclusion**

In summary, despite strong and expected gender differences in physical activity and child wellbeing measures, achieving the recommended level of 60 minutes MVPA was associated with higher levels of most wellbeing measures examined in this study. Being physically active at the recommended level seems to be a marker for good physical, psychological and social aspects of wellbeing. Any attempts to increase physical activity in children
therefore need to consider the wider context of children’s behavior. Thus, further longitudinal studies are needed to explore the association between physical activity, intensity and duration on child wellbeing, preferably using objective measures of physical activity.

References


