Low vigorous physical activity at ages 15, 19 and 27: childhood socio-economic position modifies the tracking pattern

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Background: The present study examines (i) if the level of vigorous physical activity (VPA) at age 15 predicts low VPA at ages 19 and 27 and (ii) whether the observed prediction pattern differs by childhood socio-economic position (SEP). In this way, prediction analyses are applied to study tracking behaviour. Methods: Data are from The Danish Longitudinal Health Behaviour Study. The baseline survey was conducted in 1990 at age 15, the first follow-up in 1994 at age 19, and the second follow-up in 2002 at age 27, n = 561. The study population was a random sample of the Danish population selected from the National Civic Registration System, and data were collected by anonymous postal questionnaires. The indicator of childhood SEP was family occupational social class. Prediction analyses are conducted by stratified logistic regression analyses. Results: There was a significant and marked predictive power of low levels of VPA in mid adolescence (aged 15) for low VPA in late adolescence (age 19) [odds ratio (OR)=4.95 (2.83–8.66)], from late adolescence (age 19) into early adulthood (age 27) [OR=2.71 (1.61–4.55)] and also over the full study period from age 15 to age 27 [2.91 (1.72–4.94)]. Analyses stratified by SEP revealed that the predictive power of VPA at age 19 for low VPA at age 27 was only significant among participants from low SEP. Conclusion: These findings suggest that low VPA tracks through adolescence while tracking into adulthood only occurs among individuals with low childhood SEP.
Introduction

Low physical activity in adulthood is associated with increased risk of morbidity and mortality. In childhood, the absence of physical activity may have immediate health consequences and adult health may be compromised directly (e.g. by deterioration of adult bone health) or indirectly by instigating habits of low levels of physical activity. Therefore, a special emphasis on low levels of physical activity – including breaking the tracking patterns – is a key public health focus area.

In epidemiology, 'tracking' describes that an individual's level of a given behaviour at a given time in life predicts the same level of behaviour later in life. Tracking is also defined by the maintenance of relative rank or position within a given group over time when considering the full range of the behaviour of interest. Telama (2009) summarizes explanations of tracking of physical activity by four potential approaches. First, the carry-over value hypothesis suggests that people simply continue activities they engaged in at a younger age. Second, the ability and readiness hypothesis suggests that early experiences with physical activities and the skills thereby acquired make it easier to maintain being physically active. Third, tracking results from physical activity being a habit which is maintained automatically without much awareness or intended behaviour. Finally, a hereditary disposition to fitness and motor performance may result in maintaining high levels of physical activity over time.

Two comprehensive reviews show low to moderate tracking of physical activity during all life phases. Some studies document weaker tracking patterns in early childhood and in transitional phases from childhood into adolescence and from adolescence into adulthood compared with adulthood. Some studies indicate lower levels of tracking across longer intervals, whereas more recent studies document similar levels of tracking in long-term studies. Several studies show lower levels of tracking among women compared with men.

Low physical activity is prevalent among adolescents, so from a public health perspective it may be even more relevant to study tracking patterns of low levels of physical activity. Also, physical activity and physical inactivity may have different determinants which indicate the relevance of studying different levels of physical activity separately. The scientific literature on tracking of low physical activity is limited. Studies of preschool children show inconsistent findings, whereas studies on older age groups indicate that inactivity and low activity tends to track more strongly than high activity.

Also, little research has examined whether tracking of physical activity varies across socio-economic groups. Social differential tracking patterns of physical activity from adolescence into adulthood may be one of several mechanisms which result in social inequality in physical activity in adulthood.

Kimm et al. reported larger decreases in self-reported leisure time physical activity from ages 9–10 to 18–19 among US girls of lower educated parents compared with girls of higher educated parents. Another US study by Walters et al. found that boys of less-educated parents showed a steeper decline in self-reported moderate to vigorous physical activity (VPA) from mean age 15.9 to mean age 20.4. A Norwegian study showed that from age 15–16 to 18 self-reported physical activity levels declined more in girls of mothers with compulsory education than in girls of mothers with higher education and declined more among boys with fathers with low income than among boys with fathers with high income. A study from Australia by Cleland et al. analysed the social patterns of tracking of self-reported physical activity from age 7–15 to 26–36 years. No relationship between parental education and tracking of physical activity was observed.

We have not been able to identify studies of socially differentiated tracking which specifically focus on low physical activity, and only limited documentation exists for transitions from mid adolescence into late adolescence and from late adolescence into adulthood, two distinct life periods of great behavioural transitions. Also, no studies with two or more follow-up surveys covering a long follow-up time have been identified.

The present study used data from a Danish cohort study of men and women to examine (i) if the level of VPA at age 15 predicts low VPA at ages 19 and 27 and (ii) whether the observed prediction pattern differs by childhood socio-economic position (SEP). In this way, we use prediction analyses to study tracking behaviour.

Methods

We used data from the youngest of the five cohorts in The Danish Longitudinal Health Behaviour Study. The baseline survey was conducted in 1990 at age 15, the first follow-up was in 1994 at age 19 and the second follow-up was in 2002 at age 27. The study population was a random sample of 15 year olds selected from the National Civic Registration System. The questionnaires included items concerning demographic factors, social background, living conditions, psychosocial factors, self-reported health, illness and health behaviours.

Data were collected by postal questionnaires. As the participants were underaged at baseline, parents were informed about the possibility to withdraw their child from the study. Of all the invited adolescents (n=1100), 104 were left out due to parental request, leaving a potential study population of 996 adolescents. Response rates were 85.0% in 1990, 86.9% in 1994 and 81.3% in 2002. Only participants completing questionnaires in all three surveys were included in the present analyses (n=561, nboys=215, ngirls=346), corresponding to 56.3% of the baseline population.

Table 1 describes the applied measures of VPA and the re-coded categories applied in the analysis. The outcome measure in the statistical analyses was 0 hours of VPA outside school/work. Participants with 0 hours of VPA may conduct VPA during school or work time, so we characterize this behaviour as low VPA.

Childhood SEP was estimated by retrospective data measured at age 27 using two items about the father’s and mother’s occupation. Respondents reported their parents’ occupation at the age of 50. Data were coded according to the standards of the Danish National Institute of Social Research into SEP I (high) to V (low) and VI (living on social welfare benefits). Two criteria guided the coding of occupation: required educational qualifications and control over people or capital, e.g. size of the company or number of subordinates. This standard is almost identical to the UK Registrar General’s classification. Due to the relatively low power of the study for stratified analyses, we categorized participants in two groups, according to the highest ranking parent: high childhood SEP (I+II) and low childhood SEP (III+IV+V+VI).

Sensitivity analyses showed that change of cut-point did not influence the direction of the associations. In analyses of loss to follow-up, we used similar data on parental occupation collected by students’ reports at age 15.

Based on the assumption that 27 year olds are able to provide more reliable data on parental occupation compared with 15 year olds, we decided to use the data collected at age 27 for prediction analyses. Prediction analyses with both sets of information on parental occupation revealed identical conclusions (data not shown).

Ethics

Ethical approval of questionnaire-based survey studies in the general population is not required in Denmark. The study complies with the formal rule to request parents’ acceptance of inclusion of their children in a prospective study. The participants were informed in writing that participation was voluntary and anonymous. The study complies with the Helsinki II declaration.
Table 1 Description of items measuring vigorous physical activity outside school at ages 15, 19 and 27 and categorizations applied for analysis

<table>
<thead>
<tr>
<th>Item description</th>
<th>Response categories</th>
<th>Categorization when included in analysis as independent variable</th>
<th>Dichotomization when included in analysis as dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 15: &quot;Outside school: How many hours a week do you exercise or participate in sports that make you sweat or out of breath?&quot;</td>
<td>None, 0.5 h per week, 1 h per week, 2–3 h per week, 4–6 h per week, ≥7 h per week</td>
<td>0–0.5 h per week, 1 h per week, 2–3 h per week, 4–6 h per week, ≥7 h per week</td>
<td>_</td>
</tr>
<tr>
<td>Age 19: &quot;Outside work or school: How many hours a week do you exercise or participate in sports that make you sweat or out of breath?&quot;</td>
<td>None, 0.5 h per week, 1 h per week, 2–3 h per week, 4–6 h per week, ≥7 h per week</td>
<td>0–0.5 h per week, 1 h per week, 2–3 h per week, 4–6 h per week, ≥7 h per week</td>
<td>0 h per week, ≥0.5 h per week</td>
</tr>
<tr>
<td>Age 27: &quot;How many hours a week do you exercise or participate in sports that make you sweat or out of breath?&quot;</td>
<td>None, 0.5 h per week, 1 h per week, 2–3 h per week, 4–6 h per week, ≥7 h per week</td>
<td>_</td>
<td>0 h per week, ≥0.5 h per week</td>
</tr>
</tbody>
</table>

Statistical analyses

We used logistic regression analyses to estimate odds ratios (OR) for the prediction of low VPA at ages 19 and 27 by level of VPA at age 15 (reference group: ≥4 hours/week). Thereby we were able to keep several levels of the independent variables. We also estimated the association between level of VPA at age 19 and low VPA at age 27. Preliminary stratified analyses showed similar patterns for males and females, and consequently we show analyses for men and women combined. The overall tracking analyses were adjusted by sex and childhood SEP. Finally, analyses were stratified by childhood SEP to evaluate the modifying effect of childhood SEP. Additionally, the modifying effect of childhood SEP was tested by inclusion of an interaction term in the regression model of SEP and level of VPA at ages 15 and 19, respectively.

Analyses of loss to follow-up from baseline to second follow-up (n = 282) regarding sex, VPA at age 15 and parental occupational class reported at age 15 were conducted by chi-squared tests. Analyses were conducted using SAS software (version 9.1, SAS institute, Cary, NC).

Results

The prevalence of low VPA increased from 12.7% at age 15 to 26.2% at age 19 and 29.2% at age 27. Generally, females were less physically active than males (Table 2). Table 3 presents the results of the prospective analyses of the association between level of VPA at age 15 and low VPA at age 19 and 27 and the association between level of VPA at age 19 and low VPA at age 27. All analyses showed gradually increasing OR with decreasing level of VPA. The OR for low VPA at age 19 was 4.95 (2.83–8.66) among those with 0–½ hours of VPA per week at age 15. The corresponding OR for ages 19 to 27 was 2.71 (1.61–4.55) and 2.91 (1.72–4.94) for ages 15 to 27.

Table 3 also shows the results of the analyses stratified by childhood SEP. In both SEP strata, there was a strong association between level of VPA at age 15 and low VPA at age 19. A significant association was seen between level of VPA at age 15 and low VPA at age 27 in the low SEP stratum [OR = 4.03 (2.11–7.68) for 0–½ hour/week] whereas no corresponding association was found in the high SEP stratum. Correspondingly, the association between VPA at age 19 and low VPA at age 27 was significant in the low SEP stratum [3.79 (2.00–7.20) for 0–½ hour/week] and insignificant in the stratum of high childhood SEP. No statistical interactions were identified.

Analyses of loss to follow-up revealed no differences between those who did and did not participate in the follow-up surveys regarding VPA at age 15 (P = 0.5965) and SEP measured at age 15 (P = 0.2787). For sex, the loss to follow-up was selected towards men (P < 0.0001).

Discussion

This study of a Danish cohort documents a significant and marked predictive power of low levels of VPA in mid-adolescence for low VPA in late adolescence, from late adolescence into adulthood and for the full study period from mid-adolescence into early adulthood. However, analyses stratified by childhood SEP revealed that the predictive power of VPA at age 15 and 19 for low VPA at age 27 was only significant among participants from low childhood SEP. These findings suggest socially differential tracking of low VPA from late adolescence into early adulthood, whereas tracking of low VPA between mid and late adolescence seems to be independent of socio-economic background. Despite insignificant statistical tests for interaction, the observed differences in OR estimates in stratified analyses suggest the existence of a modifying effect of childhood SEP. It is likely that the observed insignificant tests for interaction are due to limited statistical power.

The US study by Kimm et al.16 covering the period from childhood to late adolescence and the US study by Walters et al.17 and the Norwegian study by Sagatun et al.,18 which both analyse the period from mid-adolescence to late adolescence (age 15.9 to 20.4 and age15–16 to 18, respectively), all found that tracking of physical activity was modified by childhood SEP. In our study, there was no modifying effect of childhood SEP from age 15 to 19. The study by Cleland et al.19 studied the tracking pattern of physical activity from adolescence into adulthood and found no modifying effect of...
Table 2 Characteristics of study population

<table>
<thead>
<tr>
<th>Childhood SEP</th>
<th>Social class I</th>
<th>Social class II</th>
<th>Social class III</th>
<th>Social class IV</th>
<th>Social class V</th>
<th>On social welfare benefits</th>
<th>Unclassifiable</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social class I</td>
<td>10.2 (57)</td>
<td>21.9 (123)</td>
<td>25.3 (142)</td>
<td>24.8 (139)</td>
<td>14.6 (82)</td>
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<td>24.2 (52)</td>
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<td>4.7 (10)</td>
</tr>
<tr>
<td>Social class III</td>
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<td>26.0 (90)</td>
<td>26.3 (91)</td>
<td>26.3 (91)</td>
<td>22.0 (76)</td>
<td>0.9 (3)</td>
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<td>1.2 (4)</td>
</tr>
<tr>
<td>Social class IV</td>
<td>19.7 (68)</td>
<td>26.0 (90)</td>
<td>26.3 (91)</td>
<td>26.3 (91)</td>
<td>15.0 (52)</td>
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<td>0.6 (2)</td>
</tr>
<tr>
<td>Social class V</td>
<td>9.5 (33)</td>
<td>29.0 (76)</td>
<td>26.3 (91)</td>
<td>26.3 (91)</td>
<td>15.0 (52)</td>
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<td>On social welfare benefits</td>
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<td>0.5 (1)</td>
<td>0.5 (1)</td>
<td>0.9 (3)</td>
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<td>0.6 (2)</td>
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<tr>
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<td>4.7 (10)</td>
<td>1.2 (4)</td>
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<td>0.6 (2)</td>
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</table>

First follow-up, age 19

<table>
<thead>
<tr>
<th>Weekly hours of vigorous physical activity</th>
<th>Total population</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 h/week</td>
<td>26.2 (147)</td>
<td>23.3 (50)</td>
<td>28.0 (97)</td>
</tr>
<tr>
<td>0.5 h/week</td>
<td>9.5 (53)</td>
<td>9.3 (20)</td>
<td>9.5 (33)</td>
</tr>
<tr>
<td>1 h/week</td>
<td>16.2 (91)</td>
<td>10.7 (23)</td>
<td>19.7 (68)</td>
</tr>
<tr>
<td>2–3 h/week</td>
<td>21.4 (120)</td>
<td>20.5 (44)</td>
<td>22.0 (76)</td>
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<tr>
<td>4–6 h/week</td>
<td>16.6 (93)</td>
<td>19.1 (41)</td>
<td>15.0 (52)</td>
</tr>
<tr>
<td>≥7 h/week</td>
<td>9.6 (54)</td>
<td>16.7 (36)</td>
<td>5.2 (18)</td>
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<td>0.6 (2)</td>
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</table>

Second follow-up, age 27

<table>
<thead>
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<th>Weekly hours of vigorous physical activity</th>
<th>Total population</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 h/week</td>
<td>29.2 (164)</td>
<td>24.7 (53)</td>
<td>32.1 (111)</td>
</tr>
<tr>
<td>0.5 h/week</td>
<td>9.3 (52)</td>
<td>7.4 (16)</td>
<td>10.4 (36)</td>
</tr>
<tr>
<td>1 h/week</td>
<td>14.8 (83)</td>
<td>14.0 (30)</td>
<td>15.3 (53)</td>
</tr>
<tr>
<td>2–3 h/week</td>
<td>25.3 (142)</td>
<td>20.9 (45)</td>
<td>28.0 (97)</td>
</tr>
<tr>
<td>4–6 h/week</td>
<td>16.2 (91)</td>
<td>25.6 (55)</td>
<td>10.4 (36)</td>
</tr>
<tr>
<td>≥7 h/week</td>
<td>3.6 (20)</td>
<td>5.1 (11)</td>
<td>2.6 (9)</td>
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<td>Missing</td>
<td>1.6 (9)</td>
<td>2.3 (5)</td>
<td>1.2 (4)</td>
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</tbody>
</table>

Childhood SEP

<table>
<thead>
<tr>
<th>Social class I</th>
<th>Social class II</th>
<th>Social class III</th>
<th>Social class IV</th>
<th>Social class V</th>
<th>On social welfare benefits</th>
<th>Unclassifiable</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social class I</td>
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<td>7.4 (16)</td>
<td>6.7 (23)</td>
<td>6.7 (23)</td>
<td>6.7 (23)</td>
<td>4.9 (16)</td>
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<tr>
<td>Social class II</td>
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<td>24.0 (83)</td>
<td>24.0 (83)</td>
<td>24.0 (83)</td>
<td>14.6 (82)</td>
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<tr>
<td>Social class III</td>
<td>28.2 (158)</td>
<td>26.5 (57)</td>
<td>29.2 (101)</td>
<td>29.2 (101)</td>
<td>29.2 (101)</td>
<td>15.4 (33)</td>
<td>0.9 (3)</td>
</tr>
<tr>
<td>Social class IV</td>
<td>26.7 (149)</td>
<td>24.2 (52)</td>
<td>28.0 (97)</td>
<td>28.0 (97)</td>
<td>28.0 (97)</td>
<td>15.0 (52)</td>
<td>0.5 (1)</td>
</tr>
<tr>
<td>Social class V</td>
<td>10.9 (61)</td>
<td>10.7 (23)</td>
<td>11.0 (38)</td>
<td>11.0 (38)</td>
<td>11.0 (38)</td>
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<tr>
<td>On social welfare benefits</td>
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<td>0.3 (1)</td>
<td>0.3 (1)</td>
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<td>Unclassifiable</td>
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<td>Missing</td>
<td>1.1 (6)</td>
<td>1.9 (4)</td>
<td>0.6 (2)</td>
<td>0.6 (2)</td>
<td>0.6 (2)</td>
<td>0.0 (0)</td>
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</tr>
</tbody>
</table>

Table 3 Sex-adjusted odds ratios (OR, 95% CI) for low vigorous physical activity (VPA) at ages 19 and 27 by level of vigorous physical activity (VPA) at ages 15 and 19 stratified by childhood SEP (n = 561)

<table>
<thead>
<tr>
<th>Childhood SEP</th>
<th>Low VPA at age 19</th>
<th>Low VPA at age 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low SEP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High SEP</td>
<td></td>
<td></td>
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<tr>
<td>Low SEP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High SEP</td>
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</tr>
</tbody>
</table>

VPA at age 15

<table>
<thead>
<tr>
<th>Low VPA at age 19</th>
<th>Low VPA at age 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–0.5 h/week</td>
<td>4.95 (2.83–8.66)</td>
</tr>
<tr>
<td>1 h/week</td>
<td>2.29 (1.19–4.41)</td>
</tr>
<tr>
<td>2–3 h/week</td>
<td>1.81 (1.07–3.06)</td>
</tr>
<tr>
<td>≥4 h/week</td>
<td>1.0</td>
</tr>
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</table>

VPA at age 19

<table>
<thead>
<tr>
<th>Low VPA at age 19</th>
<th>Low VPA at age 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–0.5 h/week</td>
<td>2.71 (1.61–4.55)</td>
</tr>
<tr>
<td>1 h/week</td>
<td>2.14 (1.15–4.01)</td>
</tr>
<tr>
<td>2–3 h/week</td>
<td>1.35 (0.73–2.48)</td>
</tr>
<tr>
<td>≥4 h/week</td>
<td>1.0</td>
</tr>
</tbody>
</table>

a: Adjusted by childhood SEP
b: Adjusted by sex

childhood SEP. We observed stronger tracking of low VPA among adolescents with low childhood SEP compared with high childhood SEP from age 19 to 27.

The inconsistent findings of socio-economic patterning of physical activity among young people,23,24 suggest that the role of SEP for young people’s habits of physical activity may vary by cultural setting and by birth cohorts. This may also explain the differences in findings from the previous studies of social differential tracking of physical activity and the presented results from analyses of a Danish cohort. Methodological differences may also partly explain the different findings. First, the present study specifically analyses the prediction of low levels of physical activity whereas the focus of the previous literature has been higher levels of physical activity. Second, the applied measure of childhood SEP varies across studies. Finally, the present study has two follow-up data collections which gave the opportunity to analyse prediction patterns in two study periods. In the present study, we did not find different tracking patterns for men and women. This does not correspond with the existing literature which generally finds stronger tracking among men.25,26 These inconsistent findings may also be due to differences in cultural setting and methodology.

A life-course perspective is crucial for understanding social inequalities in health and health behaviours in adult population,22,23 and the distinct relevance of adolescence is increasingly being recognized.15 The Adolescent Pathway Model by Due et al.15 outlines pathways which may work during adolescence to create and strengthen adult health inequalities. One relates to socially differential tracking of health behaviours from adolescence into adulthood. The literature on social inequalities in physical activity in adolescence is inconclusive23,24, whereas studies on adult populations are generally more consistent in finding social inequality in physical activity.22 One way of understanding the change in social patterning of physical activity over time is therefore to disentangle the patterns of social differential tracking of physical activity and thereby understand the timing of changes. The present study from a Danish cohort contributes to this yet limited research by suggesting that low VPA mainly tracks from late adolescence into adulthood in populations with low childhood SEP but not in populations with high childhood SEP. Tracking of low VPA from mid- into late adolescence occurs independent of socio-economic background. Understanding such timing and the underlying mechanisms will contribute to the planning and designing of health promotion initiatives. The mechanisms leading to socially differential tracking of low physical activity are yet unknown.

When interpreting the presented results, a number of limitations should be considered. Analyses of loss to follow-up revealed that dropouts were more often male than female. No selected loss to follow-up was seen for VPA or SEP. However, a selected uptake of
individuals into the study at baseline may have occurred as almost no participants had parents who received social welfare benefits. The conclusions of the present study therefore only apply for children with economically active parents. Also, a selection bias into the study at baseline may have reduced the variation in SEP, which may have caused an underestimation of the modifying effect of SEP.

Data on physical activity were collected from self-reports. Former validation studies suggest that the applied measurements have reasonably good reliability and validity.\textsuperscript{28,29} Still, the use of self-reports increase the risk of recall bias and social desirability bias.\textsuperscript{30} The applied analytical model may reduce the effect of such bias as we model against low levels of VPA. Social desirability may lead to an overestimation whereby individuals with low or no physical activity are categorized in high levels of physical activity. Therefore, the issues of over-reporting physical activity may be less serious in analyses focusing on low physical activity. Also, it should be kept in mind that the measure of physical activity solely relates to VPA outside school/work. Conclusions are therefore valid only for VPA conducted during leisure time.

A validation study of retrospectively reported childhood parental education showed that such data are valid and that validity did not vary by SEP.\textsuperscript{31} We used parental occupation as the indicator of SEP and assume acceptable validity also of recalls of parental occupation. Validity studies have shown that adolescents can report their parents’ occupational activity in sufficient details to be used for studies of socio-economic differences.\textsuperscript{2,33}

Personal SEP at age 27 may influence VPA at age 27, and its role as an unmeasured confounder should be considered. However, as personal SEP at age 27 cannot be a determinant of VPA at age 15, it does not fulfil the criteria for being a confounder between levels of VPA at age 15 and low VPA at age 27. Rather, it may potentially be a mediating factor. As Cleland et al.\textsuperscript{19} argue, high physical activity may improve physical or emotional health which may lead to improved SEP through improved educational and occupational opportunities. Further, initial analyses showed that personal SEP at age 27 was not significantly associated with low VPA at age 27 (data not shown). Finally, for many individuals, the measure of personal SEP at age 27 will characterize a short period of life in which one holds a temporary low SEP, e.g. as a student. There may be other issues of unmeasured confounding, e.g. availability of physical activity resources in the environment, but we have no available data on such variables.

The random sample, the long period of follow-up and the inclusion of two follow-up data collections are important merits of the study. Thereby, two distinct life stages of high importance to physical activity were explored separately. Throughout the study period, the response rates were fairly high and the measurement of physical activity was similar. Finally, very few studies specifically focus on low physical activity. The present study adds to this upcoming area of socio-epidemiological behavioural research.

The present study suggests social differential tracking of low VPA as a potential pathway that may lead to social inequality in low VPA among adults. We propose further analyses based on larger and less selected data sets and analyses including moderate levels of physical activity. Still, in a life-course perspective, the presented findings highlight the importance of considering socio-economic circumstances in adolescence for long-term development of healthy habits.

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**References**


The family’s economic resources and adolescents’ health complaints—do adolescents’ own economic resources matter?

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Background: The present study focuses on the relevance of economic resources to psychological and psychosomatic health complaints during adolescence. It explores the link between the family’s and the adolescent’s economic resources and investigates whether or not differences in health complaints explained by the family’s financial situation can be explained by adolescents’ own economic resources. Methods: Drawing on data from two Swedish surveys on living conditions during adolescence (in the age group 10–18 years) conducted in 2002–03, logistic regressions were used to assess the associations between adolescents’ own and household economic resources on two measures of health complaints. Results: The association between family economic hardship (i.e. lack of cash margin) and adolescents’ health complaints largely disappeared when controlling for adolescents’ own economic resources. Three measures of own absolute and relative economic resources were used. Out of these, the ability (or not) to buy things that others have was associated with both psychological [Odds ratio (OR) 2.16, 95% confidence interval (95% CI) 1.6–2.9] and psychosomatic complaints (OR 1.67, 95% CI 1.3–2.1), irrespective of age and gender. The importance of lacking a personal cash margin or not being able to join friends seemed to differ between age groups and genders. Conclusions: The importance of different aspects of economic resources seems to vary across age groups and gender. However, not being able to buy things that others have was clearly associated with health complaints irrespective of age and gender. Family economic hardship was associated with adolescents’ health complaints, and this association was largely explained by adolescents’ own economic resources.

Introduction

In the adult population, the relation between income, or economic resources, and health has been studied extensively and the importance of income discussed in both absolute and relative terms. Needs and necessities are relative to the society and to the groups we belong to, and lacking these necessities makes it difficult to fully participate in society or to be part of these groups. For young people, inclusion is sometimes linked to having ‘what all the other kids have’, leading to increased stress among both parents and children if these needs cannot be met. The influence of family economy in the peer group setting may have many components, including young persons’ own economic resources in both absolute and relative terms. The concept of relative deprivation has long been used in social research. The general idea is that having less resources than others...