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Adolescent Health

Trends in vigorous physical activity and TV watching of adolescents from 1986 to 2002 in seven European Countries

Oddrun Samdal1, Jorma Tynjälä2, Chris Roberts3, James F. Sallis4, Jari Villberg2, Bente Wold1

Background: The aim is to study trends in physical activity and TV viewing in seven European countries in the period 1985–2002. Methods: The data are collected through questionnaires in the survey ‘Health Behaviour in School-aged Children’. A WHO Cross-national study, using nationally representative samples of 11-, 13-, and 15-year-olds. Between 1985/86 and 2001/02, a standard set of items was used to measure vigorous physical activity and TV watching in the study. Austria, Finland, Hungary, Norway, Scotland, Sweden, and Wales used these measures in all surveys. Results: Between 1985/86 and 2001/02, there was a slight increase in Finland in the proportions reporting vigorous physical activity 4 or more times a week, whereas as pattern of stability was observed for the other countries. Across all surveys and countries boys were more likely to report regular vigorous physical activity than girls. No clear pattern emerges when examining trends over time in TV watching. Boys reported spending more time watching TV than girls in all countries. The correlation between the two behaviours at the 1986 and 1998 measurement points was non-significant. Conclusion: The finding that boys were more likely to report regular vigorous physical activity and TV watching confirms results of previous studies. The present study of seven European countries generally indicates stability or a small increase in physical activity of boys and girls aged 11–15 from the mid-1980s to the early 2000s.

Keywords: adolescents, Europe, physical activity, trends, TV watching

Introduction

It is well recognised that physically inactive lifestyles present a major health problem to the populations of developed and developing nations, contributing to chronic diseases and psychological distress.1–6 Physical activity in youth has been associated with risk factors for chronic diseases, overweight, skeletal health, and mental health.7 Time spent engaging in sedentary behaviours, particularly television viewing, is independent of physical activity, but consistently associated with risk of overweight in youth.8,9

Although young people are more physically active than adults, the worldwide increase in overweight among youth10 has raised concerns about the adequacy of habitual activity levels in children and adolescents.1 It has therefore been suggested that young people undertake at least an hour of physical activity of at least moderate intensity on most days of the week.11,12

Societal changes such as increasing car ownership, unfriendly walking and cycling environments, and increasing choices in electronic entertainment combined with the concern about overweight have created a need to understand physical activity trends in youth. However, few studies have reported such trends, as it typically is impossible to compare prevalence rates across countries, due to differences in methodology.13–15 In the United States, trends were documented for high school students between 1993 and 2003. Insignificant changes in prevalence of vigorous physical activity and inactivity were found.16,17 On the other hand there is evidence that television viewing is increasing among youth both in the United States8 and in Europe.18

Trends are likely to differ by country, and country-specific data are needed for public health planning. Thus, the purpose of the present study is to document trends in leisure time physical activity and television viewing of adolescents across several European countries, using standardised measures and protocols.

Methods

Health behaviour in school-aged children study

The data presented here are taken from the ‘Health Behaviour in School-aged Children study’ (HBSC),19 ‘The study was established in 1983/84 in four European countries (Austria, England, Finland, and Norway), growing to eleven countries in 1985/86. Since then, data have been collected every four years (1989/90, 1993/94, 1997/98), and in 2001/02, in 35 countries and regions across Europe and North America participated.

The survey aims to improve understanding of young people’s health behaviours, lifestyle and perceptions of health, and their predictors. The data are collected through questionnaires from 11-, 13-, and 15-year-olds, following a standard protocol. Between 1985/86 and 2001/02, a standard set of items was used to measure vigorous physical activity and TV watching.
Sample
This study focuses on those countries that have collected physical activity and TV watching data according to the HBSC protocol over the five surveys from 1985/86 to 2001/02. Of the eleven countries participating in 1985/86, seven countries met these criteria, namely Austria, Finland, Hungary, Norway, Scotland, Sweden, and Wales. Austria did not have comparable data for 2002, but was still included as it has trend data up to 1998. The seven countries represent four of the five major regions in Europe: the north (Norway, Finland, and Sweden), the west (Scotland and Wales), the central (Austria), and the east (Hungary). Southern Europe was not represented.

A standard cluster sampling procedure was followed by every country. Samples were designed to be nationally representative, the primary sampling unit being the school class, or the school where school class information was not available. A minimum sample size for each country of approximately 4500 was recommended, 1500 from each age-group. Actual sample sizes for the countries reported in this study ranged from 2992 (Austria in 1990) to 6724 (Wales in 1990). A further requirement for the sampling process was that 90% of the students should fall between half a year of the mean ages, 11.5, 13.5, and 15.5. The two main sources of non-response were school/class non-participation and pupils absent on the day the survey was carried out. Absent students were not followed up. Data were weighted for Austria and Scotland in 1986, and for Scotland in 1990; these weights have been accounted for in the analysis presented here. Full details of the methods used can be found in Currie, Samdal et al. 2001.29

Data collection
To produce mean ages of 11.5, 13.5, and 15.5 the timeline and the survey administration depended on the time frame for admission to schools in each country. Whereas some countries followed the calendar year (January through December), other countries’ school admission was based on the school year (e.g., September to August). Table 1 shows that the timetable for data collection was broadly consistent through time for each country, although there were some notable exceptions; Austria’s data collection took place as early as March (1997/98) and as late as October (2001/02).

The physical activity variable was administered in all countries from 1986 to 1998, and in all countries, except Austria and Hungary in 2002. The TV variable was administered in all countries in 1986 to 1998, and in all countries, except Sweden in 1998.

Questionnaire
The questionnaires were developed through international consensus. All participating countries translated the final international version of the questionnaire into their native language(s) and piloted the national questionnaire before crop. This was done to ensure that the translation gave the correct connotations and concepts, an independent re-translation back to English was carried out.

Vigorous physical activity was measured using the item ‘OUTSIDE SCHOOL HOURS: How often do you usually exercise in your free time so much that you get out of breath or sweat?’ with seven response categories: (1) Every day, (2) 4–6 times a week, (3) 2–3 times a week, (4) Once a week, (5) Once a month, (6) Less than once a month, and (7) Never. TV watching was measured by the item ‘How many hours a day do you usually watch TV?’ with six response options: (1) Not at all (2) Less than half an hour a day, (3) Half an hour to 1 hour, (4) 2 to 3 hours, (5) 4 hours, and (6) More than 4 hours.

Reliability
An Australian study investigating the HBSC items measuring vigorous physical activity concluded the items had acceptable reliability.20 Based on the 1993/94 data, a test-retest study for the physical activity measure was conducted among Norwegian students. The Intraclass correlation coefficient (ICC) was 0.74, which is considered high.21 A similar test-retest in Finnish students in 2005 had ICC scores ranging between 0.6 and 0.8.22

Data analysis
The data were analysed using SPSS for Windows, v12.0 (SPSS for Windows 2003). For the purpose of trend analyses, the two items were dichotomised. For vigorous activity, the cut-off point was set at four or more times a week, including the response options (1) Every day, (2) 4–6 times a week. This decision was based on international guidelines that children and adolescents should be at least moderately active at a minimum of 60 min per day on most days of the week.11–12 The cut-off point for TV watching was set at 4 h a day or more, because this amount of viewing has been linked with an increased risk of obesity for young people.6

The younger age-groups reported to be more physically active than the older groups across all countries. Nevertheless, as trends followed the same pattern for all age-groups, and to reduce complexity of data presentation, the analyses are presented for the total sample of 11–15-year-olds, broken down by country and gender, with 95% confidence intervals calculated for gender subgroup estimates. Statistical tests were not computed for comparisons of interest, because the very large sample size would yield statistical significance when no practical significance was obtained. Interpretations are based on the confidence intervals and visual inspection of figures.

Finally, group level correlations of change scores from 1985/86 to 1997/98 for physical activity and TV watching were performed using each age and gender subgroup in each country as a case. As no Swedish data were available for TV watching, the total number of cases was 36, based on six countries and three age-groups by gender (6 × 3 × 2). Cross-sectional correlations at 1986 and 1998 between physical activity and TV watching were computed.

Results

Trends in vigorous physical activity
Some key findings emerge from the examination of trend data by country. In Finland alone there was evidence of a small but consistent increase for each survey in the proportions reporting regular vigorous physical activity between 1985/86 and 2001/02. In Scotland and Wales, an increase can be seen between 1985/86 and 1997/98, followed by a decline in 2001/02. In Austria, Hungary, Norway, and Sweden, the proportions remained stable across the 16-year-period. For all countries a similar pattern was observed for boys and girls.

Comparing prevalence rates of vigorous physical activity across countries, young people in Austria were most likely to report vigorous physical activity four or more times a week. On average 67% of the Austrian boys reported this level of activity across all surveys, whereas the number of boys reporting this level in the other countries averaged from 37% to 57%. For Austrian girls, the respective average proportion was 45%, whereas the average for girls elsewhere varied from 20% to 32%.

Trends in TV watching
Figure 2 shows that, overall, the proportions watching 4 h of TV daily changed little between 1985/86 and 1997/98. There
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were two main exceptions to this stable picture. In Hungary, rates were low in 1985/86 but rose in 1989/90 and were then stable until 1997/98. In Norway, rates were somewhat lower for boys in 1993/94 and 1997/98, compared with rates in 1985/86. Boys and girls in Wales were most likely to report high levels of TV watching across all four surveys. Boys reported spending more time watching TV than girls in all countries.
Correlation of change in physical activity and TV from 1986 to 1998

The mean change score from 1986 to 1998 was calculated for vigorous physical activity and TV watching. Cases were mean changes for each age and gender group for each country. The correlation between these two measures was $r = 0.07$ and thus non-significant. The correlation between the two behaviours at the 1986 and 1998 measurement points was also non-significant.

Discussion

The HBSC study’s long-term use of the same measures and research protocols allows a reasonably robust analysis of trends in a number of health behaviours, including physical activity and watching TV. The finding that boys and the younger age-group were more likely to report regular vigorous physical activity and TV watching confirms results of previous studies. It is now known that children and adolescents have health-enhancing effects not only from continuous forms of vigorous physical activity that the HBSC item was designed to assess. Thus, guidelines have changed current recommendations are for young people to accumulate 60 min of at least moderate intensity activity most days of the week. Nevertheless, the vigorous physical activity item allows an assessment of trends over time that cannot be computed from any other multi-country study.

Because of the limitations of self-reported physical activity, absolute prevalence estimates should not be interpreted. However, the trends for vigorous physical activity were clear. Country-specific data revealed either stability or a small increase across time. Finland was the only country to show consistent and substantial increases in vigorous physical activity across the whole period in girls and boys. These trends indicating stability or small increases during most of the 1990s are surprising, because rates of overweight were generally increasing in European youth.

The trends for TV watching suggested minimal change over the period 1985/86 to 1997/98, although there was some variation by country and gender groups. It is not possible to determine the reasons for different trends by subgroups, and additional research is needed to suggest factors that could account for the findings. During the study period, multiple new entertainment options were introduced that may be substituting for TV viewing, but few prospective studies have been conducted. An attempt was made in the present study to examine the correlation between change in physical activity and change in TV viewing. The analysis was limited by the lack of a cohort design and the need to treat population subgroups as cases. However, the lack of correlation between change scores or in cross-sectional analyses provides further confirmation that it is possible for adolescents to obtain sufficient physical activity and to spend time watching TV. The association between TV viewing and overweight in youth, usually, is found to relate to snacking during viewing time, and in many countries there are advertisements on TV to eat unhealthy foods which may contribute to increased energy intake in young people. It is therefore recommended that steps be taken to limit viewing time.

The present study has a number of limitations. First, there was a reliance on self-reported measures which do not provide accurate prevalence estimates. Second, moderate intensity physical activities were not assessed, so the physical activity measure did not reflect current international guidelines for youth physical activity. Given growing international concern about the increase in overweight and obesity, it would have been useful to examine body mass index data alongside physical activity. However, such information is only available for the most recent survey, with self-reported height and weight added to the HBSC protocol in 2001/02. The measure of vigorous activity did not take seasonal variation into account. Some studies have found seasonal variation, showing children are more active in summer than in winter, whereas other studies have not. As seen in table 1, most countries in the present study collected their data in winter time. Two countries, Austria and Scotland, did, however, collect data during summer months in some of the surveys. Given the stability in vigorous physical activity across all surveys and countries (with the exception of Finland), increase of physical activity levels could have been expected for Austria and Scotland in the summer month surveys. This was not the case, and seasonal variation is therefore not considered to be a major problem in the data collection of this study.

Contrary to popular opinion that young people are becoming less physically active, the present study of seven European countries generally indicated stability or a small increase in vigorous physical activity of boys and girls aged 11 to 15 from the mid-1980s to the early 2000s. The results suggest that physical activity is still a popular leisure time activity per day, confirming the small, but steady increase of TV watching across surveys observed in Finland.

There is substantial interest in the association between physical activity and TV watching, based on the concern that adolescents who spend large amounts of time watching TV have limited time for physical activity. Most studies have shown very small associations between physical activity and TV watching, but few prospective studies have been conducted. An attempt was made in the present study to examine the correlation between change in physical activity and change in TV viewing. The analysis was limited by the lack of a cohort design and the need to treat population subgroups as cases. However, the lack of correlation between change scores or in cross-sectional analyses provides further confirmation that it is possible for adolescents to obtain sufficient physical activity and to spend time watching TV. The association between TV viewing and overweight in youth, usually, is found to relate to snacking during viewing time, and in many countries there are advertisements on TV to eat unhealthy foods which may contribute to increased energy intake in young people. It is therefore recommended that steps be taken to limit viewing time.

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Contrary to popular opinion that young people are becoming less physically active, the present study of seven European countries generally indicated stability or a small increase in vigorous physical activity of boys and girls aged 11 to 15 from the mid-1980s to the early 2000s. The results suggest that physical activity is still a popular leisure time activity.
among young people. Confidence in these findings is increased by (i) the consistent use of the same survey items, sampling protocol, and administration methods; (ii) the large samples in each country; (iii) replication of findings across countries; and (iv) replication of findings across age and gender groups. The potential for further increases in physical activity among young people might particularly be related to transportation activities in terms of walking or biking to and from school and activities during the school day when young people spend a large part of their waking time.35–37

There could be different influences on the youth physical activity trends in different countries. It is particularly difficult to identify causes of population-wide trends, so questions about causation may never be answered. These data may be more valuable for public health planning. It is important to continue to monitor these trends, so feedback on the possible outcomes of public health programmes can be obtained. It is also important to study the differences between countries and link them to incentives in the national policy to learn more about how physical activity can be increased in Europe. Finland is of particular interest to study more closely as they have been able to achieve a consistent increase over the 1980s and 1990s. It is of great interest to determine trends in physical activity in other parts of the world, and across age-groups of younger and older adolescents using comparable measures and methods. The HBSC study has now expanded to over 40 countries on two continents, so the ability to monitor international trends for physical activity, TV watching, and other health behaviours is improving.

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Key points

- This study provides unique data on physical activity and TV viewing behaviours of adolescents in multiple European countries at a time of increasing obesity rates.
- From the mid 1980s to the early 2000s there was a very small increase in the proportion of youths reporting vigorous physical activity and general stability in the amount of TV viewing.
- It does not appear that increasing obesity in European adolescents is explained by decreasing physical activity or increasing TV viewing.

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