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Short Communication

Changes in socio-economic differences in adolescent self-reported health between 15 and 19 years of age: a longitudinal study

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Introduction

While social gradients in health are well established during childhood,[1] several studies have concluded that adolescence is characterized more by the absence than the presence of class gradients in health.[2] In adulthood, socio-economic differences in health are clearly present.[3] The period of adolescence may be particularly important in the shaping of the socio-economic gradient. However, despite its importance, only a few follow-up studies of adolescents have investigated changes in socio-economic differences in health during adolescence.

Patterns of socio-economic inequalities may vary by gender, although findings have been inconsistent. Mustard and Etches[4] performed a systematic review of 136 papers published between 1970 and 2000 about observational cohort studies using all-cause or cause-specific mortality among people aged 25–64 years as a health indicator for six developed countries (Denmark, Norway, Sweden, Finland, the USA and the UK). They concluded that gender differences in socio-economic inequality in mortality existed, but the findings were sensitive to the choice of inequality measure.

The size of socio-economic health differences seems to be age-specific, with a particular role for the period of adolescence. Previous studies have suggested that socio-economic inequalities are gender related. Despite this, only a few follow-up studies of adolescents have focused on changes in socio-economic differences in health during this crucial period of life. The aim of this study was to assess whether socio-economic differences in self-reported health (SRH) among adolescents in a country in Central Europe (Slovakia) changed between 15 and 19 years of age by gender in a longitudinal study.

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Methods

Sample and procedure

The data used in this study were derived from a longitudinal study on socio-economic inequalities in health. Data for the baseline study (T1) were collected in autumn 1998, and the study population consisted of 2616 (52.4% males) first-year students at 31 randomly selected secondary schools in Kosice, Slovakia. The mean age of the participants at baseline was 14.9 [standard deviation (SD) 0.62] years. The sample was stratified according to gender and type of secondary school. Respondents who agreed at T1 to participate in the second wave of the study (T2; $n = 1850$) received self-administered questionnaires by post in December 2002, together with a stamped return envelope. One reminder was sent to non-respondents. In total, 844 usable questionnaires were returned (42.7% males), representing a response rate of 45.5%. The mean age of the participants was 18.8 (SD 0.55) years.

Measures

Indicators of socio-economic position and self-rated health
Four indicators of the adolescents' socio-economic position (SEP) were used:

- Educational level of respondents was defined as the highest level of education attained. It was classified as: grammar school, specialized secondary school or apprentice/elementary school;
- Current employment status of respondents was classified as: student, employed or unemployed. The length of compulsory education in Slovakia is 10 years and usually starts at six years of age. As a consequence, most 16 year olds have already finished their compulsory education;
- Parental educational level was defined as the highest level of education attained by either parent. It was classified as: university, secondary high school or apprentice/elementary school; and
- Parental occupational status was defined as the highest level of occupation attained by either parent. The level of occupation was derived by coding job descriptions according to the International Standard Classification of Occupations (ISCO) 88 classifications. The 10 ISCO categories were clustered into three groups.

Respondents rated their health using a five-point Likert scale from 1 (excellent) to 5 (poor). For the purpose of the analyses, the variable was dichotomized (excellent/very good health and good/fairly good/poor health), with the latter three forming poor SRH.

Statistical analyses

Changes in socio-economic gradients in SRH were analysed using logistic regression. Three regression models were explored: Model 1 to examine the effect of SEP on SRH at T1; Model 2 to examine the effect of SEP on SRH at T2; and Model 3 to examine the potential differences in changes in socio-economic gradients in SRH between 15 and 19 years of age by analysing the effect of SEP on SRH at T2 controlled for SRH at T1. The procedure was repeated for all four socio-economic indicators, separately for males and females.

Table 1 – Socio-economic gradients of poor self-rated health at 15 (T1) and 19 (T2) years of age (logistic regression).[a]

	Poor self-rated health (odds ratio)					
	Males ($n = 361$)			Females ($n = 483$)		
	T1 (95% CI)	T2 (95% CI)	T2 adjusted for T1 (95% CI)	T1 (95% CI)	T2 (95% CI)	T2 adjusted for T1 (95% CI)
Respondent's educational level[b]						
Grammar	1.00	1.00	1.00	**1.00**	**1.00**	**1.00**
Specialized	1.16 (0.66–2.05)	0.96 (0.57–1.63)	0.90 (0.52–1.56)	**1.46 (0.95–2.24)**	**1.48 (0.95–2.30)**	**1.36 (0.86–2.16)**
Apprentice	1.78 (0.98–3.22)	1.41 (0.81–2.48)	1.23 (0.68–2.22)	**2.21 (1.33–3.68)**	**3.30 (1.96–5.55)**	**2.87 (1.67–4.92)**
Current employment status[c]						
Student	**1.00**	**1.00**	1.00	1.00	**1.00**	**1.00**
Employed	**2.48 (1.18–5.24)**	**2.70 (0.99–4.34)**	1.71 (0.79–3.70)	1.90 (0.65–1.84)	**1.23 (0.73–2.08)**	**1.22 (0.71–2.10)**
Unemployed	**1.98 (1.12–3.50)**	**1.88 (1.08–3.29)**	1.65 (0.92–2.96)	1.50 (0.97–2.32)	**1.89 (1.22–2.93)**	**1.76 (1.12–2.78)**
Parental educational level						
High	1.00	1.00	1.00	**1.00**	**1.00**	**1.00**
Medium	1.12 (0.65–1.92)	1.20 (0.72–1.99)	1.18 (0.69–2.00)	**1.65 (1.04–2.62)**	**1.80 (1.12–2.88)**	**1.63 (1.00–2.66)**
Low	1.33 (0.69–2.59)	1.19 (0.63–2.26)	1.60 (0.54–2.08)	**3.34 (1.94–5.74)**	**2.72 (1.58–4.68)**	**2.80 (1.18–3.66)**
Parental occupational level						
High	1.00	1.00	1.00	**1.00**	**1.00**	**1.00**
Medium	1.10 (0.62–1.93)	0.86 (0.50–1.45)	0.82 (0.47–1.43)	**1.43 (0.88–2.31)**	**1.34 (0.82–2.19)**	**1.24 (0.75–2.06)**
Low	1.52 (0.83–2.76)	1.11 (0.63–1.95)	0.96 (0.53–1.74)	**2.15 (1.31–3.54)**	**2.34 (1.41–3.89)**	**2.10 (1.19–3.39)**

CI, confidence interval.
[a] Figures in bold indicate that a variable contributes to the logistic model at $P < 0.05$.
[b] Respondent's educational level at T1.
[c] Respondent's employment status at T2.

Results

Among males, small, insignificant traditional socio-economic gradients of poor SRH were found for respondent's educational level, parental educational level and parental occupational status at 15 years of age (Table 1). Socio-economic gradients of poor SRH were similar at 19 years of age. According to current employment status, students reported a much lower occurrence of poor SRH than their employed or unemployed peers at both T1 and T2. However, the gradients did not change over time.

Among females, traditional significant socio-economic gradients were found (the lower the socio-economic position, the higher the prevalence of poor health) for respondent's educational level, parental educational level and parental occupational status at T1 and T2 (Table 1). No significant socio-economic gradient was found for respondent's current employment status at T1, but a gradient was seen at T2. Socio-economic gradients in SRH at T2 remained stable even after controlling for SRH at T1. The values of the odds ratios indicate that the SEP-SRH gradients increased between 15 and 19 years of age.

Discussion

The pattern of socio-economic differences in SRH among males remained stable from 15 to 19 years of age. The relationship between SEP and health consistent with this model has been described previously.[5] However, previous studies used cross-sectional data, and therefore assessed an age effect contrary to a cohort effect assessed in this study, and did not focus on gender differences.

Females from lower socio-economic groups reported a higher prevalence of poor SRH than females from higher socio-economic groups, resulting in larger socio-economic gradients in SRH at 19 years of age compared with 15 years of age. The explanation could be a combination of two factors. Firstly, it could be explained by the emergence of both stress sensitivity and depressive symptoms among females during early adolescence.[6] The emergence of differences in the prevalence of mental health problems starts between 10 and 15 years of age, during pubertal development.[7] This specific period is suggested to play a role due to hormonal changes, specifically the increase in female sex hormones. The transition to adolescence is accompanied by a substantial rise in depressive problems in girls compared with boys, and shows that girls' hypothalamic–pituitary–adrenal axis is more sensitive to long-term alterations caused by chronic stress.[8] Secondly, the higher level of chronic stress among individuals of lower socio-economic status[9] could also explain, in part, the socio-economic differences.

Among females, a traditional gradient of socio-economic differences in SRH was found at 15 years of age, and this was more distinct at 19 years of age. Thus, the present findings about females could fit into the pathway effects/change model, which hypothesizes that the early life environment sets individuals on to life trajectories that affect health status over time.[10] The present findings regarding males did not fit into this model. Although this concept may not seem appropriate for the period of adolescence or young adulthood, it could still be useful over a longer period. In general, adolescence is characterized by better health status compared with childhood and adulthood. Thus, the effects of early environment on health could be obscured to some extent during adolescence.

This study has some strengths and limitations. A major strength of the study is its longitudinal design. The main limitation of this study is the relatively low response rate. Compared with females and better-educated males, fewer low-educated males responded. However, the differences in response rates by three measures of SEP were trivial, and were relatively small for respondent's educational level; therefore, biased results due to selective non-response are less likely.

No socio-economic differences in SRH were found among males at 15 and 19 years of age, although differences are well described during adulthood. To track the onset of socio-economic differences, further research involving more psychosocial factors should be performed in order to gain a better understanding of sex differences in socio-economic gradients during adolescence. In addition, more longitudinal studies, with shorter time intervals and overlapping childhood and adulthood, should be designed to determine factors that may explain changing mental and physical health and their (causal) paths.

In summary, this follow-up study, performed on a sample of adolescents, revealed that the socio-economic differences in poor SRH of males at 15 years of age were very minor, and this pattern remained stable at 19 years of age. On the other hand, the traditional gradient of socio-economic differences in poor SRH (the lower the socio-economic position, the higher the prevalence of poor health) among females became more distinct between 15 and 19 years of age.

Author statements

Ethical approval

This study was conducted according to the ethical requirements formulated by the Agreement on Human Rights and Biomedicine (40/2000 Slovak Code of Laws). The Science and Technology Assistance Agency also approved the ethical aspects of the study in its decision on APVT-20-003602 in April 2002.

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Competing interests

None declared.

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