Social and regional variations in health status and health behaviours among Swiss young adults

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Summary

OBJECTIVE: To provide nationwide data on health status and health behaviours among young adults in Switzerland, and to illustrate social and regional variations.

METHODS: Data came from the Swiss Federal Surveys of Adolescents, conducted in 2010/11. The sample consisted of 32,424 young men and 1,467 young women. We used logistic regression models to examine patterns of social inequality for three measures of health status and three measures of health behaviour.

RESULTS: Among men, lower self-rated health, overweight and lower physical fitness levels were associated with lower educational and fewer financial resources. Patterns were similar among young women. Unfavourable self-rated health (odds ratio [OR]: men 0.83, women 0.75) and overweight (OR: men 0.84, women 0.85; p >0.05) were less common in the French- than in the German-language region. Low physical fitness was more common in the French- than in the German-language region. In both sexes, daily smoking was associated with fewer educational resources, and physical inactivity was associated with lower educational and fewer financial resources. Males from the Italian-language region were three times more likely to be physically inactive than their German-speaking counterparts (OR 2.95). Risk drinking was more widespread among males in the French- than in the German-speaking language region (OR 1.47).

CONCLUSIONS: Striking social and moderate regional differences exist in health status and health behaviours among young Swiss males and females. The current findings offer new empirical evidence on social determinants of health in Switzerland and suggest education, material resources and regional conditions to be addressed in public health practice and in more focused future research.

Key words: youth health; health behaviours; social determinants; social gradient; regional variations

Introduction

Collecting population data in order to monitor health and health behaviours is necessary for public health. These data help us to identify where and when interventions are needed. We need data that show and compare the distribution of health and its determinants across social strata and regions within each country. A growing body of statistical evidence from many countries demonstrates the "social gradient effect" of social stratification on health [1]. A "social gradient in health" is a continuous effect pattern in which health status or health behaviour worsens when social disadvantage increases. Likewise, higher social status confers continuous health advantage with continually increasing social resources [2–4].

In Switzerland, our ability to produce scientific reports on the social distribution of health, and to track the social gradient effect on health and health behaviours, is limited by a dearth of nationwide population data on morbidity, risk factors and health behaviours. Helpful data sources on the social and regional distribution of mortality exist [5–7]. However, the few data sets that provide information on health status and health behaviours represent subpopulations in a limited fashion (e.g. Swiss Health Survey) and include very few measures of health (e.g. Swiss Household Panel). Population-based data on youth health (the developmental phase from teenage to early adulthood) is even more limited: few studies to date have systematically examined health status and health behaviours among adolescents and young adults [8–10].

Youth is a period of social transition and increased vulnerability [11–13]. Data that show and compare the distribution of young people's health and its determinants across social strata and regions is especially useful since it helps us to identify necessary interventions during the formative years, a period when many health risk behaviour patterns emerge (e.g. smoking and physical inactivity) [14, 15]. However, a current lack of sufficient data prevents researchers from analysing social and regional distribution patterns in health and health behaviour in younger age groups in Switzerland.

To address the need for more and better data collection, the long-established Swiss conscript studies [16, 17] recently set up "ch-x", a new long-term project to monitor youth development in Swiss society. One of three major themes in this project is health and sport. This cross-sectional survey, first carried out in 2010/11 and scheduled for two more repetitions, collects data relevant to the health and health behaviours of young Swiss men and women (www.chx.ch). The ch-x surveys were specifically designed to link data

on health status and health behaviours to more detailed information on their social determinants, and therefore include data on regional and social distributions.

The aims of this paper are to describe the methodological basis of the Swiss ch-x study and to report on the social and regional distribution of health and health behaviours among young Swiss men and women. We used logistic regression models to show variations in outcome variables associated with social factors, language region and urban vs. rural areas. We examined the links between health and health behaviours with respondents' education and financial conditions and we tested for social gradient effects.

Methods

The ch-x first began collecting data in 2010/11. The dataset possesses the following properties. First, the ch-x examines young adults. Second, each survey samples a large number of young Swiss men (some n = 31,000) and a smaller number of young Swiss women (some n = 1,500); the same questionnaire is used for both sexes. Third, the sample covers the three main language regions, urban and rural areas, and all social strata, facilitating analyses of social and regional distributions. Fourth, the data set includes many measures to assess social determinants of health and health behaviours. Fifth, the survey will be repeated in 2014/15 and 2018/19, which will allow researchers to assess long-term stability or changes in health status and health behaviours, and their association with social and regional conditions.

The ch-x sample

Data for the male sample were collected at six national recruiting centres in Switzerland during recruitment for compulsory military service. The target population were Swiss male citizens aged 18 to 25 years (mean 19.7, standard deviation [SD] 1.1). Because local administrative records do not provide detailed information on the numbers of participants in the recruitment, the exact response rate could not be calculated. Reports from field staff showed that refusals were rare. Also, a recent study in two of those recruitment centres using a very similar sampling procedure reported a 95% response rate [18]. For additional information on the sample, we calculated the proportion of the eligible population on the basis of data from the register survey of the Swiss census. Our sample corresponded to 40.2% of the eligible population, which means that about 40% of the young men of that age group in Switzerland filled in the survey. Because recruitment is compulsory for all Swiss men, our sample included also individuals unfit for military service and individuals opting for civil service. Data for the female sample were collected with a mail-out survey to Swiss female citizens aged 18 to 21 years (mean 18.8, SD 0.4). Addresses for the female survey were drawn from official registers of 201 Swiss communities in a two-stage randomisation procedure [19]. Young women responded at a rate of 49.3%. Participation was voluntary and anonymous in both surveys. All variables were based on self-reports. The survey design and translation processes into the three national languages are described elsewhere [20].

The survey provides data on health status and health behaviour measures. Most health behaviour variables were collected using a supplementary questionnaire, administered to one-third of the participants. The other two thirds of participants received a supplementary questionnaire which focused either on their education and vocational career, or on their political and civil engagement. Supplementary questionnaires were delivered alternately in the classrooms for the male sample and alternately within the selected communities for the female sample. With a few exceptions, variables had fewer than 6% missing values (2.1%–5.9% in men and 0.8%–5.5% in women; see table 1). The exceptions were household equivalent income (20.3% in men and 19.6% in women) and parents' education (9.6% in men and 4.2% in women).

Measurement

Categories, proportions and missing values of variables are given in table 1 below.

Social factors

Current family income was transformed into household equivalent income (square root scale) and categorised as low (below 2,500 CHF), middle (between 2,500 CHF and 5,000 CHF), and high (above 5,000 CHF). Education of respondents was categorised as mandatory, secondary vocational training, and secondary grammar school, or higher. Because young people often have not completed educational training, parents' education was included and categorised as mandatory, secondary (vocational training or school), and tertiary (university or university of applied sciences). The highest level of education attained by either parent was used in the analyses. The ordinal categories of those three indicators of social inequality allowed us both to present basic distributions of social determinants and to test for the social gradient effect [2, 3].

Regional factors

Regional factors were assessed according to place of residence. We used the official spatial divisions of the Swiss Federal Statistical Office to assign language region (German, French, Italian) and urban/nonurban place of residence.

Health behaviours

Smoking status was categorised as daily smoking versus not smoking or occasional smoking. This decision was based on the public health relevance of daily smoking and on preliminary analyses of our data, which showed that occasional smoking was not associated with most of the social and regional indicators. Alcohol consumption was measured as average consumption of standard units on weekdays and weekends. Standard units were one glass of beer (3 dl), wine (1 dl), or liquor (0.2 dl). In line with published Canadian low-risk drinking guidelines [21], we considered more than 2 units per day for young men and more than one unit per day for young women as a meaningful distinction between low and high risk alcohol consumption. We coded risk drinking as consumption of 15 or more standard units per week for men, and 10 or more standard units per week for women. Physical activity was assessed

Table 1: Sample characteristics. Interval variables are presented as mean and standard deviation (SD), categorical variables are presented as percentages (%).				
	Men (n = 31424)		Women (n = 1467)	
Age, mean (SD)	19.7	(1.1)	18.8	(0.4)
Household equivalent income, n (%)				
<2,500 CHF	3327	(13.3)	184	(15.6)
2,500–5,000 CHF	9466	(37.8)	529	(44.9)
>5,000 CHF	12259	(48.9)	466	(39.5)
Total	25052	(100.0)	1179	(100.0)
Missing values	6372	(20.3)	288	(19.6)
Parents' education, n (%)				
Mandatory	716	(2.5)	29	(2.1)
Upper secondary	13942	(49.1)	682	(48.5)
Tertiary	13764	(48.4)	694	(49.4)
Total	28422	(100.0)	1405	(100.0)
Missing values	3002	(9.6)	62	(4.2)
Own education, n (%)				
Mandatory	2565	(8.3)	88	(6.1)
Vocational	17901	(58.2)	694	(48.0)
Grammar school or higher	10298	(33.5)	663	(45.9)
Total	30764	(100.0)	1445	(100.0)
Missing values	660	(2.10)	22	(1.5)
Language region, n (%)				
French-speaking	5861	(18.7)	255	(17.4)
Italian-speaking	1957	(6.2)	91	(6.2)
German-speaking	23606	(75.1)	1121	(76.4)
Total	31424	(100.0)	1467	(100.0)
Missing values	0	–	0	–
Place of residence, n (%)				
Rural	24744	(78.7)	1139	(77.6)
Urban	6680	(21.3)	328	(22.4)
Total	31424	(100.0)	1467	(100.0)
Missing values	0	–	0	–
Smoking[a], n (%)				
Not or occasionally	7190	(69.9)	399	(83.1)
Daily	3097	(30.1)	81	(16.9)
Total	10287	(100.0)	480	(100.0)
Missing values	453	(4.2)	4	(0.8)
Alcohol consumption (standard glasses per week)[a], n (%)				
Low-risk drinking (men: ≤14; women: ≤9)	8136	(80.4)	431	(90.2)
Risk drinking (men: >14; women: >9)	1981	(19.6)	47	(9.8)
Total	10117	(100.0)	478	(100.0)
Missing values	623	(5.8)	6	(1.2)
Sport[a], n (%)				
No	1833	(17.5)	67	(14.0)
Yes	8649	(82.5)	411	(86.0)
Total	10482	(100.0)	478	(100.0)
Missing values	258	(2.4)	6	(1.2)
BMI, n (%)				
Normal (BMI <25)	22953	(77.6)	1242	(89.5)
Overweight (BMI ≥25)	6622	(22.4)	145	(10.5)
Total	29575	(100.0)	1387	(100.0)
Missing values	1849	(5.9)	80	(5.5)
Physical Fitness[a, b], n (%)				
Low	2608	(25.5)	125	(26.5)
High	7620	(74.5)	346	(73.5)
Total	10228	(100.0)	471	(100.0)
Missing values	512	(4.8)	13	(2.7)
Self-rated health, n (%)				
Poor	130	(0.4)	2	(0.1)
Fair	1077	(3.5)	39	(2.7)
Good	10030	(32.3)	534	(37.3)
Very good	13621	(43.9)	637	(44.5)

Excellent	6155	(19.9)	221	(15.4)
Total	31013	(100.0)	1433	(100.0)
Missing values	411	(1.3)	34	(2.3)

BMI = Body Mass Index = (weight in kilogram / height in meters^2) ^{a} Subsample: men: n = 10,740; women: n = 484
^{b} Dichotomised into the 1st quartile (representing low physical fitness) vs. remaining quartiles 2 to 4 (representing high physical fitness)

with a single question about participation in physical activities or sports.

Health status

Self-rated health was measured on a five-point Likert scale [22]. This is a valid and reliable survey question to assess health status [23–25]; however, in the healthy age-group of young adults, scores are expected to skew towards the upper end of the scale (a high proportion of respondents will have maximum scores). In order to detect meaningful variation in health status, answers to this question were categorised as favourable (excellent or very good health) or unfavourable (good, fair or poor health). Overweight was defined as a Body Mass Index (BMI) of 25 or larger. Physical fitness (ability to perform physical tasks in everyday life, such as carrying a heavy bag) was assessed with the FFB-Mot short-form questionnaire [26]. The scores were standardised separately for men and women. As no standard reference data are available for this age group and, again, considering the healthy age-group of young adults we dichotomised the standardised score in low versus high physical fitness. Low physical fitness was defined as falling within the lowest quartile, high physical fitness represented the remaining three quartiles.

Statistical analysis

We conducted all analyses using Stata 12 [27]. Basic distributions (health status, health behaviours, social and regional characteristics) are presented in table 1 below. We calculated Chi^2 test statistics for gender differences in health status and health behaviour variables. We explored social and regional distribution patterns using logistic regression models yielding odds ratios (ORs) and accompanying confidence-intervals (95% CIs). Results were considered significant when the 95% CIs did not include 1. We estimated bivariate associations between predicting social factors (own and parents' education, household equivalent income, language region, and rural vs. urban place of residence) and each outcome (daily smoking, risk drinking, physical inactivity, unfavourable self-rated health, overweight, and low physical fitness) for men (see table 2) and women (see table 3), controlling for age.

Table 2: Logistic parameter estimates for men (n = 31,424) with unfavourable health behaviour (daily smoking, alcohol risk consumption, physical inactivity) or unfavourable health status (overweight, low physical fitness, unfavourable self-rated health) as the dependent variable. Estimates are presented as age-adjusted odds ratios (ORs) and 95% confidence intervals (CIs).

Variable	Health Behaviour									Health status								
	Daily smoking^a			Risk drinking^a			Physical inactivity^a			Unfavourable self-rated health			Overweight			Low physical fitness^a		
	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)
Own education																		
Mandatory	50.0	4.86	(4.13–5.73)	21.0	1.56	(1.28–1.89)	26.4	2.09	(1.74–2.51)	45.1	1.62	(1.48–1.77)	28.4	1.89	(1.70–2.10)	35.8	1.69	(1.43–1.99)
Vocational	34.9	2.60	(2.34–2.89)	22.2	1.67	(1.49–1.88)	17.9	1.28	(1.14–1.44)	36.6	1.13	(1.08–1.19)	24.5	1.55	(1.46–1.65)	24.6	0.98	(0.89–1.09)
Grammar school or higher	16.9	1.00		14.7	1.00		14.4	1.00		33.3	1.00		17.1	1.00		24.5	1.00	
Parents' education																		
Mandatory	38.0	1.55	(1.17–2.05)	10.8	0.53	(0.34–0.83)	26.2	1.78	(1.30–2.42)	42.0	1.27	(1.09–1.48)	34.8	1.86	(1.57–2.20)	37.8	1.87	(1.41–2.48)
Upper Secondary	31.7	1.28	(1.17–1.40)	20.9	1.13	(1.02–1.26)	18.2	1.24	(1.11–1.39)	37.2	1.18	(1.12–1.24)	23.3	1.23	(1.16–1.31)	26.0	1.20	(1.09–1.32)
Tertiary	26.6	1.00		18.9	1.00		15.2	1.00		33.5	1.00		19.9	1.00		22.8	1.00	
Household equivalent income																		
<2,500 CHF	31.0	1.13	(0.97–1.30)	17.3	0.81	(0.68–0.97)	24.4	2.07	(1.76–2.44)	42.6	1.53	(1.42–1.66)	24.6	1.16	(1.06–1.27)	31.4	1.60	(1.38–1.86)
2,500–5,000 CHF	30.1	1.08	(0.97–1.20)	17.9	0.84	(0.75–0.95)	17.7	1.39	(1.22–1.58)	37.8	1.27	(1.20–1.35)	21.9	1.02	(0.95–1.09)	27.1	1.31	(1.17–1.46)
>5,000 CHF	28.3	1.00		20.6	1.00		13.4	1.00		32.2	1.00		21.5	1.00		22.0	1.00	
Language region																		
French-speaking	29.5	0.92	(0.82–1.03)	24.3	1.47	(1.30–1.66)	23.7	1.68	(1.48–1.90)	34.1	0.83	(0.78–0.88)	21.3	0.84	(0.78–0.90)	33.6	1.50	(1.34–1.67)
Italian-speaking	34.0	1.24	(1.05–1.47)	19.5	1.06	(0.86–1.30)	32.8	2.95	(2.47–3.51)	38.3	1.11	(1.01–1.22)	21.5	0.97	(0.86–1.09)	16.2	0.62	(0.50–0.77)
German-speaking	29.9	1.00		18.4	1.00		14.7	1.00		36.6	1.00		22.7	1.00		24.3	1.00	
Place of residence																		
Urban	31.0	1.02	(0.92–1.14)	19.4	1.00	(0.88–1.13)	19.4	1.13	(1.00–1.28)	38.8	1.10	(1.04–1.16)	23.3	1.01	(0.95–1.08)	27.7	1.11	(0.99–1.24)
Rural	29.9	1.00		19.6	1.00		17.0	1.00		35.6	1.00		22.2			24.9		

^{a} Subsample: n = 10,740

Results

Table 1 shows the social characteristics and regional distributions of respondents, as well as health status and health behaviour variations by gender. Prevalence of daily smoking was higher in males than in females (30.1% vs 16.9%; Chi^2 = 38.6, p <0.001). Men reported risk drinking twice as often as women (19.6% vs 9.8%; Chi^2 = 28.0, p <0.001). Physical inactivity (no participation in sports/ physical exercise) was reported by 17.5% of men and by 14.0% of women (Chi^2 = 3.8, p = 0.05).

Of our health status indicators, reports of overweight were more than twice as high for men than for women (22.4% vs 10.5%; (Chi^2 = 110.5, p <0.001). Unfavourable self-rated health was slightly more common for female respondents than for males (females 40.1%; males 36.2%; Chi^2 = 9.0, p <0.05).

Health behaviours and health status in young Swiss men: variations by social and regional characteristics

Health behaviours

Table 2 shows that daily smoking was negatively associated with the respondent's (OR 4.86, 95% CI 4.13–5.73) and parents' (OR 1.55, 95% CI 1.17–2.05) education, and was more common in the Italian- than the German-language region (OR 1.24, 95% CI 1.05–1.47). Risk drinking was more common in young men who had only mandatory schooling (OR 1.56, 95% CI 1.28–1.89) or who attended

or completed vocational training (OR 1.67, 95% CI 1.49–1.88) than in those with more education. Risk drinking was less common in young men whose parents completed only mandatory schooling (OR 0.53, 95% CI 0.34–0.83), but slightly more common among those whose parents completed upper secondary education (OR 1.13, 95% CI 1.02–1.26). Men from households with a monthly income of less than 5,000 CHF were less likely to be risk drinkers (OR 0.81, 95% CI 0.68–0.97; and OR 0.84, 95% CI 0.75–0.95) than men from wealthier households. Physical inactivity was significantly associated with all social factors (from OR 1.24, 95% CI 1.11–1.39 to OR 2.09, 95% CI 1.74–2.51). Physical inactivity was more widespread in the Italian- (OR 2.95, 95% CI 2.47–3.51) and French- (OR 1.68, 95% CI 1.48–1.90) language regions, and in urban than rural areas (OR 1.13, 95% CI 1.00–1.28).

Health status

Self-rated health was significantly associated with all that social factors we considered. Unfavourable health was more common in those from lower educational and income backgrounds (ranging from OR 1.13, 95% CI 1.08–1.19 to OR 1.62, 95% CI 1.48–1.77). Young men from the Italian-speaking part had a higher proportion of unfavourable health ratings than those from the German-language region (OR 1.11, 95% CI 1.01–1.22), whereas those from the French-language region were less likely to have a low health rating than their German counterparts (OR 0.83, 95% CI 0.78–0.88). Respondents from urban areas had

Table 3: Logistic parameter estimates for women (n = 1,467) with unfavourable health behaviour (daily smoking, alcohol risk consumption, physical inactivity) or unfavourable health status (overweight, low physical fitness, unfavourable self-rated health) as the dependent variable. Estimates presented as age-adjusted odds ratios (ORs) and 95% confidence intervals (CIs).

Variable	Health behaviour									Health status								
	Daily smoking[a]			Risk drinking[a]			Physical inactivity[a]			Unfavourable self-rated health			Overweight			Low physical fitness[a]		
	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)
Own education																		
Mandatory	24.1	3.15	(1.19–8.33)	6.9	1.02	(0.22–4.72)	23.3	3.14	(1.19–8.33)	50.6	2.00	(1.26–3.17)	13.3	2.49	(1.21–5.09)	37.0	2.81	(1.18–6.71)
Vocational	23.1	2.97	(1.70–5.21)	11.8	1.84	(0.94–3.59)	16.8	2.09	(1.16–3.77)	44.4	1.56	(1.25–1.95)	14.0	2.65	(1.78–3.95)	33.8	2.55	(1.61–4.03)
Grammar school or higher	9.2	1.00		6.8	1.00		8.8	1.00		33.8	1.00		5.8	1.00		16.7	1.00	
Parents' education																		
Mandatory	25.0	2.11	(0.41–10.91)	–	–	–	37.5	5.83	(1.30–26.13)	35.7	0.93	(0.42–2.05)	34.6	6.82	(2.89–16.10)	50.0	2.77	(0.66–11.62)
Upper Secondary	19.7	1.55	(0.94–2.56)	12.4	1.56	(0.84–2.87)	16.7	1.94	(1.10–3.43)	41.5	1.19	(0.95–1.48)	12.4	1.83	(1.25–2.66)	25.8	1.04	(0.68–1.60)
Tertiary	13.7	1.00		8.3	1.00		9.3	1.00		37.3	1.00		7.2	1.00		24.9	1.00	
Household equivalent income																		
<2,500 CHF	20.9	1.73	(0.82–3.63)	15.6	2.19	(0.91–5.29)	22.4	2.88	(1.32–6.31)	42.1	1.32	(0.93–1.88)	10.2	1.41	(0.77–2.57)	24.6	1.06	(0.54–2.07)
2,500–5,000 CHF	19.1	1.54	(0.84–2.82)	8.4	1.09	(0.49–2.44)	15.1	1.78	(0.89–3.56)	41.5	1.29	(0.99–1.67)	11.8	1.64	(1.05–2.57)	29.3	1.34	(0.81–2.23)
>5,000 CHF	13.3	1.00		7.8	1.00		9.1	1.00		35.6	1.00		7.5	1.00		23.6	1.00	
Language region																		
French-speaking	24.4	1.76	(1.01–3.08)	14.6	1.75	(0.88–3.50)	15.7	1.27	(0.67–2.44)	34.7	0.75	(0.56–0.99)	9.5	0.85	(0.53–1.36)	28.1	1.06	(0.63–1.78)
Italian-speaking	10.3	0.63	(0.18–2.15)	6.9	0.76	(0.17–3.34)	24.1	2.17	(0.88–5.37)	39.6	0.93	(0.60–1.43)	6.7	0.59	(0.25–1.37)	17.2	0.57	(0.21–1.53)
German-speaking	15.5	1.00		8.9	1.00		12.8	1.00		41.4	1.00		11.0	1.00		26.9	1.00	
Place of residence																		
Urban	14.8	0.82	(0.46–1.46)	5.2	0.43	(0.18–1.03)	19.1	1.67	(0.96–2.93)	40.9	1.04	(0.81–1.34)	10.4	0.99	(0.66–1.50)	30.4	1.29	(0.81–2.06)
Rural	17.5	1.00		11.3	1.00		12.4	1.00		39.9	1.00		10.5	1.00		25.3	1.00	
[a] Subsample: n = 484																		

a slight health disadvantage when compared with rural residents (OR 1.10, 95% CI 1.04–1.16). Bodyweight and physical fitness showed similar patterns of association for the three social determinant variables: respondents with less educational and fewer financial resources were more likely to report overweight and low physical fitness (ranging from OR 1.16, 95% CI 1.06–1.27 to OR 1.89, 95% CI 1.70–2.10). Regional differences were evident: overweight was less common in the French- than in the German-language region (OR 0.84, 95% CI 0.78–0.90). Low physical fitness was more common in the French-language region (OR 1.50, 95% CI 1.34–1.67) and less common in the Italian-language region (OR 0.62, 95% CI 0.50–0.77).

Health behaviours and health status in young Swiss women: variations by social and regional characteristics

Table 3 shows that many patterns of associations were similar in men and women. Confidence intervals were wider for women, mostly due to the smaller sample size.

Health behaviours

Where associations were statistically significant, unhealthy habits of smoking, drinking and physical inactivity among young women were associated with fewer educational and fewer financial resources. Largest effect sizes for social determinants were seen for physical inactivity (OR 5.83, 95% CI 1.30–26.13 for parents' education) and daily smoking (OR 3.15, 95% CI 1.19–8.33 for own education).

Health status

All statistically significant associations showed that, for women, less favourable subjective health, overweight and low physical fitness were all associated with fewer educational and fewer financial resources. The strongest effects were found for parents' education on overweight (OR 6.82, 95% CI 2.89–16.10), and own education on low physical fitness (OR 2.81, 95% CI 1.18–6.71). The only statistically significant regional variation was that unfavourable self-rated health was less common among young women from the French-language region than among those from the German-language region (OR 0.75, 95% CI 0.56–0.99).

Social gradient effects among young Swiss adults

In both our male and female sample, daily smoking and physical inactivity showed a mostly consistent gradient pattern for education (see tables 2 and 3). The probability that a respondent engaged in daily smoking and was physical inactive increased as educational status (own and parents' education) decreased. Those in the highest educational category ("tertiary") had the lowest rate of daily smoking and physical inactivity. Similarly, the likelihood of physical inactivity was lower in all respondents as household income decreased (for the latter, only in the female sample was the middle-income category not statistically significant).

For health outcomes among men, the gradient effect was evident for all three social inequality measures, self-rated health, overweight and physical fitness, with two exceptions: physical fitness by own education and overweight by income. In seven of nine tested associations, diminish-

ing educational or financial resources correlated with a decrease in health status. There is also some evidence that women's risk of health disadvantage continually increased as educational resources decreased. Among females, gradient effects are seen for own education on self-rated health and physical fitness, and for parental education on overweight.

Summary and discussion

We found striking differences in the social distributions of health and health behaviour among young Swiss adults. For both genders, the likelihood of daily smoking was strongly associated with lower educational resources; physical inactivity was significantly more common in those with lower educational attainment and with less family financial resources. Many of the social inequality effects conformed to a social gradient pattern.

The largest regional variation in health behaviours was in physical activity. Men from the Italian-language region were almost three times as likely to be physically inactive than their German-speaking counterparts. In men, risk drinking was more widespread in the French-language region of Switzerland and daily smoking was more prevalent in the Italian-language region. These regional differences in physical activity, risk drinking and daily smoking are consistent with, and corroborate, previous findings [28–32]. A more recent study, however, did not find evidence of regional differences in risk drinking between the German- and the French-language regions [33]. In summarising our findings on health behaviours it should be noted that the current data on the regional distribution of risk behaviours are basically of a descriptive nature. Reasons for such variations may be found in differences in the infrastructure conditions (particularly for physical activity) or in culture-based factors such as values and norms. More focused studies are needed to explain those variations. Our descriptive findings can provide starting points for such future explanatory studies.

As for health status, among young Swiss men, lower self-rated health, overweight and less physical fitness were all associated with lower educational and fewer financial resources. The pattern was similar for young women, although social determinant effects in our female sample were weaker. The gradient effect in overweight we found in our data is consistent with previous findings [10, 31, 34]. As for the prevalence rates, our study updates older national data on overweight in young Swiss adults. Earlier findings showed an increase in the prevalence of overweight among young Swiss men between 1993 (10.9%) and 2003 (14.8%) [8], and our current results show a continuation of this trend, with the prevalence rising again between 2003 and 2011 to 22.4%. The same data showed that, during the same time period, overweight in young Swiss women was less prevalent and rather stable. Differences in health status by language region showed that unfavourable self-rated health in both genders and overweight in men were less common in the French-language region than in the German-language region. Young men from the French-language region most often reported low physical fitness, followed by men from the German-language region, and then

men from the Italian-language region. Unfavourable self-rated health was associated with urban residence, but the effect size was small. We found no systematic variation associated with urban vs. rural residence in the other health status measures. There may be no statistically significant associations for the latter, or our measures of urban/rural residence might not be specific enough to detect such variations in health status.

Social gradient effects are most evident in the link between own education and smoking among males, and own education and physical inactivity among females. Parents' education also demonstrates gradient effects on overweight and physical inactivity in both genders. Our results on alcohol use are in line with those of earlier studies that showed systematic associations between health behaviour and social class; behaviours tend to be worst at the bottom rungs of the class ladder [14, 32, 35, 36]. In our sample of young males, smoking was more frequent among those in vocational training, a result which is in line with previous findings [32]. Also, risk drinking was most frequent among those with less education. This finding corroborates that of other Swiss studies, which found problem drinking was most prevalent in young adults in vocational training [33, 37]. However, we also found that risk drinking was less frequent among young men whose parents had only mandatory education. This points towards an inverse social gradient for parental education. A similar inverse social gradient was reported in a French study of young adults, which also explored effects of parental class on alcohol use [38]. These combined findings suggest a need for future research to consider different effect patterns of own and parental social class on alcohol use among young people. The likelihood of risk drinking also decreased in correspondence to household financial resources. Poorer young people may be unable to purchase alcohol as easily as their wealthier counterparts, which may explain the latter finding.

Our research and analyses resulted in some specific methodological and conceptual insights into studies of youth health. Among social factors, respondents' own education was the measure that showed the most, and on average the strongest, statistical associations with all outcome variables. The effects of parental education on health and health behaviours among young adults mostly ran parallel to those of own education and showed weaker effect sizes on average. Thus, educational status of the respondent may appear to be the "best" indicator for social inequality in this age group [see also 36], even though many young people have not yet completed their education. However, we found considerable effects of parental education on youth health behaviours that would not have been captured by simply measuring an individual's own educational status. For instance, risk drinking among men is less likely among those whose parents have only mandatory education. The effect of educational resources in the family might not have been apparent if we had looked only at individuals' own education. Parental education shows a stronger effect on overweight and physical inactivity in young women than does own education. These examples indicate that for youth health, family educational resources can be relevant, especially for health factors that relate to health behaviours like eating, drinking and physical activity.

Limitations of the study

We used a limited number of indicators for social and regional differences, and for health and health behaviours. Other social determinants, such as occupational status, and outcome measures like chronic health conditions deserve to be analysed in future studies. Our sampling procedure excluded non-Swiss residents and people with severe disabilities, and so we could not analyse patterns in the distribution of health and health behaviours among those populations. Injured and sick men are likely to postpone their conscription. Therefore, our sample is likely not to include individuals who were severely ill on the day of the survey. Thus, prevalence of poor health status might be underestimated in our male sample. Self-reports are susceptible to bias from social desirability. Still, validity and reliability of self-reports were demonstrated for most of our outcome indicators, for example, for self-assessed health [23–25], physical fitness [26] and smoking [39]. Underreporting might be an issue in the amount of weekly alcohol consumption [40] and BMI [41]. The sample of women was small, and this led to low frequencies in the cells for the Italian-language region and in the category of mandatory parent education. We classified urban/rural residence according to the official classification of the Swiss Federal Statistical Office, which is based on a very heterogeneous typology of communes, especially in suburban areas. It is possible that if we used an alternative classification, more or stronger differences between urban and rural areas would be evident.

Implications for future research

The descriptive findings presented here on the regional differences in health behaviours can serve as starting points for future studies on the determinants of such variations. Merging descriptive and explanatory findings will then allow to produce more comprehensive data for the development and implementation of focused public health interventions.

Our finding that parental education is relevant to health behaviours and health status in young people can serve as a starting point for concept development and formulation of more specific research questions. In particular, our finding that parents' education shows social gradient effects on overweight and physical inactivity in both genders, combined with our knowledge that overweight and physical inactivity are causally related, suggest that future studies on the social determinants of youth health should seek to capture these bivariate associations, and also to formulate and to answer questions about the effect of social resources on the interplay between different health behaviours.

Conclusion

The increased attention given to the unequal distribution of health has spurred calls for improvements in the monitoring of health and its social determinants. The new descriptive data we provide on the social and regional distribution of health status and health behaviours in Swiss youth advances that cause. We also offer new evidence that there is a social gradient effect on health status and health behaviours in young Swiss adults: fewer educational and fewer

financial resources are associated with lower health status and an increase in unhealthy behaviours. In Switzerland, as in other countries, social inequality in health status and health behaviours tends to follow a pattern of a continuous health disadvantage associated with lowered levels of material and non-material resources.

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