

# Subjective health, symptom load and quality of life of children and adolescents in Europe

Ulrike Ravens-Sieberer<sup>1</sup>, Torbjørn Torsheim<sup>2</sup>, Jorn Hetland<sup>3</sup>, Wilma Vollebergh<sup>4</sup>, Franco Cavallo<sup>5</sup>, Helena Jericek<sup>6</sup>, Mujgan Alikasifoglu<sup>7</sup>, Raili Välimäa<sup>8</sup>, Veronika Ottova<sup>1</sup>, Michael Erhart<sup>1</sup> and the HBSC Positive Health Focus Group\*

<sup>1</sup> University Medical Center Hamburg-Eppendorf, Hamburg, Germany

<sup>2</sup> University of Bergen, Bergen, Norway

<sup>3</sup> Research Centre for Health Promotion, Bergen, Norway

<sup>4</sup> Utrecht University, Utrecht, Netherlands

<sup>5</sup> University of Torino, Torino, Italy

<sup>6</sup> Centre for Health Promotion, Ljubljana, Slovenia

<sup>7</sup> Istanbul University, Istanbul, Turkey

<sup>8</sup> University of Jyväskylä, Jyväskylä, Finland

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## Abstract

**Objectives:** To examine cross-cultural differences in the prevalence of school children's subjective health types and the pattern of socio-demographic and socio-economic differences.

**Methods:** Within the cross-sectional Health Behaviour in School-aged Children 2005/2006 Survey 200,000 school children aged 11, 13 and 15 answered a general health item, the Cantrill life satisfaction ladder and a subjective health complaints checklist. ANOVA and multilevel logistic regression models were conducted.

**Results:** Overall, 44% of the respondents reported multiple recurrent health complaints, only poor to fair general health, low life satisfaction or a combination of these. Older adolescents (OR: 1.1–1.6) and girls (OR: 1.2–1.4) reported more health problems, the gender difference increased with age (OR: 1.3–1.6). Low socio-economic status was also associated with health problems (OR: 1.4–2.3). Sizeable cross-national variation in the

prevalence of health types and the impact of the above mentioned factors were observed, yet the main pattern of impact could be confirmed cross-culturally.

**Conclusions:** Increasing social and gender role pressure with growing age, as well as restricted access to material resources and psychosocial strains are discussed as potential explanations for the observed health inequalities.

**Keywords:** Children & adolescents – Subjective health – Health types – HBSC Study – Cross-cultural differences.

## Introduction

The last decades have seen a paradigm shift in criteria used to evaluate medical outcomes. Classical endpoints such as reduction of symptoms, laboratory values, function tests or clinical observations and increased survival<sup>1</sup> have been supplemented by patient-oriented outcomes<sup>2,3</sup>. Important are not only somatic indicators of health but also how a person feels, psychologically and physically, how he or she gets along with other people, and copes with everyday life<sup>4–6</sup>.

The term subjective health or health-related quality of life<sup>7</sup> has been coined to integrate this new look at medical outcomes. It denotes, in psychological terminology, a multidimensional construct covering physical, emotional, mental, social and behavioural components of well-being and functioning as perceived by patients and/or other observers<sup>2,5,8,9</sup>.

\* Members of the HBSC Positive Health Focus Group: Ulrike Ravens-Sieberer (DE) (Coordinator), Torbjørn Torsheim (NO), Bogdana Alexandrova (BG), Fiona Brooks (GB), Antony Morgan (GB), Cath Fenton (GB), Kädi Lepp (EE), Raili Välimäa (FI) Céline Vignes (FR), Mariane Sentenac (FR), Veronika Ottova (DE), Christina Schnohr (GL), Gyöngyi Kökönyei (HU), Kjartan Unak (IS), Franco Cavallo (IT), Inese Gobina (LV), Wilma Vollebergh (NL), Saskia van Dorsselaer (NL), Jørn Hetland (NO), Joanna Mazur (PL), Tania Gaspar (PT), Viorel Mih (RO), Aurora Szentagotai (RO), Eva Kallay (RO), Andrea Geckova (SK), Zuzana Katreniakova (SK), Helena Jericek (SI), Eva Stergar (SI), Vesna Pucelj (SI), Pilar Ramos (ES), Mia Danielson (SE), Lilly Eriksson (SE), Mujgan Alikasifoglu (TR), Ethem Erginoz (TR)

One aspect of subjective health is the global health perception. Life satisfaction denotes the cognitive evaluation of one's life, thus representing the cognitive-evaluative aspect of subjective health and well-being<sup>10</sup>. Subjective health complaints, such as headache, backache, feeling low etc., are common in adolescence<sup>11–13</sup> and tend to occur in cluster rather than as single symptoms<sup>11,14,15</sup>. In a few instances, these symptoms are related to a defined diagnosis or disease<sup>11</sup>. Somatic complaints with no obvious organic cause are labelled as psychosomatic complaints and are often viewed as stress-reaction to psychosocial tensions<sup>16</sup>. Organic reactions to psychosocial stress often need the same therapeutic care as somatic disorders<sup>17</sup>. With regards to the population of children and adolescents, the assessment of their subjective health is especially relevant in view of the background of substantial shifts from acute to chronic illnesses and, above all, from somatic to psychological symptoms, behavior disturbances, and psychosomatic illnesses<sup>18,19</sup>.

With increased globalisation, the study of cross-national variation plays an important role. In previous studies, subjective health has been typically studied only in one or at most a few countries. However, such investigations ignore an important source of variation. Between country-differences in the national socio-economic situation (e.g. absolute level and magnitude of inequalities), social support mechanisms, the educational system and the health service system are potential sources for subjective health inequalities. Thus, the assessment of cross-national differences in subjective health is essential for judging the scope for international public health priorities in e.g. countries of the European Union.

As with the adult population, the assessment of cross-national differences in subjective health becomes increasingly important in children and adolescents<sup>20–23</sup>. Cultures might not only differ in the level of subjective health, but also in the specific complaints expressed and maybe in the exact meaning of the concept. The comparison and interpretation of previous studies is limited by methodological differences regarding e.g. the definition of symptoms and time frame of reporting. A previous study found the pattern of adolescents' subjective health complaints to be consistent across countries, although the prevalence decreased from Finnish to Scottish, Polish and Norway students<sup>22</sup>. Another study in Scandinavians aged 15 and older observed no clear differences between Sweden, Denmark, Norway and Finland in terms of reporting any complaints at all. Regarding substantial complaints, the Swedes had the highest reports, while the Finnish had the fewest reports<sup>24</sup>.

This paper aims at examining patterns of school children's subjective health in 41 countries. Differences in health patterns across socio-demographic and socio-economic groups will be examined and investigated for cross-national variation.

## Methods

### *Study design and procedure*

The methods and design of the HBSC study are described in the overview papers of Currie et al. and Roberts et al. in this supplement<sup>25,26</sup>. The 2005/2006 HBSC survey took part in 41 European and North-American countries and Israel. The target population of the HBSC Study were children aged 11, 13 and 15 visiting regular schools. The sample unit were school classes (or school where a sampling frame of classes was not available). Approximately 1,500 students were targeted for each age group, assuming a 95% confidence interval of +/- 3 percent around a proportion of 50 percent.

Interviewers or teachers distributed the study questionnaire in class. More than 200,000 children with written consent from their parents filled in the study questionnaire and returned it in anonymous envelopes. Of these children, 49.1% were male, 50.9% were female. They were 11 years (30.2%), 13 years (31.8%) and 15 years (38.1%) old.

### *Instruments and Variables*

This paper examines three different aspects of subjective health: the general health perception, overall life-satisfaction and subjective health complaints.

The global self-reported health is assessed by asking the respondents "Would you say your health is...?" and the answer categories are "excellent", "good", "fair" and "poor". Answers were coded with values between 4 and 1. For some analyses, the respondents reporting "poor" or "fair" health were contrasted with the others. Global self-reported health has proven to be a valid predictor of mortality and future morbidity, even after accounting for known demographic, social and medical risk factors<sup>27</sup>. Diabetes, infectious and respiratory diseases show a strong association with perceived health, while so-called social pathologies (accidents, suicides, and homicides) do not<sup>28</sup>.

Life satisfaction was assessed with the so called Cantrill ladder<sup>29</sup>. Respondents were presented the picture of a ladder with steps ranging from 0 to 10. Respondents were asked to indicate where on the ladder they "... feel standing at the moment", with the top of the ladder (10) indicating the best possible life ... and the bottom (0) representing the worst possible life". For some analyses the respondents were classified as expressing "low" (categories 0–5) versus "normal-high" life satisfaction (categories 6–10). The Cantrill ladder has been validated in several studies<sup>30</sup>.

The HBSC-symptom-checklist (HBSC-SCL) assesses the occurrence of eight subjective physical and psychological health complaints namely headache, stomach-ache, backache, feeling-low, irritable-bad tempered, nervousness, sleeping-difficulties and dizziness. The respondents can reply to the 8 item

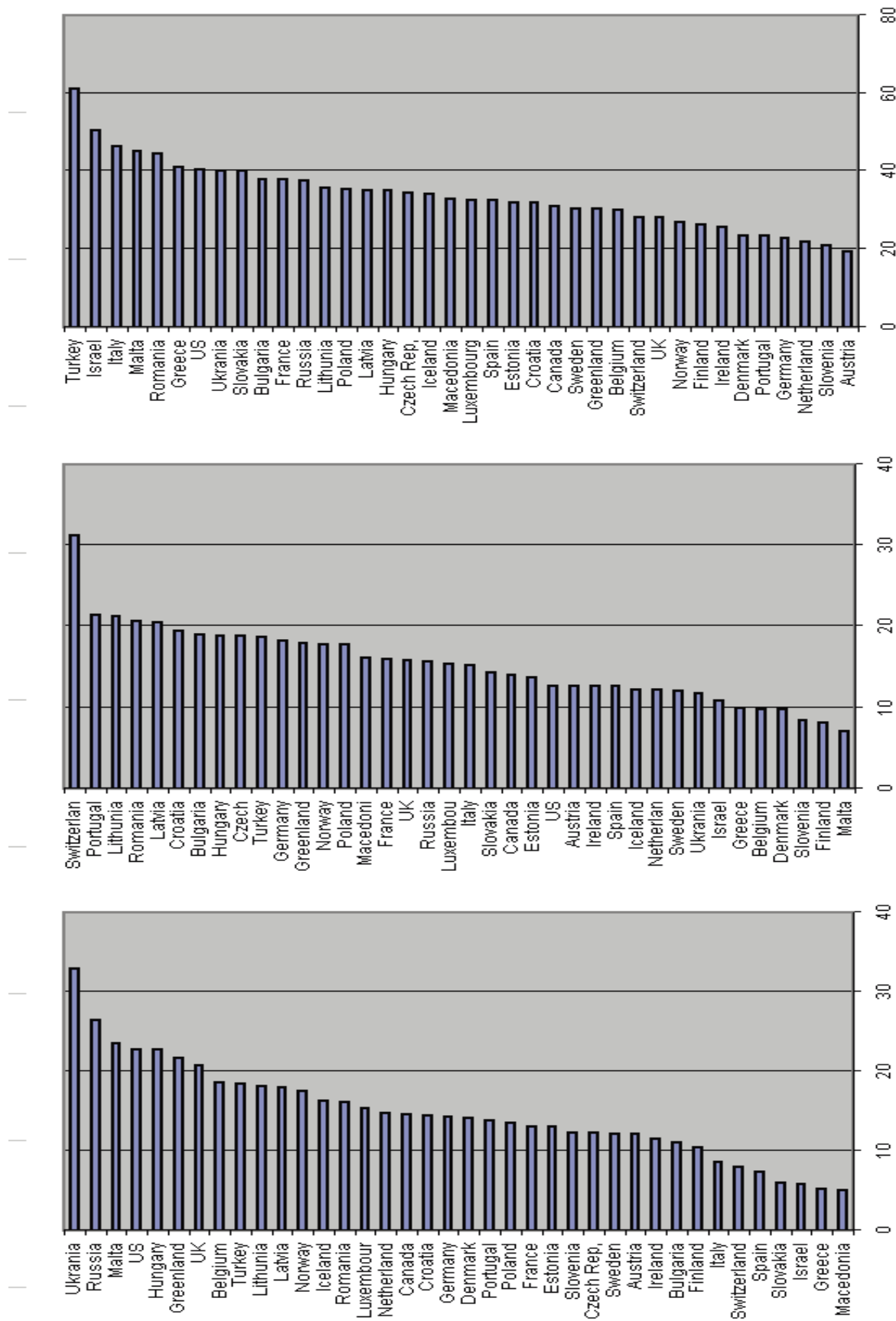


Figure 1. Prevalence of subjective health indicators across European countries: From left to right: General health perception, life-satisfaction and subjective psychosomatic health complaints.

**Table 1.** Association between general health, life satisfaction and subjective health complaints and age, gender and SES. Random slopes random intercept multilevel model with country as second level.

Sample	OR	95% CI		VPC	95% population variation		$\chi^2$ Test for random coefficient
		superior	inferior		superior	inferior	
<b>General Health</b>							
Intercept	0.092	0.080	0.106	0.192	0.041	0.207	p < .001
13 years	1.086	1.004	1.175		0.801	1.472	p < .001
15 years	1.245	1.129	1.374		0.801	1.935	p < .001
female	1.198	1.105	1.299		0.872	1.647	p < .001
female 13 years	1.315	1.222	1.414		1.149	1.504	p = 0.045
female 15 years	1.619	1.474	1.779		1.197	2.191	p < .001
SES medium	1.185	1.109	1.266		0.878	1.600	p < .001
SES low	1.726	1.597	1.864		1.214	2.452	p < .001
<b>Life Satisfaction</b>							
Intercept	0.094	0.082	0.108	0.174	0.043	0.204	p < .001
13 years	1.080	1.004	1.162		0.830	1.407	p < .001
15 years	1.289	1.171	1.419		0.832	1.998	p < .001
female	1.000	0.931	1.075		0.788	1.271	p < .001
female 13 years	1.409	1.309	1.515		1.231	1.611	p = 0.040
female 15 years	1.533	1.409	1.669		1.230	1.911	p = 0.008
SES medium	1.371	1.284	1.464		1.023	1.837	p < .001
SES low	2.332	2.124	2.561		1.460	3.726	p < .001
<b>Subjective health complaints</b>							
Intercept	0.319	0.278	0.366	0.186	0.140	0.725	p < .001
13 years	1.041	0.987	1.099		0.851	1.274	p < .001
15 years	1.106	1.029	1.190		0.793	1.543	p < .001
female	1.391	1.308	1.478		1.078	1.794	p < .001
female 13 years	1.341	1.280	1.405		1.276	1.409	p > .500
female 15 years	1.570	1.460	1.689		1.220	2.020	p < .001
SES medium	1.058	1.008	1.112		0.843	1.329	p < .001
SES low	1.388	1.303	1.478		1.029	1.872	p < .001

Reference Group: 11 year old boys with low SES

VPC = Variance partitioning coefficient

SES low: low socio-economic status, Family Affluence Scale = low

SES Medium: medium socio-economic status, Family Affluence Scale = medium

SES high: High socio-economic status, Family Affluence Scale = high

statements of the HBSC-SCL by indicating how frequently during the last 6 months the symptom occurred. Answer categories are: „rarely or never“, „about every month“, „about every week“, „more than once a week“, about every day“<sup>30</sup>. Previous research suggests that the scale reflects two facets – one psychological and one somatic facet<sup>22,31</sup>. But overall the scale can be considered as measuring along a uni-dimensional latent trait of psychosomatic complaints.<sup>32,33</sup> The reliability and validity of the instrument has been confirmed<sup>32</sup>. For the current study, the mean item score was calculated resulting in values between 1 (worst health) and 5 (best health). Respondents with recurrent multiple health complaints (two or more complaints at least weekly) are considered as displaying noticeable subjective health complaints.

The socio-economic status of their families was assessed with the Family Affluence Scale (FAS). The FAS asks about family car ownership, having an own unshared room, the number of computers at home, and number of times the child went on holidays in the past year. The FAS was collected in categories ranging from 0 to 7 which were recoded into low (0–3), intermediate (4–5), and high (6–7) FAS level. The validity of the FAS was shown in several studies<sup>30</sup>.

The respondents were also asked about their age and gender.

#### Statistical analyses

The children and adolescents were classified into one of 4 possible combinations of the dichotomised 3 health indicators: Three specific problem areas and generalized problems (two

Health type	healthy	Specific health problems			generalized Problems	
		PC	LS	GH	(two or more)	$\chi^2$ Test
Sample	%	%	%	%	%	p
Total	56.10	19.12	4.68	4.74	11.68	
11 years	61.19	18.63	4.34	4.16	15.29	p < .001 <sup>a</sup>
13 years	56.10	19.35	4.56	4.70	18.89	p < .001 <sup>b</sup>
15 years	51.30	19.36	5.13	5.32	11.37	
Boys (n =)	62.35	16.51	5.18	4.59	19.11	p < .001 <sup>a</sup>
Girls (n =)	50.21	21.59	4.21	4.88	23.67	p < .001 <sup>b</sup>
SES low	43.55	20.56	7.11	5.11	14.65	p < .001 <sup>a</sup>
SES medium	56.74	19.07	4.76	4.78	11.03	p < .001 <sup>b</sup>
SES high	63.18	18.36	3.05	4.38	9.8	

**Table 2.** Distribution of adolescents' subjective health types across age, gender, SES and country.

SES low: Low socio-economic status, Family Affluence Scale = low  
 SES Medium: medium socio-economic status, Family Affluence Scale = medium  
 SES high: High socio-economic status, Family Affluence Scale = high

or more problem areas). The relative frequency of these patterns was compared across age, gender, SES as well as across country by cross-tabulation. Chi-square test and contingency coefficients were calculated. The hierarchical and clustered structure of the data was accounted for by statistical methods for survey data respectively complex samples.

To account for the hierarchical and clustered structure of the data (country, classroom) cross-national differences in the health patterns across age, gender and SES were examined within a random intercept random slopes multilevel model analysis. Classroom defines the second level of this analysis while country membership defines the third level of this analysis.

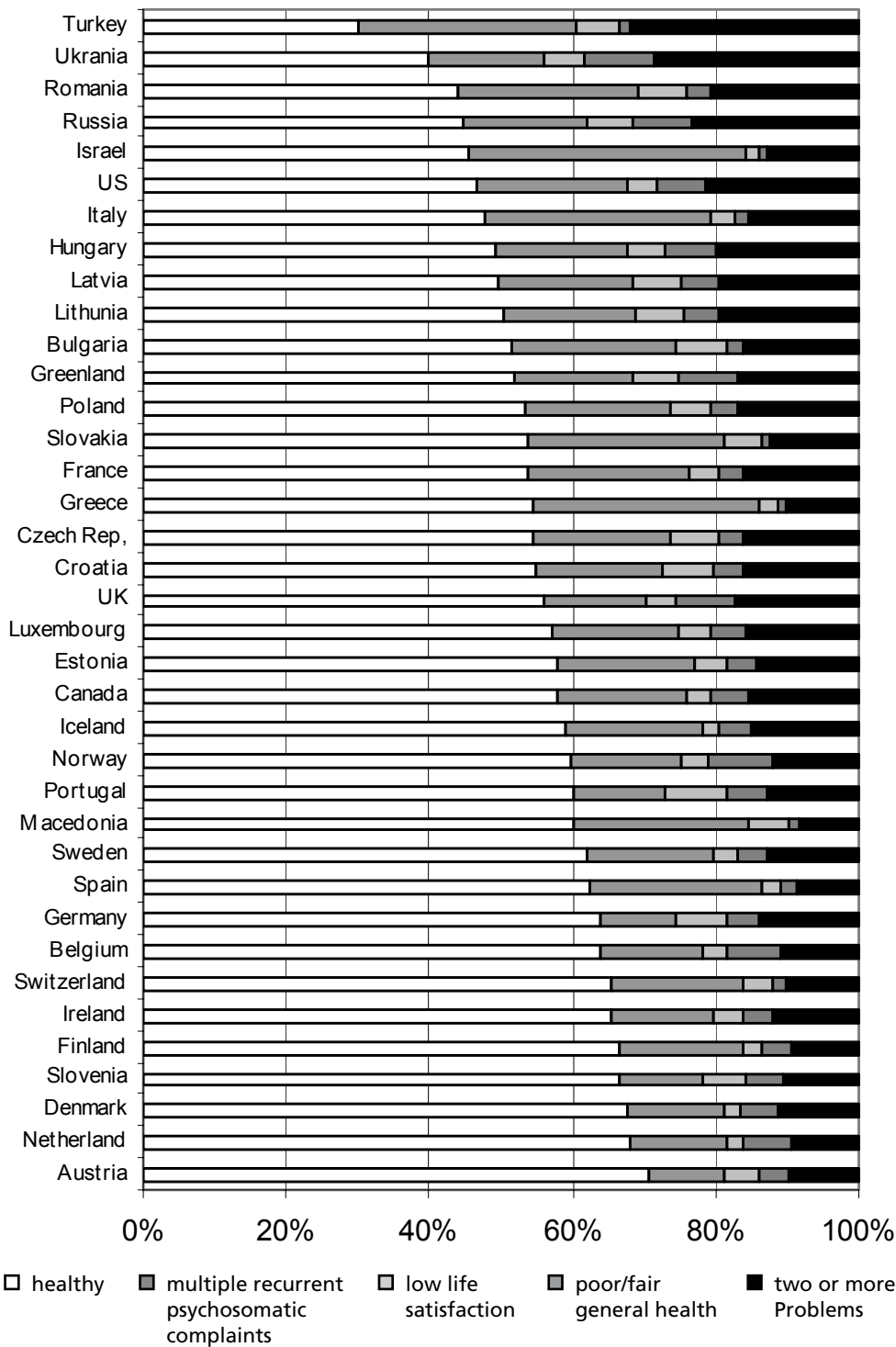
Statistical analyses were carried out with the software SPSS 15 and HLM 5.

## Results

Fig. 1 shows the percentage of respondents with only poor or fair general health, a low life satisfaction and multiple recurrent health complaints across countries, showing the different ranking of the countries regarding the three health indicators. Respondents from Macedonia, Greece and Israel reported the best general health. Ukraine and Russia reported the poorest general health. Life satisfaction was highest in Israel and Ukraine and lowest in Latvia and Switzerland. Respondents from Netherlands and Portugal reported the fewest subjective health complaints, while their peers from Israel and Turkey reported the most.

A random intercept and random slopes multilevel model analysis was carried out separately for each of the three dichotomised health variables as outcomes. Age-group, gender,

age\*gender interaction and socio-economic status were entered as predictors on the individual level. Country membership defined the second level and the variation of the outcome intercepts and the predictors slopes were estimated across countries. The logistic formula was used to link the outcome with the predictors. Odds ratios (OR) were computed. Intra class correlation coefficients were calculated beforehand (results not shown) to estimate the proportion of “true” variation of the intercepts (prevalence) and slopes (OR) across country. Table 1 shows first the results for the general health perception. In the model with fixed effects, a higher age (13 or 15 years versus 11 years), being female, and a medium or low SES, as opposed to a high SES, were associated with a higher “chance” (OR) for poor/fair general as opposed to good/excellent health perception. Being female and 13 or especially 15 additionally increased the “chance” for lower general health, supporting the finding that the difference between girls and boys increased with higher age. The variance partitioning coefficient indicated statistically significant and sizeable variation of the intercept and the slopes across countries. The 95% population variation confidence interval for age, gender and medium SES included countries with no or even a reversed association for these predictors. Being 13 or 15 years old and female, as well as having a low SES was associated with a higher “chance” for poor health in 95% of all theoretically possible countries. For life satisfaction similar results were observed, however, gender alone was not statistically significant associated with low life satisfaction. Being 13 or 15 years old and female, as well as having a medium or a low SES was associated with a higher “chance” for low life satisfaction in 95% of all theoretically possible countries (Tab. 2). Being 15 years old, female and 13 or 15 years old, as well as with an only medium or even low SES was associated



**Figure 2.** Prevalence and variation of adolescents' subjective health types across European countries.

with multiple recurrent health complaints. The impact of being 13 years old and female did not show statistically significant differences across the countries. Being 13 or 15 years old and female, as well as having a low SES was associated with a higher “chance” for multiple recurrent health complaints in 95 % of all theoretically possible countries.

Fig. 2 shows the prevalence of four different patterns of subjective health. Overall, 56.1 % of the respondents reported no noticeable health problems for any of the indicators. About 19.1 % suffered from multiple recurrent health complaints solely, 4.7 % reported low life satisfaction only. The percentage of respondents reporting poor/fair health only in general health was also 4.7 %. Generaliz-

able health problems (two or more problem areas) were reported by 5.2%. Tab. 2 and Fig. 2 show age-, gender and SES-related differences and cross-national differences in the prevalence of these health patterns. The percentage of healthy respondents varied from 29.9% in Turkey to 70.6% in Austria. Similarly, the percentage of respondents reporting poor health in all three indicators varied from 1.1% in Macedonia to 9.5% in Turkey.

An attempt was made to find out if adolescents from countries with similar geographic and historical background display similar prevalence of the subjective health patterns. The mid-European countries Austria, Germany and Slovenia are characterized by a large proportion of pupils free from noticeable subjective health problems, about 10% suffering from multiple recurrent health complaints, about 5–7% reporting low life satisfaction and 4–5% reporting poor/fair general health. The Benelux countries Belgium, Netherlands and Luxembourg are characterized by relatively high percentage of healthy children as well, about 14–18% reporting multiple recurrent health complaints and a higher percentage of respondents reporting poor/fair general health (5–7%) than low life-satisfaction. The Scandinavian countries Denmark, Finland, Sweden, Norway and Iceland displayed prevalence rates similar to the Benelux countries. A heterogeneous picture was found for the western Mediterranean countries Spain, Portugal, France and Italy. The former mid-European / Eastern European countries Czech Republic, Slovakia and Poland show a high proportion of respondents suffering from multiple recurrent health complaints alone or in connection with low life satisfaction. The other former Eastern European countries Bulgaria, Hungary, Russia, Romania and Ukraine also display high prevalence rates of multiple recurrent health complaints alone or in connection to poor/fair general health or in connection with low life-satisfaction. A sizeable proportion of respondents even display poor health on all three indicators. The Baltic countries Estonia, Latvia and Lithuania show similar results with higher percentages of adolescents reporting multiple recurrent health complaints alone or in connection with low life satisfaction or poor/fair general health. The eastern Mediterranean countries Greece, Israel and Turkey show a heterogeneous picture. However, all three countries showed the largest proportion of respondents suffering from recurrent multiple health complaints alone. The English speaking countries Ireland, UK and Canada show relatively similar results: about 14–18% suffer from multiple recurrent health complaints alone and low life-satisfaction as the next prevalent mono-morbid condition.

## Discussion

Although adolescence is traditionally seen as a life period with relatively good health, our findings show a sizeable number of

school children suffering either from subjective health complaints, reporting a low life-satisfaction, a poor or only fair general health or a combination of these three indicators. Taking into account the high relevance of subjective experiences of health problems for the personal burden, social functioning but also such aspects as health care utilization,<sup>34</sup> it could be concluded that health of adolescents is a key area for public health research, the health care system, but also the educational system and politics. However, interpretation of these results should be cautious with regards to our non-clinical measures. These results indicate the importance of paying closer attention to adolescents' health problems to separate typical adolescents' discomfort with growing up from increased risk of serious health problems. The measures applied in the HBSC study might not enable such separation. Further in-deep examination is warranted prior to any e.g. medical intervention.

The results from the three health indicators under study converge to a similar picture: Older adolescents and girls are at a higher risk for poor general health perception, low life-satisfaction and multiple recurrent health complaints. Furthermore, a rising gap between girls and boys as they grow older could be observed. Similar results were issued from analyses of former HBSC surveys<sup>35,36</sup> and other health studies as well<sup>37</sup>. Different explanations might account for these results: With growing age, developmental tasks become increasingly gender-specific, and are linked to different burdens and resources thereby leading to gender-related differences in subjective health in adolescence<sup>38</sup>. The age range under study is characterized by physical and social transition from childhood to adulthood, combined with transitions in school. Hormonal development could cause physiological processes becoming so imbalanced that subjective well-being might be impaired<sup>39</sup>. Furthermore, adolescents experience an increasing discrepancy between their physical and intellectual development on the one hand, and their restricted possibilities compared to adults on the other<sup>40</sup>. They have to adapt to their changing bodies and new gender identities and have to search for their own identities. Adolescents are increasingly confronted with social and cultural insecurity, moral and value-based contradictions, and uncertainty about the future<sup>41</sup>.

Low familial affluence as an indicator of low socio-economic status was associated with poor general health perception, low life satisfaction and – to a certain extent – multiple recurrent subjective health complaints. Our results thus confirm the findings from other international studies, such as the KIDSCREEN survey<sup>42</sup>. Differences in the access to material resources or reactions to stress are discussed as mechanisms linking SES to adolescents' well-being<sup>43</sup>. Adolescents with better access to places e.g. for social and educational purposes, due to the family's possession of a car; with more pri-

vacy because of an own bedroom; with experience of different cultures during holidays and better access to media due to computer ownership report better health in general and higher life-satisfaction<sup>44</sup>. Psychosocial strains and stresses associated with socially unfortunate positions could especially affect the familial system resulting in disturbed relationships, inner-familial conflicts and reduced familial support, which are important determinants of adolescents' health<sup>45</sup>.

Our findings revealed cross-national differences in the prevalence and to a lesser extent in the qualitative pattern of subjective health as well. Still, the question remains if these differences reflect true differences or if they reflect differences in how the health aspects were understood, conceptualised and expressed by the respondents. Previous studies have shown the HBSC-SCL to be functioning as a measure largely comparable across the countries involved in the 2001/02 HBSC survey<sup>32</sup>. Further studies are warranted that use other measures of adolescents' health with confirmed cross-national comparability like for example the KIDSCREEN-index of mental health and well-being<sup>46</sup>. Some clusters of countries with similar cultural and/or geographic background displayed homogeneous patterns of adolescents population health. Seemingly, countries with lower SES status in general display higher prevalence of subjective health problems. However, other aspects might be relevant as well: Holstein et al. found higher income inequality (Gini Index) associated with higher rates of subjective health complaints<sup>47</sup>. Similar results were found in the KIDSCREEN study using the KIDSCREEN-Index of mental health and well-being<sup>48</sup>. Multilevel analyses revealed sizeable cross-national differences in the strength of associa-

tion between age, gender and SES with the subjective health indicators under study. However, the main pattern – older pupils and girls (especially older girls) and low SES and their association with an increased risk for subjective health problems – could be established for nearly all potentially possible countries.

Our findings could provide the basis for further in deep examination of the role of contextual factors at the cultural level as a potential explanation of cross-national differences. Contextual factors of interest are different gender role traditions, e.g. between Scandinavian and Mediterranean countries. On the other hand, several national indicators of wealth and socioeconomic status, such as the gross domestic product per capita, the Gini-coefficient, youths' unemployment rates, the per capita expenditure on social protection, etc., could be included in such multi-level analyses. Enhancing the knowledge on the factors playing a role on health and health problems is a key requisite for any health promotional and preventive attempts.

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#### References

- Wasem J, Hessel F. Gesundheitsbezogene Lebensqualität und Gesundheitsökonomie. In: Ravens-Sieberer U, Cieza A, eds. Lebensqualität und Gesundheitsökonomie in der Medizin. Landsberg: Ecomed, 2000:319–35.
- Bullinger, M. Assessing health related quality of life in medicine. An overview over concepts, methods and applications in international research. *Restor Neurol Neurosci* 2002;20:93–101.
- Sullivan M. The new subjective medicine: taking the patient's point of view on health care and health. *Soc Sci Med* 2003;56:1595–604.
- Bircher J. Towards a dynamic definition of health and disease. *Med Health Care Philos* 2005;8:335–41.
- Schumacher J, Klaiberg A, Brähler E. Diagnostik von Lebensqualität und Wohlbefinden – Eine Einführung. In: Schumacher J, Klaiberg A, Brähler E, eds. Diagnostische Verfahren zu Lebensqualität und Wohlbefinden. Göttingen: Hogrefe, 2003:9–24.
- Ware JE. Conceptualization and measurement of health-related quality of life: comments on an evolving field. *Arch Phys Med Rehabil* 2003;84 Suppl.2:43–51.
- Leplege A, Hunt S. The problem of quality of life in medicine. *JAMA* 1997;278:47–50.
- Taillefer M, Dupuis G, Roberge M, et al. Health-related quality of life models: systematic review of the literature. *Soc Indic Res* 2003;64:293–323.
- WHOQOL Group. The World Health Organization Quality of life assessment (WHOQOL): position paper from the World Health Organization. *Soc Sci Med* 1995;41:1403–9.
- Ferring D, Filipp S. Die Skala zur Lebensbewertung: empirische Skalenkonstruktion und erste Befunde zu Reliabilität, Stabilität und Validität. *Zeitschrift für Differentielle und Diagnostische Psychologie* 1996;17:141–53.
- Garralda ME. Somatisation in children. *J Child Psychol Psychiatry* 1996;37:13–33.
- King A, Wold B, Tudor-Smith C, Harel Y. The health of youth. A cross-national survey. WHO Regional Publications 1996;69.
- Mikkelsen M, Salminen J, Kautiainen H. Nonspecific musculoskeletal pain in pre-adolescents. Prevalence and 1-year persistence. *Pain* 1997;73:29–35.
- Knishkowsky B, Palti H, Timä C, Adler B, Gofin R. Symptom clusters among young adolescents. *Adolescence* 1995;30:351–62.

15. Alfvén, G. The covariation of common psychosomatic symptoms among children from socio-economically differing residential areas: an epidemiological study. *Acta Paediatrica* 1993;82:484–7.
16. Holler-Nowitzki B. *Psychosomatische Beschwerden im Jugendalter*. Weinheim: Juventa, 1994.
17. Kolip P, Schmidt B. Gender and health in adolescence. WHO Policy Series: Health policy for children and adolescents. Issue 2, WHO Regional Office for Europe, 1999.
18. Perrin JM, Blom SR, Gortmaker SL. Increasing childhood chronic conditions in the United States. *JAMA* 2007;297:2755–9.
19. Rutter M, Smith DJ. *Psychosocial disorders in young people: time trends and their causes*. Chichester: Wiley, 1995.
20. Kirmayer LJ, Young A. Culture and somatization: clinical, epidemiological, and ethnographic perspectives. *Psychosom Med* 1998;60:420–30.
21. Crijnen AAM, Achenbach TM, Verhulst FC. Problems reported by parents of children in multiple cultures: the Child Behavior Checklist syndrome constructs. *Am J Psychiatry* 1999;156:569–74.
22. Haugland S, Wold B, Stevenson J, Aaroe LE, Woynarowska B. Subjective health complaints in adolescence – a cross-national comparison of prevalence and dimensionality. *Eur J Public Health* 2001;11:4–10.
23. Gureje O, Simon GE, Ustun TB, Goldberg DP. Somatization in cross-cultural perspective: a World Health Organization study in primary care. *Am J Psychiatry* 1997;154:989–95.
24. Erjksen HR, Svendsrod R, Ursin G, Ursin H. Prevalence of subjective health complaints in the Nordic European countries in 1993. *Eur J Public Health* 1998;8:294–8.
25. Currie C, NicGabhainn S, Godeau E. The Health Behaviour in School-Aged Children: WHO collaborative cross-National (HBSC) study: origins, concept, history and development 1982–2008. *Int J Public Health* 2009; DOI: 10.1007/s00038-009-5404-x.
26. Roberts C, Freeman J, Samdal O, et al. & MDG and the HBSC study group. The Health Behaviour in School-aged Children (HBSC) study: methodological developments and current tensions. *Int J Public Health* 2009; DOI: 10.1007/s00038-009-5405-9.
27. Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav* 1997;38:21–37.
28. Benjamins MR, Hummer RA, Eberstein IW, Nam CB. Self-reported health and adult mortality risk: an analysis of cause-specific mortality. *Soc Sci Med* 2004;59:1297–306.
29. Cantril H. *The pattern of human concern*. Rutgers University Press, 1965.
30. Currie CE, Gabhainn SN, Godeau E, et al. Inequalities in young peoples health. HBSC international report from the 2005/2006 Survey. Copenhagen, Denmark: WHO Regional Office for Europe (Health Policy for Children and Adolescents, No. 5), 2008.
31. Hetland J, Torsheim T, Aarø LE. Subjective health complaints in adolescence: dimensional structure and variation across gender and age. *Scand J Public Health* 2002;30:223–30.
32. Ravens-Sieberer U, Erhart M, Torsheim T, et al., and the HBSC Positive Health Group. An international scoring system for self-reported health complaints in adolescents. *Eur J Public Health* 2008;18:294–9.
33. Hagquist C, Andrich D. Measuring subjective health among adolescents in Sweden. *Soc Indic Res* 2004;68:201–20.
34. Seid M, Varni JW, Segall D, Kurtin PS. Health-related quality of life as a predictor of pediatric healthcare costs: a two-year prospective cohort analysis. *Health Qual Life Outcomes* 2004;2:48.
35. Torsheim T, Ravens-Sieberer U, Hetland J, Valimaa R, Danielson M, Overpeck M. Cross-national variation of gender differences in adolescent subjective health in Europe and North America. *Soc Sci Med* 2006;62:815–27.
36. Cavallo F, Zambon A, Borraccino A, Ravens-Sieberer U, Lemma P, and the HBSC Positive Health Group. Girls growing through adolescence have a higher risk of poor health. *Qual Life Res* 2006;15:1577–85.
37. Bisegger C, Cloetta B, von Rueden U, Abel T, Ravens-Sieberer U, & the European KID-SCREEN Group. Health-related Quality of Life: gender differences in childhood and adolescence. *Soz Präventivmed* 2005;50:281–91.
38. Kolip P, Schmidt B. Gender and health in adolescence. Copenhagen: WHO. (Health policy for children and adolescents; 2), 1999. (Accessed November 20, 2008, at <http://www.euro.who.int/document/e66082.pdf>)
39. Flammer A, Alsaker F. *Entwicklungspsychologie der Adoleszenz: die Erschließung innerer und äusserer Welten im Jugendalter*. Bern: Huber, 2002.
40. Moffitt TE. Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychol Rev* 1993;100:674–701.
41. Haberlandt M, Höfer R, Keupp H, Seitz R, Straus F. Risiken und Chancen der Entwicklung im Jugendalter. In: Kolip P, Hurrelmann K, Schnabel P-E, eds. *Jugend und Gesundheit: Interventionsfelder und Präventionsbereiche*. Weinheim: Juventa, 1995:87–109.
42. von Rueden U, Gosch A, Rajmil L, et al. Socioeconomic determinants of health related quality of life in childhood and adolescence: results from a European study. *J Epidemiol Community Health* 2006;60:130–5.
43. Bradley RH, Corwyn RF. Socioeconomic status and child development. *Annu Rev Psychol* 2002;53:371–99.
44. Radziszewska B, Richardson JL, Dent CW, Flay BR. Parenting style and adolescent depressive symptoms, smoking, and academic achievement: ethnic, gender, and sex differences. *J Behav Med* 1996;3:289–305.
45. Lampert T, Richter M. Gesundheitliche Ungleichheit bei Kindern und Jugendlichen. In: Richter M, Hurrelmann K, eds. *Gesundheitliche Ungleichheit*. Wiesbaden: VS Verlag für Sozialwissenschaften, 2006:199–220.
46. Erhart M, Torsheim T, Hetland J, et al. Measuring Mental health and well-being of schoolchildren in 15 European countries: Results from the KIDSCREEN-10 Index. *Int J Public Health* 2009; DOI: 10.1007/s00038-009-5407-7.
47. Holstein BE, Currie C, Boyce W, Mogens T, Damsgaard M, Gobina I, Kökönyei G, Hetland J, de Looze M, Richter M, Due P and the Social Inequalities Focus Group. Socio-economic inequalities in multiple health complaints among adolescents: international comparative study in 37 countries. *Int J Public Health* 2009; DOI: 10.1007/s00038-009-5418-4.
48. Ravens-Sieberer U, Wille N, Erhart M, Nickel J, Richter M, Suhrcke M. Socioeconomic Inequalities in mental health among adolescents in Europe. In: WHO Regional Office for Europe. *Social cohesion for mental well-being among adolescents*. Copenhagen, Denmark: WHO Regional Office for Europe, 2008:26–42.

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**Address for correspondence**

**Prof. Dr. Ulrike Ravens-Sieberer, MPH**  
Head of Research, Professor for Child Public Health  
University Medical Center Hamburg-Eppendorf  
Center for Obstetrics and Pediatrics, Department of Psychosomatics in Children and Adolescents, Martinistr. 52  
D-20246 Hamburg  
Germany  
Tel.: +49-40-7410-57585 (phone secretary Ms. Wegner)  
Fax: +49-40-7410-55105  
E-mail: Ravens-Sieberer@uke.uni-hamburg.de