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Inequalities in Adolescent Health and Life Satisfaction: Evidence from the Health Behaviour in School-aged Children study

Yekaterina Chzhen, Zlata Bruckauf, Kwok Ng, Daria Pavlova, Torbjorn Torsheim, Margarida Gaspar de Matos

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INEQUALITIES IN ADOLESCENT HEALTH AND LIFE SATISFACTION: EVIDENCE FROM THE HEALTH BEHAVIOUR IN SCHOOL-AGED CHILDREN STUDY

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Abstract: International studies of inequalities in adolescent health tend to focus on the socio-economic gradient in average outcomes rather than their dispersion within countries. Although understanding the extent to which differences in health are related to socio-economic disadvantage is important, focusing exclusively on socio-economic status risks neglecting differences in the distribution of health outcomes within and between countries. To fill this research gap, this study analyses variation in the extent of inequality in the lower half of the distribution in five indicators of adolescent health and well-being – health symptoms, physical activity, healthy eating, unhealthy eating, and life satisfaction – across EU and/or OECD countries that took part in the latest cycle of the Health Behaviour in School-aged Children study. The study then analyses secular trends in health inequalities over a decade between 2001/02 and 2013/14, using data from the latest four HBSC cycles.

Inequality in unhealthy eating has the largest cross-country variation of all the indicators studied, while inequality in life satisfaction varies the least. The relative gaps in health and life satisfaction are significantly negatively correlated with the respective average outcomes. Inequality in health symptoms has increased in most of the countries studied between 2002 and 2014. In contrast, inequality in physical activity and in unhealthy eating decreased in the majority of the countries over this decade. About as many countries recorded a long-term increase as those that saw a decrease in inequality in healthy eating and in life satisfaction.

Keywords: adolescents; inequality; health; physical activity; balanced diet; Health Behaviour in School-aged Children.

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1. INTRODUCTION

Health inequality research focuses almost exclusively on the socio-economic 'gradient' in health outcomes. Universally, lower socio-economic position tends to be associated with poorer health [1]. Socio-economic inequalities in health and well-being are established early enough in life that they can already be observed among children and adolescents [2, 3]. In Europe and North America, adolescents from more affluent backgrounds are more likely to report good or excellent health and higher life satisfaction [4], to eat fruit and vegetables [5, 6], and to engage in fee-based physical activity [7]. Moreover, this relationship has become more pronounced over time, with socio-economic inequalities among adolescents in physical activity, body mass index and self-reported health symptoms increasing between 2002 and 2010 [8].

Socio-economic inequities in adolescent health are likely to persist into adulthood, since the foundation for adult health is established in childhood and adolescence [9]. Although research on young people has tended to focus on under-fives, there has been an increased interest in adolescent health in recent years [10]. Globally, public health concerns are shifting from childhood infectious diseases to young people's risk behaviours [11]. A dedicated series of papers in the *Lancet* called for placing adolescents at the centre of the global health agenda [12–15]. UNICEF [16] emphasises the importance of enabling adolescents to make a healthy and productive transition to adulthood in order to consolidate the gains of early childhood investment. McDaid et al. [17] show that interventions during adolescence can mitigate adverse effects of poor well-being during earlier childhood.

The extent to which differences in health are related to socio-economic disadvantage is important for addressing the social determinants of inequality in health [18]. Yet, focusing exclusively on income and socio-economic status risks neglecting other important factors associated with health inequalities: social norms, psychological climate at home, community characteristics, existing infrastructure and the characteristics of household members [19]. The complexity of drivers of health outcomes necessitates accurate measurement of the variation in health within and between countries for an appropriate policy response [9]. In other words, in order to understand why health inequalities exist, we first have to accurately measure the extent of dispersion in adolescent health outcomes and health-related behaviours within and between countries.

The degree of dispersion in health outcomes can inform policy, especially when focusing on those with the poorest outcomes in the lower tail of the distribution ('bottom-end'). A longer tail at the lower end of the distribution suggests that some children are falling far behind their peers. It may also indicate that social exclusion and entrenched disadvantage are not adequately addressed by social policies [20]. Health related indicators based only on average outcomes (which may vary little across nations) can mask substantial differences within a cohort of adolescents. Failure to recognize these differences limits the chances of success for targeted health-related provisions [16].

International studies of inequalities in child and adolescent health do tend to focus on the socio-economic gradient in average outcomes rather than their dispersion within countries. To our knowledge, the only notable exceptions are Pradhan et al [19] who analysed inequality in preschool age children's height-for-age z-scores in developing countries and Currie et al. [20] who examined

bottom-end inequality in adolescent health behaviours in OECD countries to contribute to a league table of inequality in child well-being in UNICEF's Report Card 9 [21]. To fill this research gap, this paper studies inequalities in the lower half of the distribution of adolescent health behaviours in Europe and Canada using data from repeated cross-sectional surveys of adolescent health carried out as part of the World Health Organization's Health Behaviour in Children (HBSC) study. Following Currie et al [20] and UNICEF [21], the health indicators of interest include measures of health symptoms, physical activity, healthy eating and self-reported health symptoms. In addition, an indicator of 'excess' or 'unhealthy' eating is used to reflect growing concerns about prevalence of childhood obesity and poor dental health. A measure of life satisfaction is used as a proxy for subjective well-being.

The aims of this study are twofold. First, it analyses the extent of variation in health and life-satisfaction between a child with a typical (median) outcome and a child in the lower half of the distribution in five indicators of adolescent health and well-being across 32 countries in the EU and/or the OECD that took part in the latest cycle of the HBSC study. It is posited that adolescent health inequality is greater in countries with greater income inequality. Income inequality has been linked to greater differences between socio-economic groups in health symptoms [8]. Second, it analyses secular trends in bottom-end health inequalities over nearly a decade between 2001/02 and 2013/14. It is expected that health inequality increased in countries that were hit by the recent recession to a greater extent, such as Greece, Ireland, Italy, Portugal and Spain [22–25].

2. DATA AND METHODS

The HBSC is the longest-running international study on adolescent health, well-being and their social context (www.hbsc.org). It has collected data from 11-, 13- and 15-year-olds in Europe and North America every four years since 1985 [see 3, 26]. The surveys are administered at schools through self-completion questionnaires.

This paper uses data from the last four HBSC cycles: 2001/02, 2005/06, 2009/10 and 2013/14. Although the HBSC network has grown to 44 countries, this paper focuses on those that are in the European Union and/or the Organisation for Economic Co-operation and Development. There are 32 such countries in the latest cycle and 26 in the last four cycles. However, countries with more than 10% of missing values on a key indicator were excluded from the analysis. This resulted in Israel being removed from the comparison based on 2013/14 data.

2.1 Description of indicators

2.1.1 Self-reported health

The term 'subjective health symptoms' is typically employed to explain a variety of health symptoms experienced by the individual with or without a defined diagnosis. This can vary from occasional symptoms to clinical manifestations and may impair an individual's everyday functioning [27]. The terms 'medically unexplained', 'functional' and 'psychosomatic' have additionally been used by scholars to explain a similar constellation of symptoms.

Nevertheless, experts prefer the term 'subjective health symptoms' due to neutral qualities, as it does not allow any assumptions about the etiology of symptoms and does not imply a causal relationship between the biological and psychological factors [28–30]. High prevalence of multiple health symptoms among adolescents is an important indicator because these symptoms may persist into adulthood and can be related to other health issues [31, 32].

The factors affecting subjective health symptoms and their psychosocial pathways can be complex. The most constant and best-established finding across the relevant cross-national studies is that subjective health symptoms are both gender and age dependent: females are more likely to report health complaints than males, with an increasing frequency with age for both sexes [27, 33-36]. Socio-demographic characteristics, lifestyle and occupation-related factors and objective health conditions do not sufficiently explain the differences in subjective health symptoms, suggesting that psychological factors play a greater role [37].

Health symptoms were measured using the HBSC symptom checklist (HBSC-SCL). This eight-item scale has remained unchanged since the 1993/1994 survey [27]. Students are asked to indicate how often in the last 6 months they had experienced the following symptoms: headache; stomach ache; backache; feeling low; irritability or bad temper; feeling nervous; difficulties in getting to sleep; and feeling dizzy. The response options were 'about every day', 'more than once a week', 'about every week', 'about every month', 'rarely or never'. Following Currie et al. [20], responses are summed up to produce a composite scale ranging from 0 to 32. A score of zero corresponds to frequent occurrence of all eight health symptoms and 32 refers to no health symptoms.

Validation of this measure through empirical studies [38] showed that adolescents were consistent in how they defined different symptoms, suggesting that they have a common frame of reference. However, they offered different perspectives on the causes of such symptoms. Some explanations were consistent with a stress-model of health symptoms. In other cases, adolescents attributed their health symptoms to developmental processes, such as growing pains, or ergonomic factors, such as low quality of air in classrooms. The study showed acceptable test-retest reliability for the HBSC symptom scale as a whole (Pearson-r = .79) and somewhat lower reliability for the single symptoms (Pearson-r = 0.61 to 0.76). Although some studies [39] suggested the exclusion of 'sleeping difficulties' from the scale to improve its robustness, the sensitivity checks conducted by this study did not provide sufficient ground for its omission. Therefore, the present study uses all eight symptoms, summing the responses to produce a 0-32 'health symptoms' scale.

2.1.2 Physical activity

Physical activity is a combination of human movement, increased energy expenditure and improved fitness [40]. A wide range of benefits has been reported as a result of an active lifestyle. Higher levels of physical activity improve both short- and long-term physical and mental health [41-43]. In early and mid-adolescence, physical activity is positively related to self-image and the quality of family and peer relationships, and negatively related to health symptoms and smoking [44]. Furthermore, there is evidence that increased physical activity improves academic performance [45]. Being physically active when young carries into adulthood [46] and is negatively related to adult obesity [47].

Literature suggests that few adolescents meet international physical activity recommendations of at least 60 minutes of moderate-to-vigorous physical activity per day [48] and, as adolescents get older, they do less physical activity [49]. Boys are more active than girls [50] and the decline in physical activity with age is greater for girls [51]. Adolescents from better-off families report more physical activity [7]. Between 2002 and 2010 there is a slight increase in physical activity across Europe and North America [48].

HBSC respondents are asked on how many days over the past seven they were physically active for at least 60 minutes per day. A preamble to the survey question provides a definition of moderate-to-vigorous physical activity [52]. The scale ranges from 0 days to 7 days. While adolescents' ability to recall behaviours over a long period of time can be questionable [53], the objective measures of physical activity still lack consensus, are difficult to manage, and are expensive to run [54]. To reduce recall error, a shorter time period would be desirable, although variations over a period of 24 hours could depend on which day of the week the questionnaire is administered [55]. A question about physical activities in the past week, as used by this paper, has been seen to reliably serve the purpose of their measurement [52, 56, 57]. A general question about physical activities has been shown to correlate well with one referring to activity in the last seven days, adopted in every HBSC data collection round since 2001 [48].

2.1.3 Nutrition and a balanced diet

While the importance of a healthy diet in childhood and adolescence is undisputed, children grow increasingly independent in their eating habits as they get older. Consumption of fruit and vegetables tends to decrease between the ages of 14 and 21, while the intake of sugar-containing soft drinks increases [58]. Even when nutritional guidelines are met for major food groups, intakes of fat and added sugars in the diets of children and adolescents aged two to 19 tend to exceed recommended levels [59]. Although there are no international recommendations on dietary diversity [60], ample research evidence indicates that added sugars have a detrimental effect on children's health, while consumption of fruit and vegetables is associated with positive health outcomes [see 61].

Fruit and vegetables are deemed a crucial part of a healthy diet. Their consumption is linked to a lower risk of major diseases, such as cancer [62], coronary heart disease [63] and stroke [64]. The WHO recommends a daily intake of at least 400g of fruit and vegetables. Using data from the HBSC 2002 and 2010, Vereecken et al [61] found an increase in frequency of adolescents' fruit and vegetables consumption in the majority of the 33 countries participating in both cycles. Nevertheless, most children and adolescents in Europe and North America fail to meet the WHO guidelines [65, 66].

In contrast, added sugars in food and beverages have adverse impacts on children's dental health and body weight. To improve child nutrition, reducing intake of sugar is generally perceived as an important policy objective in itself [67]. There is consistent evidence of sugar snacks and sugar-sweetened beverages being major risk factors for dental caries among children and youth [68–71]. Dental decay is proven to affect children's quality of life, weight gain and growth [72]. Furthermore, consumption of beverages that contain sugar is associated with weight gain in children [73–75], while intake of added sugars is linked to multiple indicators of cardiovascular disease risk [76].

The HBSC study uses a food frequency questionnaire (FFQ) to measure dietary habits among adolescents. However, out of 14 items measuring the consumption of dietary fibre, calcium and popular 'youth food culture' items with low nutritional value, only four items are mandatory: fruit, vegetables, sweets (candy or chocolate) and soft drinks that contain sugar. Children are asked to indicate how often they consume each of these by picking one of seven responses: 'never', 'rarely/less than once a week', 'once a week', 'two to four times a week', 'five to six times a week', 'once a day, every day' and 'more than once a day, every day'.

The reliability and validity of these food items was tested among Flemish and Italian school children by comparing food consumption estimated from the 14-item FFQ with a seven-day diet record [60]. Although the FFQ items were deemed acceptably reliable, there is evidence of overestimation of food consumption in the FFQ compared with the food diary.

Frequency of fruit and vegetables consumption is commonly used as an indicator of healthy eating. Following Vereecken et al [60], these two items are combined into a 'Fruit and Vegetables Index'. It ranges from 0 to 14, with 0 corresponding to never eating fruit or vegetables and 14 to eating both fruit and vegetables at least once a day.[1]

The sweets and soft drinks items are used here as indicators of unhealthy eating. They can be combined the same way as the fruit and vegetables items. However, for consistency with other indicators used in this paper, where higher values denote more positive outcomes, the scale is reverse-coded here. Thus, 0 denotes consuming both sweets and sugared drinks at least once a day and 14 refers to never consuming sweets or sugary drinks.[2]

2.1.4 Life satisfaction

Perceived quality of life is driven by a combination of individual, environmental and activity factors [77]. Adolescents' life satisfaction has been reported to be associated with mental health [78], implying the link between positive mental health and higher life satisfaction [79]. Literature finds that higher life satisfaction is associated with physical activities [80], social support [81] and higher family affluence, particularly in countries with large social inequalities [82]. Boys tend to have higher life satisfaction scores than girls [83], while food poverty [84] and participation in risk behaviours such as smoking, alcohol use, sexual behaviours, and injuries were significantly associated with life dissatisfaction [85]. A low level of life satisfaction during adolescence is associated with depression and other adverse health outcomes in later life [86].

The Cantril ladder of life satisfaction was originally designed for completion by adult respondents [87]. It is a one-item scale of 11 points, from 'worst' (=0) to 'best' (=10) life. The scale was later adapted for 11-year-olds with a visual scale that represents a ladder. Adolescents with low and

[1] The fruit and vegetables items are re-coded as follows and then summed up into a 0-14 scale: 'never'= 0, 'less than once a week' = 0.25, 'once a week' = 1, '2–4 days a week' = 3, '5–6 days a week' = 5.5 and 'once a day, every day' and 'more than once a day, every day' = 7.

[2] The sweets and sugared drinks times are re-coded as follows: 'never'=7, 'less than once a week'=5.5, 'once a week'=3, '2-4 times/week'=1, '5-6 days a week'=0.25 and 'once a day, every day' and 'more than once a day, every day' = 0.

high life satisfaction can be identified through response separation between those who rated a score lower than 6 or 6 and more [78, 84]. The advantage of the Cantril Ladder is that it results in a continuous and theoretically equal-interval measure. Levin and Currie [78] reported acceptable test-retest results for the samples of 11- and 13-year-olds and approaching acceptable for the sample of 15-year-olds.

2.2 Measuring health inequality in the lower half of the distribution

To evaluate health inequality in the lower half of the distribution, this paper follows Currie et al. [20] by using a linear transformation of the McLoone index.[3] Unlike other popular measures of inequality, McLoone's index characterises the lower half of the distribution only. It is calculated as the sum of all observations below the median divided by the product of the median value and the number of observations below the median. Therefore, it is the mean of all observations below the median expressed as a share of the median value. The index ranges between 0 and 1, with 1 representing perfect equality in the bottom half of the distribution, with no one falling behind the 'average' person.

$$McLoone's\ Index = \frac{\sum x_{below\ median}}{n_{below\ median} * Median} = \frac{\bar{x}_{below\ median}}{Median}$$

To measure the extent to which children in the lower half of the distribution fall behind an average child on a variety of ordinal indicators of health and well-being, we calculate the so-called 'relative gap' as the difference between the mean of the values below the median[4] and the median, as a percentage of the median. This is equivalent to 1 minus the McLoone index. Thus, a higher relative gap indicates greater inequality in the lower half of the distribution. Sample weights are used to calculate the median and the mean below the median.

$$Relative\ gap = \frac{Median - \bar{x}_{below\ median}}{Median} = 1 - \frac{\bar{x}_{below\ median}}{Median}$$

This definition implies that for any two countries with the same median, the one with a lower mean in the bottom half of the distribution will appear to be more unequal. Meanwhile, for any two countries with the same mean below the median, the one with a higher median will appear to be more unequal because children with the poorest outcomes are left further behind from the 'average'. Thus, the relative gap index penalises countries both for poorer outcomes among the most disadvantaged in absolute terms and for a greater relative distance between the poorest and median outcomes.

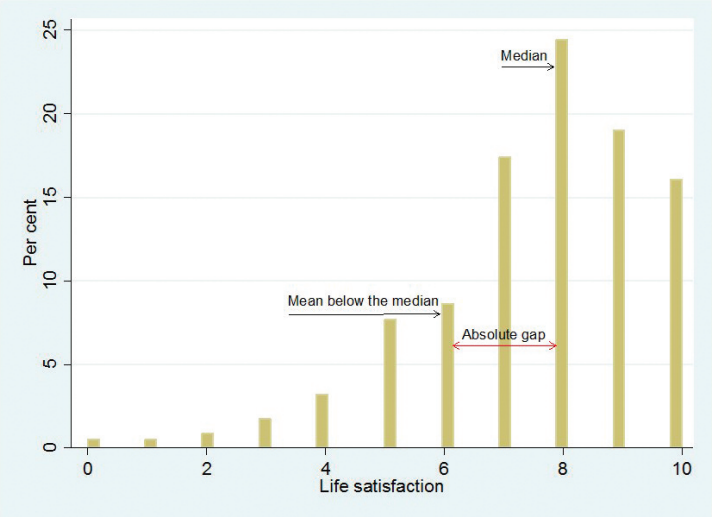
To illustrate this method with an example, Diagram 1 shows a distribution of the life satisfaction score (11 points from 0 to 10). The median is 8 score points and the mean of all the scores below the median is 6 points. Thus, the absolute gap is 2 score points and the relative gap is 25 per cent. The diagram also shows that most of the variation is in the lower half of the distribution

[3] The McLoone index originated in the field of education finance in the United States, measuring the degree of inequality in spending per pupil [88].

[4] Note that the median value itself is excluded from the calculation of the mean score in the lower half of the distribution.

(i.e. it is skewed to the left). This is not surprising because, unlike income – which does not have an upper limit – measures of health and well-being tend to have natural upper bounds beyond which no improvement can be made [19]. An upper limit can be either natural (e.g. children's height) or a matter of measurement (e.g. a life satisfaction scale from 0 to 10). Thus a longer left-hand tail tends to represent a less equal distribution and can also suggest a lower overall mean score.

Diagram 1 – ***Dispersion in life satisfaction scores***

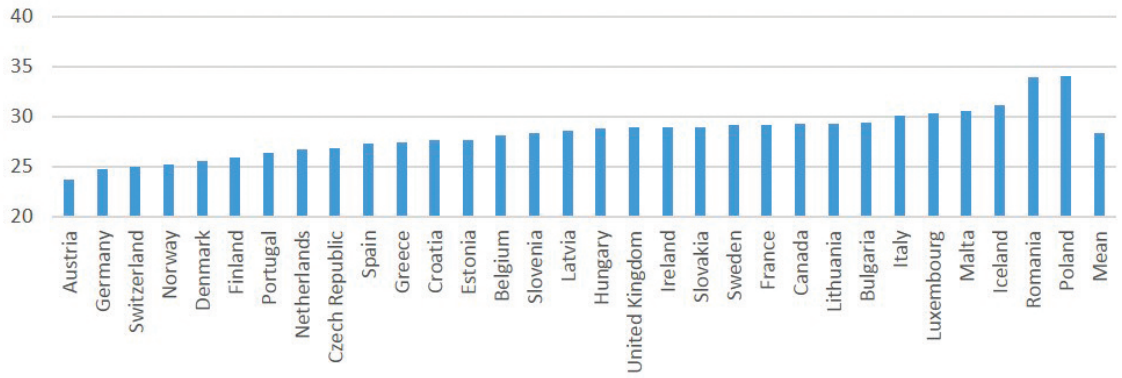


3. RESULTS

3.1 Self-reported health symptoms

Figure 1 ranks 31 countries according to the degree of inequality in adolescents' self-reported health symptoms in 2014. The relative gap is 28% on average (without adjusting for population size differences). It ranges from 24% in Austria to 34% in Poland. The left-hand tail of the distribution is visibly longer in the latter, suggesting that there are proportionally more children with low health scores in Poland (Figure A1 in the Annex). Overall, countries with a lower relative gap tend to have better average health outcomes (r=-0.56, p<0.01).

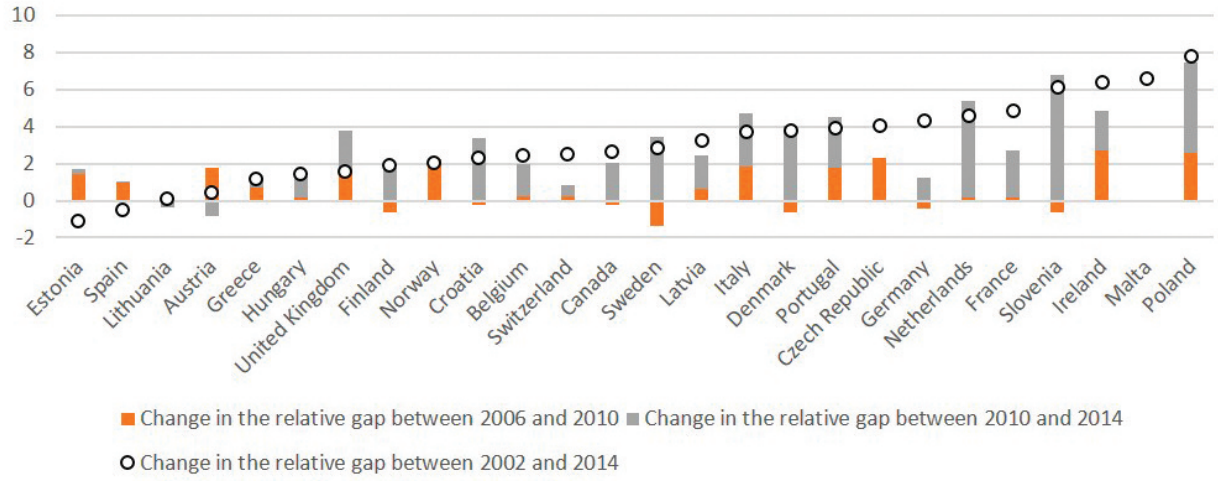
Figure 1 – ***Relative gap in health symptoms (0-32 scale), 2014***



Note: Higher values represent higher levels of inequality between the children below the median and those at the median value. Absolute data for each country are reported in the appendix (see table A1). The cross-country mean is not weighted for population differences.
Source: HBSC 2013/14.

Figure 2 shows percentage point changes in the health gap over more than a decade between 2002 and 2014. Across 26 countries that participated in both HBSC cycles, inequality increased by at least 1ppt everywhere except Austria, Estonia, Lithuania and Spain. The largest increases of 6-8ppt were in Ireland, Malta, Poland and Slovenia. Inequality in self-reported health symptoms tended to increase between 2006 and 2010 and between 2010 and 2014, i.e. over the period of the recent economic crisis and its aftermath.

Figure 2 – ***Change in the relative gap in health symptoms 2002-2014 (ppt), 2002-2014***

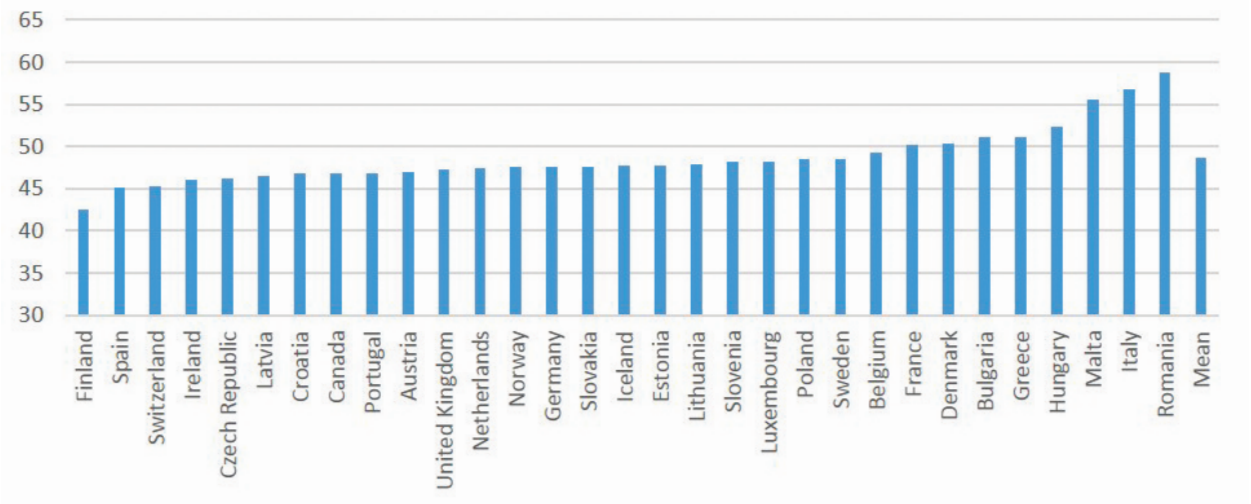


Source: HBSC 2001/02, 2005/06, 2009/10 and 2013/14. No data for 2009/10 for Malta.

3.2 Physical activity

Figure 3 shows the relative gap in the frequency of self-reported physical activity among adolescents across 31 countries in 2013-2014. The relative gap ranges from 42.5% in Finland to 59% in Romania, with the unweighted cross-country average of 49%. Overall, countries with higher average physical activity have lower levels of bottom-end inequality in physical activity among adolescents (r=-0.67, p<0.001).

Figure 3 – ***Relative gap in physical activity (0-7 scale), 2014***

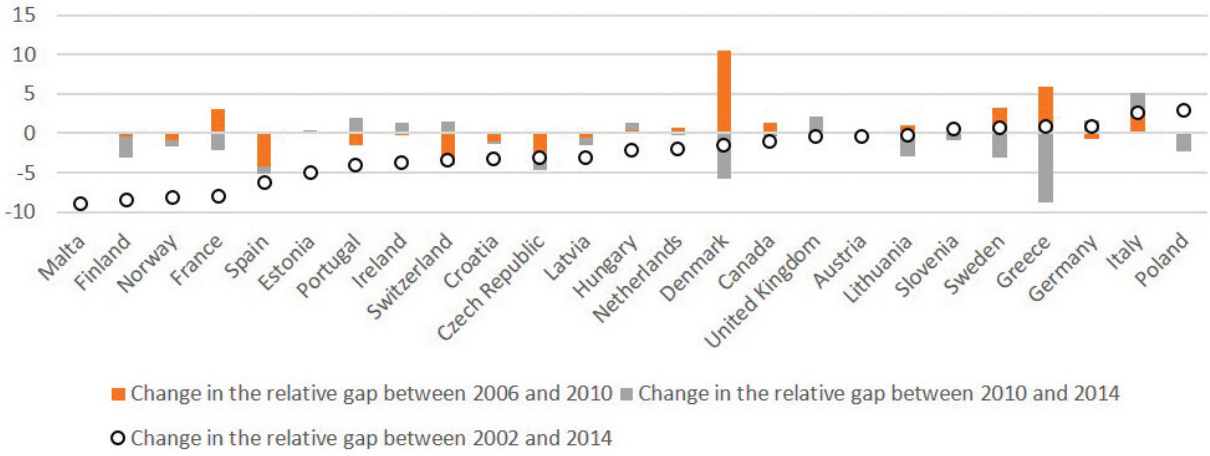


Note: Higher values represent higher levels of inequality between the children below the median and those at the median value. Absolute data for each country are reported in the appendix (see table A2). The cross-country mean is not weighted for population differences.
Source: HBSC 2013/14.

There are notable differences in the shape of the distribution of the physical activity index between the most and the least equal countries in the comparison (Figure A2). In Finland, progressively more adolescents report increased frequency of weekly physical exercise, except for a dip at six days a week. Thus, even in the lower half of the distribution there are more children who score well on the physical activity scale, with the mean of 2.9 days. In Romania, the distribution is more polarised, peaking at two days a week and seven days a week, with the mean physical activity of 1.6 days in the lower half of the distribution (see Table A2 in the Annex). The share of adolescents who report no weekly physical activity at all is two in a hundred (2%) in Finland and nearly one in ten (9%) in Romania.

Between 2002 and 2014 inequality in physical activity decreased by at least 1ppt in the majority of the countries that participated in both HBSC cycles (Figure 4). The relative gap decreased most in Finland, Malta and Norway (9-10ppt), while the largest increase (of around 3ppt) was observed in Italy and Poland. However, changes in inequality were not always consistent over time. For example, the modest decrease of 1.5ppt in Denmark is a result of decreases between 2002 and 2006 and between 2010 and 2014, balanced out by a large increase between 2006 and 2010.

Figure 4 – ***Change in the relative gap in physical activity (ppt), 2002-2014***



Source: HBSC 2001/02, 2005/06, 2009/10 and 2013/14. No data for 2009/10 for Malta.

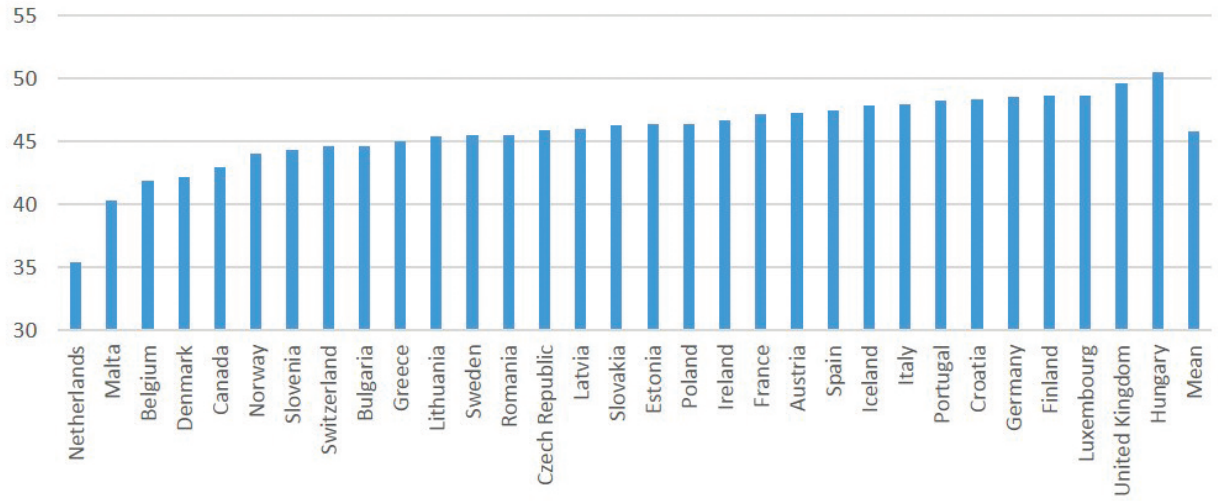
3.3 Healthy eating and a balanced diet

Figure 5 shows the relative gap between the median of the 'Fruit and Vegetables Index' and the mean below the median. It ranges from 35% in the Netherlands to 50.5% in Hungary. The unweighted mean across 31 countries is 46%. Overall, countries with a higher mean score on the fruit and vegetables index tend to have a lower relative gap in the bottom half of the distribution ($r=-0.51$, $p<0.01$).

The distribution of the 'fruit and vegetables' scale is noticeably different in the Netherlands and Hungary, i.e. the most and least equal countries, respectively (Figure A3). In the Netherlands, progressively more adolescents report a higher frequency of eating fruit and vegetables, with very few falling at the low end of the scale. The distribution of the index is more polarised in Hungary, with many adolescents reporting very infrequent consumption of fruit and vegetables, and

a substantial proportion nevertheless saying that they eat both types of healthy food at least once a day. Indeed, only 9% of adolescents in the Netherlands score below 5.5 on the scale from 0 to 14, compared with 26% of children in Hungary. This corresponds to consuming fruit or vegetables no more than two-to-four times a week. Meanwhile, the proportions of adolescents who report eating both fruit and vegetables at least once a day is similar in both countries (24% in the Netherlands and 22% in Hungary).

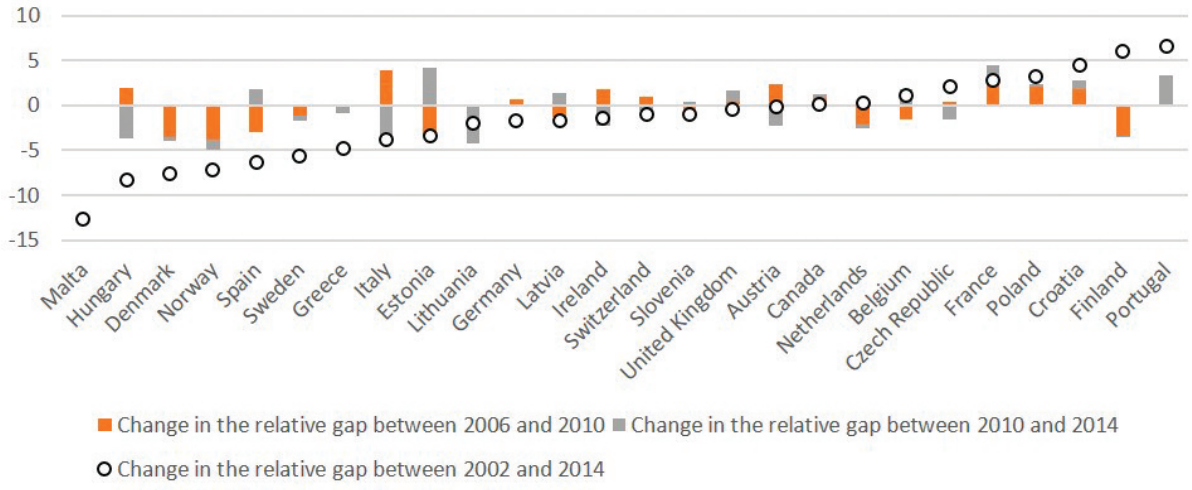
Figure 5 – ***Relative gap in healthy eating ('Fruit and Vegetables Index' 0-14 scale), 2014***



Note: Higher values represent higher levels of inequality between the children below the median and those at the median value. Absolute data for each country are reported in the appendix (see table A3). The cross-country mean is not weighted for population differences.
Source: HBSC 2013/14.

Between 2002 and 2014, the relative gap in healthy eating decreased by at least 1ppt in 15 countries and increased in 7 countries out of 26 (Figure 6). The greatest increase (7ppt) was in Portugal, most of it occurring between 2002 and 2006 and between 2010 and 2014. Finland saw the second highest increase in bottom-end inequality over the period 2002-2014, driven by a 9ppt increase between 2002 and 2006. Although Hungary has the largest relative gap in 2014, it has decreased by 8ppt since 2002.

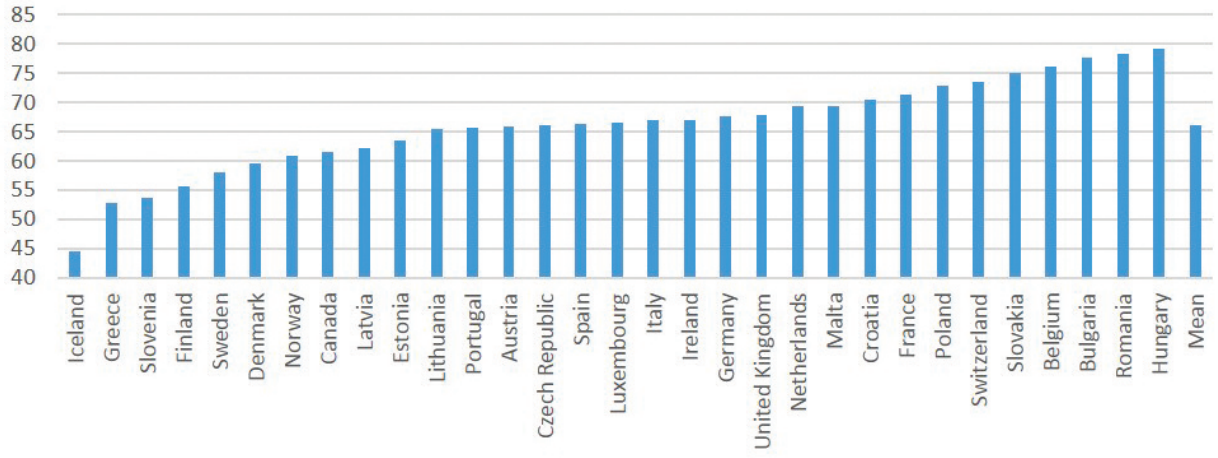
Figure 6 – ***Change in the relative gap in healthy eating (ppt), 2002-2014***



Source: HBSC 2001/02, 2005/06, 2009/10 and 2013/14. No data for 2009/10 for Malta.

There is a lot of variation in the relative gap of the unhealthy eating ('sweets and soft drinks') scale across the 31 countries studied (Figure 7). In 2013-2014, it ranges from the low of 44.5% in Iceland to the high of 79% in Hungary, with the unweighted cross-country average of 66% (Figure 10). There is a very high correlation of -0.90 ($p<0.001$) between the relative gap and the mean of the 'sweets and soft drinks' scale across the whole distribution.

Figure 7 – ***Relative gap in unhealthy eating ('sweets and soft drinks', 0-14 scale), 2014***

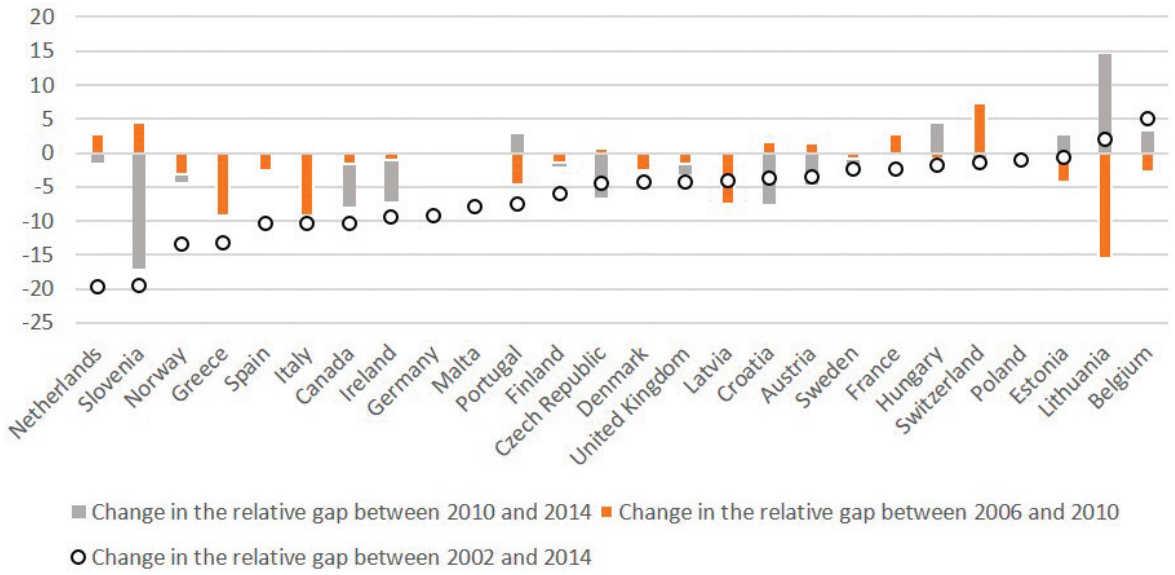


Note: Israel is excluded due to high levels of missing data. Higher values represent higher levels of inequality between the children below the median and those at the median value. Absolute data for each country are reported in the appendix (see table A4). The cross-country mean is not weighted for population differences.
Source: HBSC 2013/14.

The index is distributed quite symmetrically in Iceland, the most equal country in the comparison, with very low shares of children reporting either rare or frequent consumption of sweets and soft drinks (Figure A4). The median is 6.5 out of 14 and the mean below the median is 3.6. Although, all else being equal, higher medians lead to a higher relative gap by construction, Iceland has the lowest relative gap in the comparison due to its high mean below the median. In contrast, the distribution in Hungary is skewed to the right, with the median value of 3 and the mean below the median of 0.6 (see Table A4 in the Annex). In spite of having a low median, the mean for adolescents in the lower half of the distribution is so much lower in absolute terms that it falls 79% below the median. One in five (20%) children reportedly consume both sweets and soft drinks at least once a day in Hungary compared with one in a hundred (1%) in Iceland.

Between 2002 and 2014 inequality in sweets and sugary soft drinks consumption decreased by at least 1ppt in all the countries that participated in both HBSC cycles except Belgium, Estonia and Lithuania (Figure 8, page 17). The Netherlands and Slovenia saw the largest decreases in the relative gap of nearly 20ppt. However, in the Netherlands it was driven by a fall in bottom-end inequality between 2002 and 2006, while in Slovenia it was the more recent period between 2010 and 2014. In Hungary, where the 2014 relative gap is largest, there was a 4ppt increase in bottom-end inequality between 2010 and 2014, outdoing six years of progress in decreasing the relative gap between 2002 and 2010.

Figure 8 – ***Change in the relative gap in unhealthy eating (ppt), 2002-2014***



Source: HBSC 2001/02, 2005/06, 2009/10 and 2013/14. No data for 2009/10 for Malta.

3.4 Overview: health inequality league table

Figures 9a and 9b summarise the results of inequality analysis for four health-related indicators across 30 European countries and Canada. Figure 9a presents the overall league table based on the average of cross-country z-scores of the relative gap for each indicator calculated across the four indicators. All z-scores are calculated using the respective unweighted cross-country averages and standard deviations in the country-level sample. Figure 9b shows the z-scores separately by indicator. Thus, the length of each bar represents the number of standard deviations between the relative gap for a particular country and the unweighted cross-country average. Negative bars reflect lower bottom-end inequality in health. Countries are ranked by the simple average of the z-scores across the four indicators.

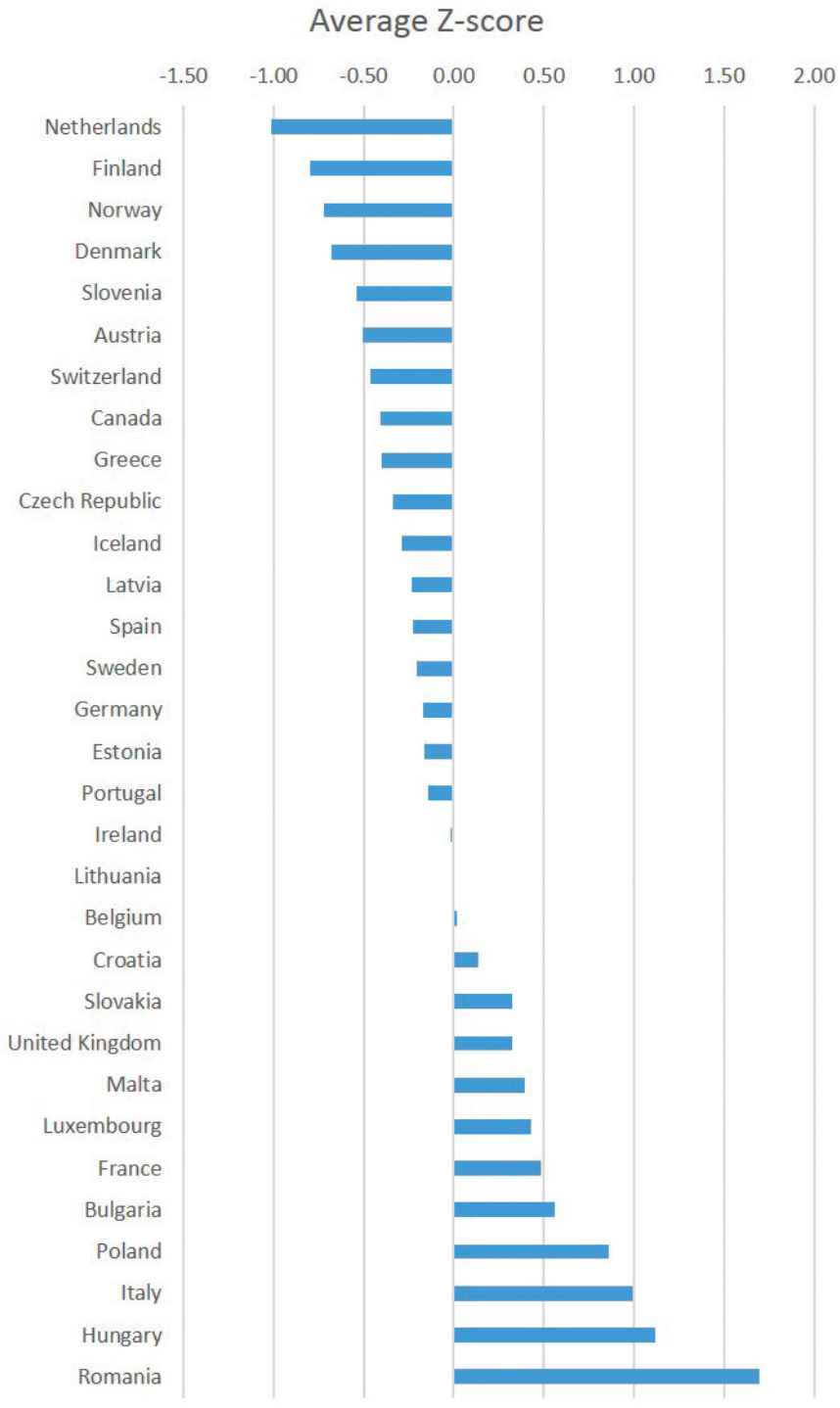
Figure 9a (page 18) shows that the Netherlands, Finland, Norway, Denmark and Slovenia cluster at the top of the overall league table with the average inequality z-score below half a standard deviation from the cross-country average. The majority of the countries lie within half a standard deviation either side of this benchmark. Five countries at the bottom of the ranking have health inequality half a standard derivation above the average: Bulgaria, Poland, Italy, Hungary and Romania. This reflects high levels of bottom-end health inequality on each of the studied indicators in these countries.

Figure 9b (page 19) shows that indicators tend to pull in different directions, with the exception of the seven countries at the bottom of the ranking, from Luxembourg to Romania, where at least three out of four indicators stack up above the 31-country average. At the top of the table, the Netherlands pulls ahead in the comparison due to its outstanding performance (of more than three standard deviations above the average) on limiting inequality in healthy eating. Health symptoms and physical activity make a smaller positive contribution, while unhealthy eating goes in the opposite direction.

The second ranked country, Finland, does well on health symptoms, physical activity and unhealthy eating, but performs below average on limiting bottom-end inequality in healthy eating.

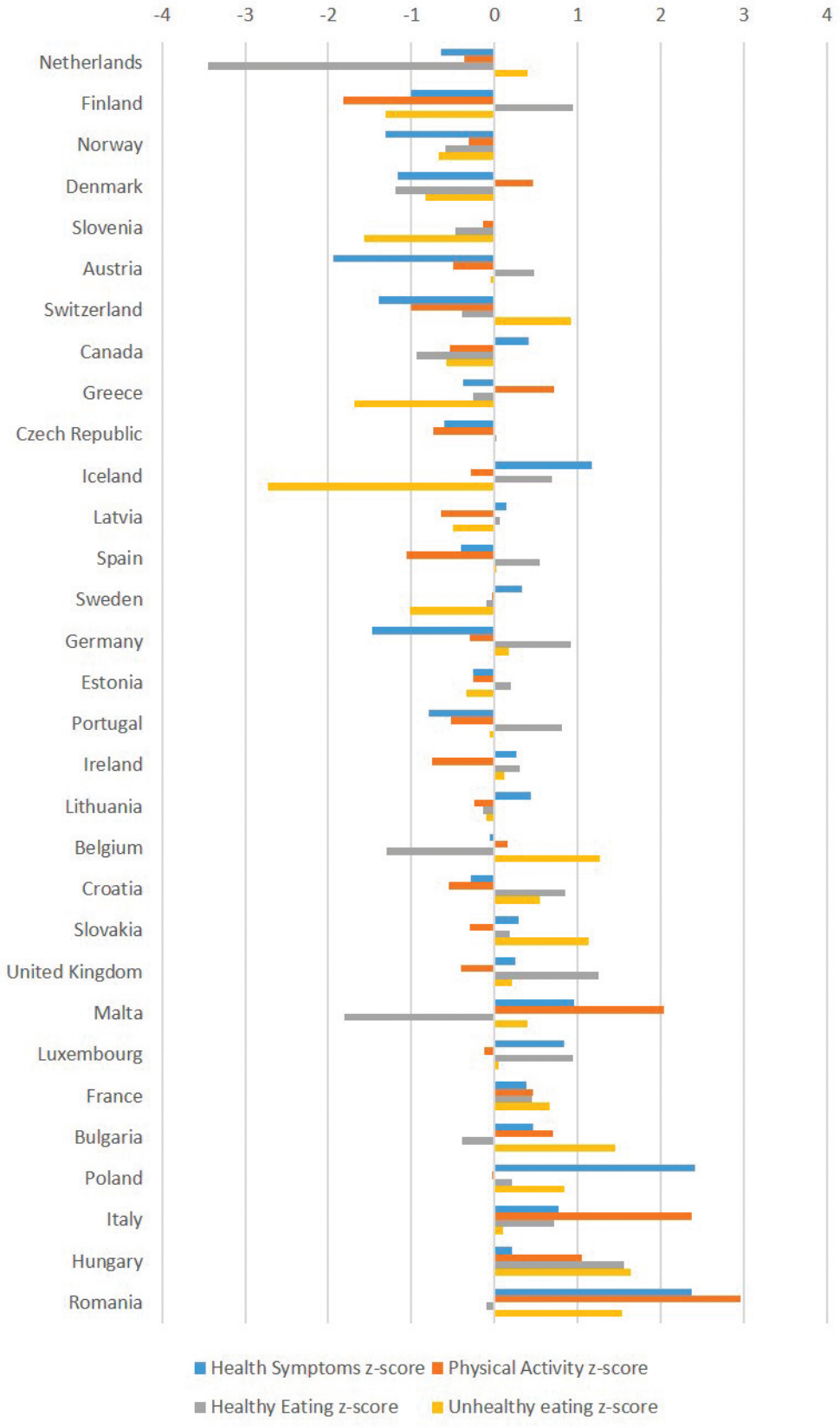
In the middle of the ranking, countries tend to perform relatively well on one or two indicators and poorly on the other two. Iceland is a leading example of this pattern: in spite of its exceptional record in limiting inequality in abstaining from sweets and sugary drinks, it performs at least half a standard deviation worse than the average in limiting inequality in the consumption of fruit and vegetables and in health symptoms.

Figure 9a – ***Inequality in adolescent health: composite ranking (2014)***



Source: HBSC 2013/14.

Figure 9b – ***Inequality in adolescent health: summary by indicator (2014)***

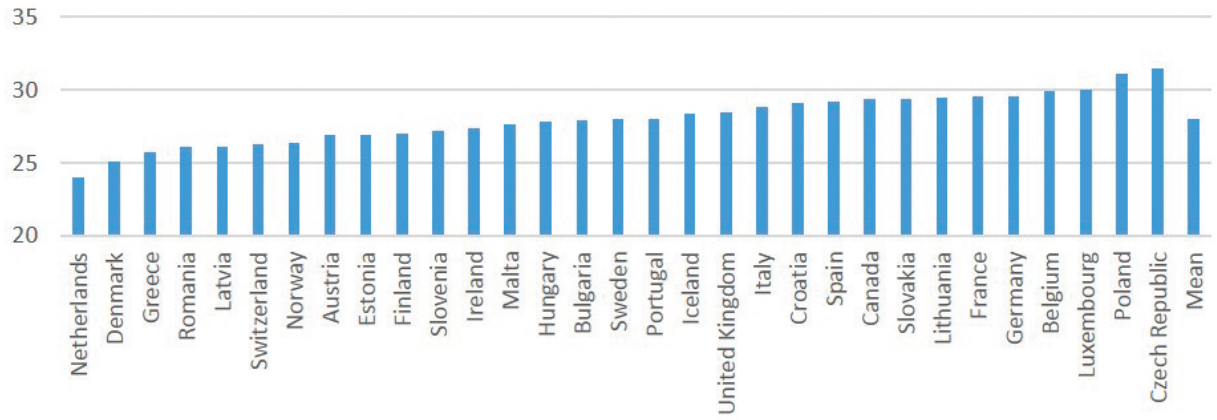


Source: HBSC 2013/14.

3.4.1 Life satisfaction

Figure 10 shows the distribution of the relative gap in life satisfaction among adolescents in 2014. There is little variation in inequality across 31 countries, with the relative gap ranging from 24% in the Netherlands to 32% in the Czech Republic. The unweighted cross-country mean is 28%. Countries with higher average levels of adolescent life satisfaction tend to have lower relative gaps (r=-0.53, p<0.01).

Figure 10 – *Relative gap in life satisfaction (Cantril ladder, 0-10 scale), 2014*



Note: Higher values represent higher levels of inequality between the children below the median and those at the median value. Absolute data for each country are reported in the appendix (see table A5). The cross-country mean is not weighted for population differences.
Source: HBSC 2013/14.

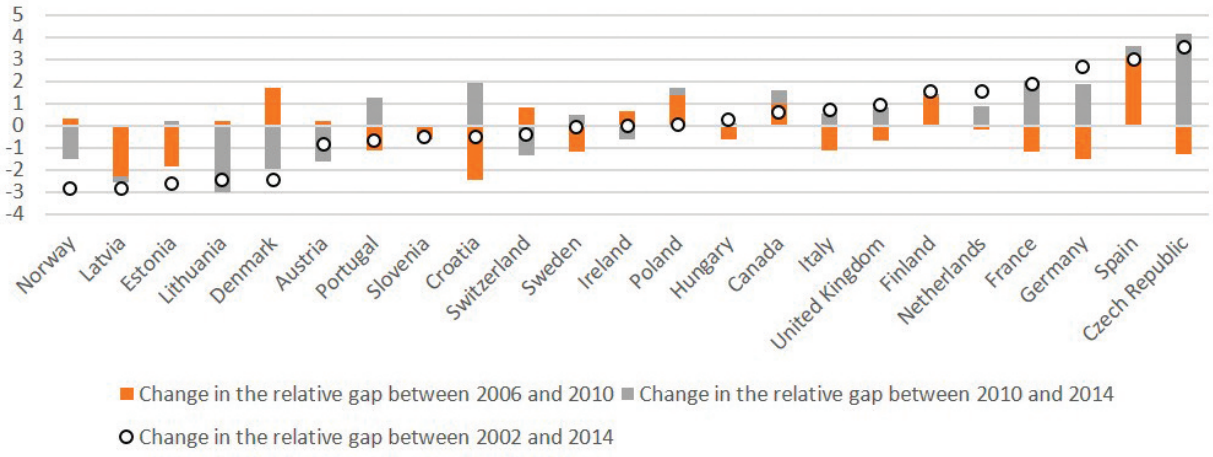
The countries on the two extremes of the comparison, the Netherlands and the Czech Republic, have similarly shaped left-skewed distributions, although the tail is somewhat longer in the latter (Figure A5). The Czech Republic has greater lower-end inequality because it has a lower mean in the bottom half (4.8 vs 6.1), although its median is also lower (7 vs 8). Nevertheless, in substantive terms, relative inequality in adolescent life satisfaction is not that dissimilar in the two countries.

Out of 23 countries that had valid data on life satisfaction for both 2002 and 2014, the relative gap decreased by 2-3ppt in five countries and increased by 1-4ppt in six (Figure 11, page 21). The greatest increase in inequality was in the Czech Republic, driven by a surge in the relative gap between 2010 and 2014. Overall, changes in inequality in adolescent life satisfaction were smaller than in the respective health behaviour indicators.

3.4.2 Cross-country variation in health and life satisfaction inequality

The five indicators of health and life satisfaction inequality do not tend to move hand in hand across the 31 countries studied here (Table 1). The only two exceptions are moderately high correlations between the relative gaps in self-reported health symptoms and physical activity (r=0.54, p<0.01) and between fruit and vegetables and life satisfaction (r=0.43, p<0.05). The five indicators do not form a reliable scale across these 31 countries (Cronbach's alpha=0.40).

Figure 11 – ***Change in the relative gap in life satisfaction (ppt), 2002-2014***



Source: HBSC 2001/02, 2005/06, 2009/10 and 2013/14.

The indicators studied here do not co-vary with measures of income inequality (Gini) or national wealth (GDP per capita in $PPP). Although the correlation coefficients are all of expected signs, they fail to reach conventional statistical significance levels. This is largely because there is too much variation in the indicators of bottom-end inequality at each level of Gini or GDP per capita. For example, Iceland, Norway and Sweden have the lowest Gini in the comparison, but Norway has lower relative gaps in health symptoms, healthy eating and life satisfaction than Iceland or Sweden, while Iceland has a lower relative gap in unhealthy eating than Norway or Sweden.

Table 1 – ***Correlations between relative gaps in health and macro-economic indicators***

N=31 countries	Self-reported health symptoms	Physical activity	Fruit and vegetables	Sweets and soft drinks	Life satisfaction	Gini	GDP per capita
Physical activity	**0.54****						
Fruit and vegetables	0.06	-0.14					
Sweets and soft drinks	0.20	0.32	-0.02				
Life satisfaction	0.31	-0.11	**0.43***	0.22			
Gini	0.16	0.14	0.28	0.25	0.01		
GDP per capita	-0.29	-0.27	-0.07	-0.20	-0.02	**-0.44***	
Child poverty rate	**0.43***	**0.44***	0.14	**0.37***	0.04	**0.71*****	**-0.56****

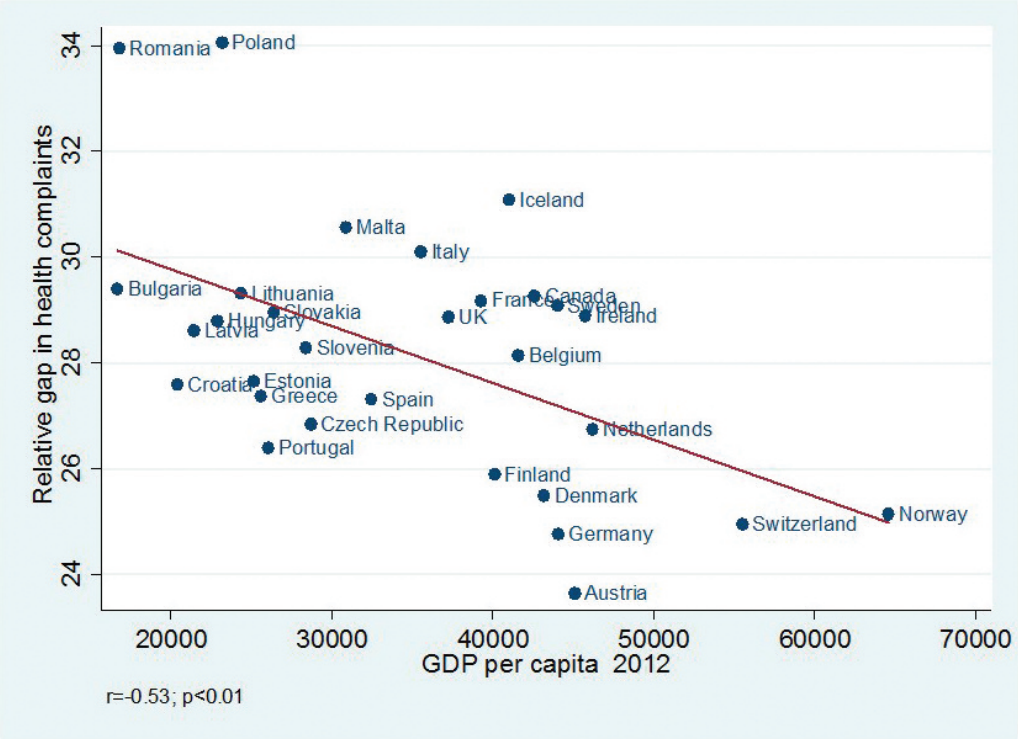
Sources: HBSC 2013/14. GDP per capita ($ PPP) in 2012 (International Monetary Fund, World Economic Outlook Database, April 2015); Gini coefficient in 2012 (Solt 2014 "The Standardized World Income Inequality Database (SWIID) Version 5.0, October 2014); share of children under 18 with equivalent disposable household incomes below 50% of the national median[5] (Eurostat, series ilc_li02, last update 13.08.2015).
***p<0.001; **p<0.01; *p<0.05.

[5] For Canada, the child poverty rate is based on the 2013 'after-tax low income' measure (see http://www.statcan.gc.ca/daily-quotidien/150708/dq150708b-eng.htm).

There is stronger evidence of a negative relationship between inequality in health symptoms and country wealth (Figure 12), but only if Luxembourg is excluded from the comparison because it is an influential outlier. The correlation between the relative gap in health symptoms and GDP per capita across 30 countries would climb from -0.29 (not statistically significant) to -0.53 ($p<0.01$). This is still not a very tight association, but Eastern European countries tend to do worse than their richer Continental and Scandinavian peers.

Three out of five indicators – health symptoms, physical activity and unhealthy eating – are correlated significantly with relative child poverty rates (Table 1). Although child poverty explains no more than 20% of the variation in these indicators, this still suggests that bottom-end health inequality is more widespread in countries where a greater share of children under 18 live in households with total disposable incomes below 50 per cent of the national median.

Figure 12 – ***Relative gap in self-reported health symptoms and GDP per capita***



Sources: see Table 1. Luxembourg is excluded as an outlier.

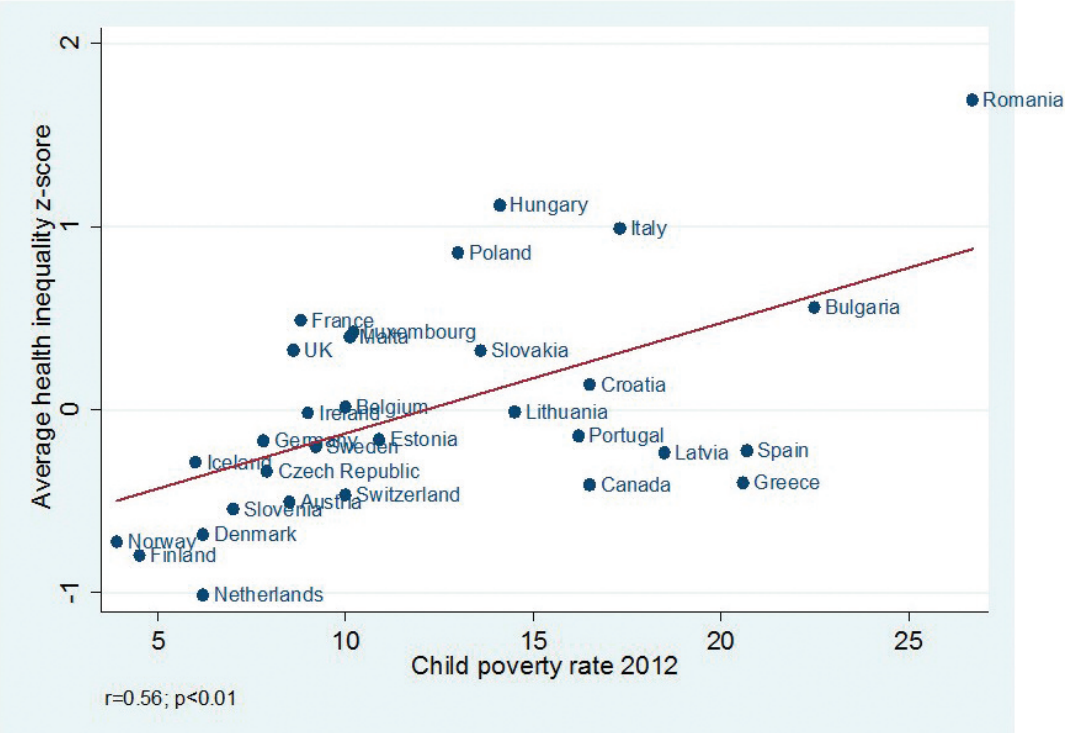
Table 2 (page 23) shows correlations between the average of the health z-scores used to rank countries in Figure 9a and each of the relative gap indicators plus three macro-economic measures. The overall health score is highly correlated with the relative gaps in self-reported health symptoms, physical activity and unhealthy eating but only moderately related to inequality in fruit and vegetables consumption. It is not associated significantly with income inequality or GDP per capita (unless Luxembourg is excluded), but it is positively correlated with child poverty (see Figure 13, page 23). Although it is not a very tight relationship, the overall pattern again shows most Eastern European countries, with higher levels of child poverty, performing worse than most of their Continental and Scandinavian counterparts.

Table 2 – ***Correlations between the overall health z-score and other indicators***

	Including Luxembourg	Excluding Luxembourg
Self-reported health symptoms	**0.74*** **	**0.73*** **
Physical activity	**0.71*** **	**0.72*** **
Fruit and vegetables	**0.37***	0.36
Sweets and soft drinks	**0.62*** **	**0.62*** **
Life satisfaction	0.35	0.33
Gini	0.34	0.36
GDP per capita	-0.34	**-0.56** **
Child poverty rate	**0.56** **	**0.58*** **

Sources: HBSC 2013/14. GDP per capita ($ PPP) in 2012 (International Monetary Fund, World Economic Outlook Database, April 2015); Gini coefficient in 2012 (Solt 2014 "The Standardized World Income Inequality Database (SWIID) Version 5.0, October 2014); share of children under 18 with equivalent disposable household incomes below 50% of the national median[6] (Eurostat, series ilc_li02, last update 13.08.2015).
***p<0.001; **p<0.01; *p<0.05.

Figure 13 – ***Average bottom-end health inequality and child poverty rates***



Sources: see Table 1.

[6] For Canada, the child poverty rate is based on the 2013 'after-tax low income' measure (see http://www.statcan.gc.ca/daily-quotidien/150708/dq150708b-eng.htm).

4. DISCUSSION

The conceptual and methodological approaches used in this paper are distinct from those ones commonly used in the literature on health inequality, which primarily examine socio-economic gradient in average health outcomes. The present analysis focused on the lower tail of the distribution and provided evidence on the extent of bottom-end inequality within and between countries as well as its evolution over time (between 2001/2002 and 2013/2014). As such it contributes to policy discussion on the position of children with very poor health outcomes and low life-satisfaction compared to their peers in the middle of the distribution.

The study finds evidence to suggest that a wide dispersion in the lower half of the distribution of a health indicator implies a lower average level of the health outcome in question. In the 31 countries with valid data in 2014, the relative gaps in health and life satisfaction are significantly negatively correlated with the respective average outcomes. In other words, adolescent health and well-being tend to be worse in countries that allow those with the poorest outcomes to fall further behind the median. Although the direction of causality is not established here, no country in the comparison combines high bottom-end health inequality with high average health and life satisfaction outcomes.

There is no uni-directional change in bottom-end inequality across all indicators over time. Between 2002 and 2014, inequality in health symptoms has consistently increased in most of the countries studied, remaining unchanged otherwise. In contrast, inequality in physical activity and in abstaining from sweets and sugary drinks decreased in the majority of the countries over this decade. The direction of change in bottom-end inequality in fruit and vegetables consumption and in life satisfaction is rather mixed, with some countries recording increases, and others decreases, in inequality. Compared to the aggregate indicator of health and health-related behaviours reported in Report Card 9 [21], only two countries – the Netherlands and Norway – retain their top positions on the composite indicator in our study. Similarly, only two are stuck at the bottom of the international ranking – Hungary and Italy.

There are complex reasons why some countries are consistently found to have lower or higher levels of 'bottom-end' inequality while others progress or backslide over time. This can often depend on the indicator studied. For example, the complexity of psychological [37], contextual [38] and cultural factors is found to explain the variation in subjective health symptoms. Government interventions can play a larger role in explaining the observed cross-national patterns in 'unhealthy' eating behaviour.

Policy measures can make a difference over time. For example, Finland made substantial progress reducing bottom-end inequality in adolescent physical activity since 2001/2002, achieving the lowest relative gap in the comparison in 2013-2014. The reduction in inequality was driven by increases in both median physical activity and the average below the median. In fact, improvements were relatively larger at the bottom of the distribution. Policy measures to stimulate an active lifestyle from a very early age came into force during this period. This includes the introduction of various school-based activities such as the Schools on the Move project, as well as rewarding schools through active transport in a Moovit programme, making equipment available

to use during recess and encouraging more parents and children to take part in organized sport [89]. Since the turn of the century, there have been improvements in services offered by the municipalities and in the private sector. Environmental structures have also changed in the last 15 years whereby more playgrounds are accessible for a number of activities in cities and rural areas.

Our results indicate that progress towards the reduction of the relative inequality in the intake of fruit and vegetables and unhealthy sugary products have been very uneven and inconsistent across countries and studied time periods. Inequality in healthy eating stagnated in many countries (exceptions are Malta showing a positive trend, Poland, which slipped down from 4th out of 24 countries to 18th among 31 countries, and the United Kingdom, which fell from 10th out of 24 to 30th out of 31 countries), pointing to the general stability of socio-economic and structural drivers of this behaviour. There are, however, positive examples of how policy focus and nationwide interventions can address inequality in this area. Malta has the largest reduction in the relative gap between the middle and children at the bottom in the consumption of fruit and vegetables. While many factors were likely to contribute to this change over a long time, Malta's National Strategy: School Fruit & Vegetable Scheme 2011-14 promoting healthy eating at school and in the family among 3-10-year-olds is certainly one of potential key drivers of changed perceptions and consumption habits [90].

However, not every policy offers direct benefits to children. Hungary has consistently ranked at the bottom of healthy and 'unhealthy' eating indicators. It has the largest relative gap in both consuming fruit and vegetables (both in 2006 and 2014) and abstaining from sweets and sugary drinks. The findings are in line with recent evidence on the dietary habits of the adult population in Hungary reported in the systematic global assessment [91]. At the same time, however, the adult population in Hungary does not stand out in the consumption of sugar sweetened beverages, ranking better than Bulgaria, Greece, Latvia, Poland, Romania or Switzerland. The discrepancy between adult and youth consumption of non-dietary soft drinks observed in Hungary should be a particular policy concern. It appears that explicit government efforts to change the consumption patterns of soft drinks towards healthier options launched in 2011[7] did not have a strong effect on the youth age category. Individual and family-level factors could have a strong association with healthy and 'unhealthy' eating habits [93].

Our initial hypothesis that European countries which were severely hit by the recession – Greece, Ireland, Italy, Portugal and Spain – would show greater increases in health inequality between the latest HBSC rounds finds mixed support. Considering changes in excess of 2 percentage points between 2005/2006 and 2013/2014, Portugal saw an increase in the relative gap in health symptoms and healthy eating. Ireland had an increase in inequality in health symptoms and a decrease in inequality in unhealthy eating. Greece, Italy and Spain also recorded a substantial reduction in unhealthy eating inequality during this period. However, there was an increase in inequality

[7] In late 2011 the Hungarian government introduced the controversial 'fat tax' on products with high fat, salt and sugar content. Differentiated taxation was also introduced for concentrates with high and low (<33%) fruit content. Hungary is not the only country which introduced taxation on 'unhealthy' food choices. Denmark has taxed non-dietary soft drinks for years. It was followed by Austria and Switzerland. Other European countries are also looking closely at policies to address concerns about obesity [92].

in health symptoms in Italy and in life satisfaction in Spain. In the aggregate ranking of four health-related indicators in 2013/2014, Greece ranked in the top third (i.e. lower inequality than the cross-country average), Ireland, Portugal and Spain ranked in the middle and Italy in the bottom. Similarly, Greece had one of the lowest levels of inequality in life satisfaction, while the other four countries recorded middling to high inequality.

It is likely that macro-economic conditions mask some underlying cultural, social and policy differences between these countries, which may influence bottom-end inequality more directly. The case of Italy is an interesting example. Although substantially hit by the recession, its poor performance on many indicators is comparable to its league table rankings reported in the Report Card 9 (2010). So, recession could worsen the health behaviour of some children, but this has to be considered only in the context of pre-crisis policies and cultural and social context. As some confirmation to this, our study finds that the observed relative gaps have limited correlation with macro-economic indicators. Although the child poverty rate is correlated with all bottom-end inequality indicators apart from healthy eating and life satisfaction, neither Gini nor GDP per capita is correlated with any of the indicators considered here across 31 countries. However, a recent multilevel panel data analysis by Elgar and Currie [94] showed that income inequality prevailing during children's early school years was significantly associated with poorer health and life satisfaction in adolescence.

The study also highlights the importance of selecting several health behaviour indicators to measure bottom-end health inequality. Each of the chosen indicators reflects a particular aspect of adolescent health, which may be interlinked but not necessarily overlap. We find that these indicators tend to pull in different directions under composite measures, with the exception of the seven countries at the bottom of the league table, from Luxembourg to Romania, where at least three out of four indicators show higher inequality than the 30-country average.

The present study is not without limitations. Cultural differences were not considered and they may well affect some of the results presented. For instance, the accuracy of self-reported health symptoms may vary across countries. The climate and time of the year where data was collected can influence the 7-day recall used to estimate the frequency of physical activity. Consumer preferences driven by traditions, norms and geographical location can influence the scores on the indicators used for healthy and unhealthy eating. For example, high consumption of fruit in Portugal may have been masked by the low use of vegetables in Portuguese cuisine, affecting the composite 'fruit and vegetables' indicator.

Further investigation is needed to clarify the links between bottom-end inequality in health outcomes and other aspects of child well-being, such as risk behaviour (e.g. fighting, substance use) and school performance. Finally it should be stressed that adolescents are a target population which is increasingly well informed. This fact has been progressively highlighted in international reports [9, 95], in youth-led participatory research projects [96, 97], and in international case studies aimed at promoting health at a school level [98]. Adolescents should be included at every stage in defining public policies that concern them.

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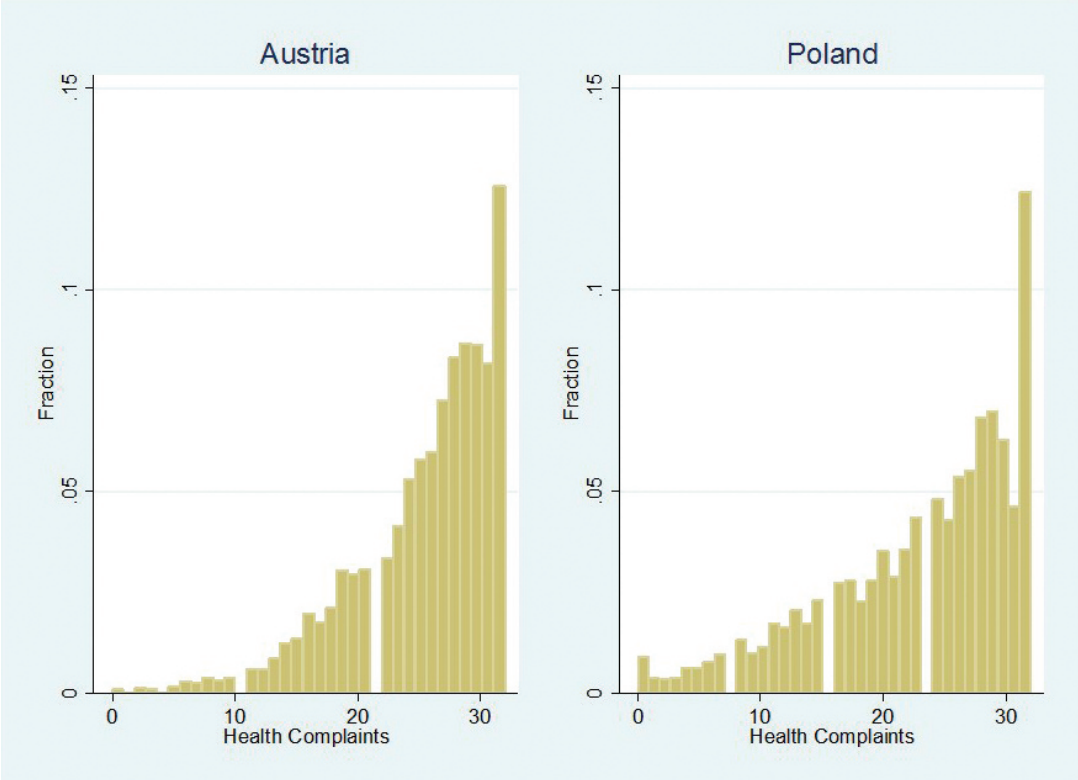
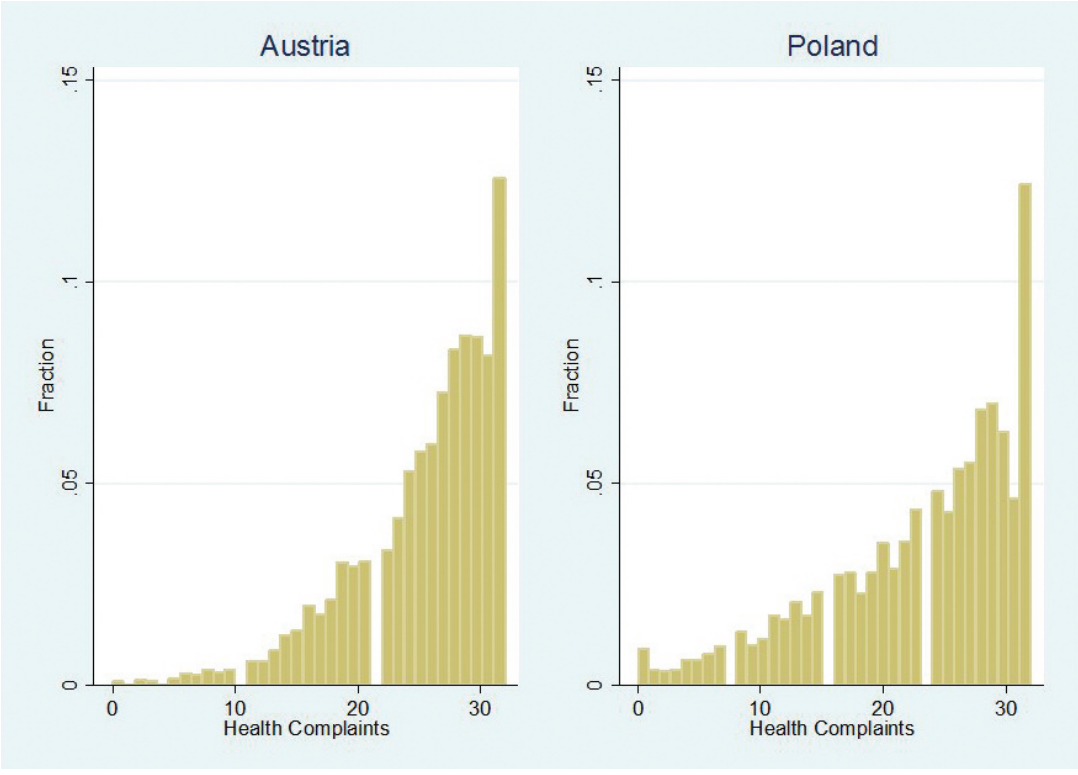
6. ANNEX

Figure A1 – ***Distribution of the health symptoms scale (Austria vs Poland)***



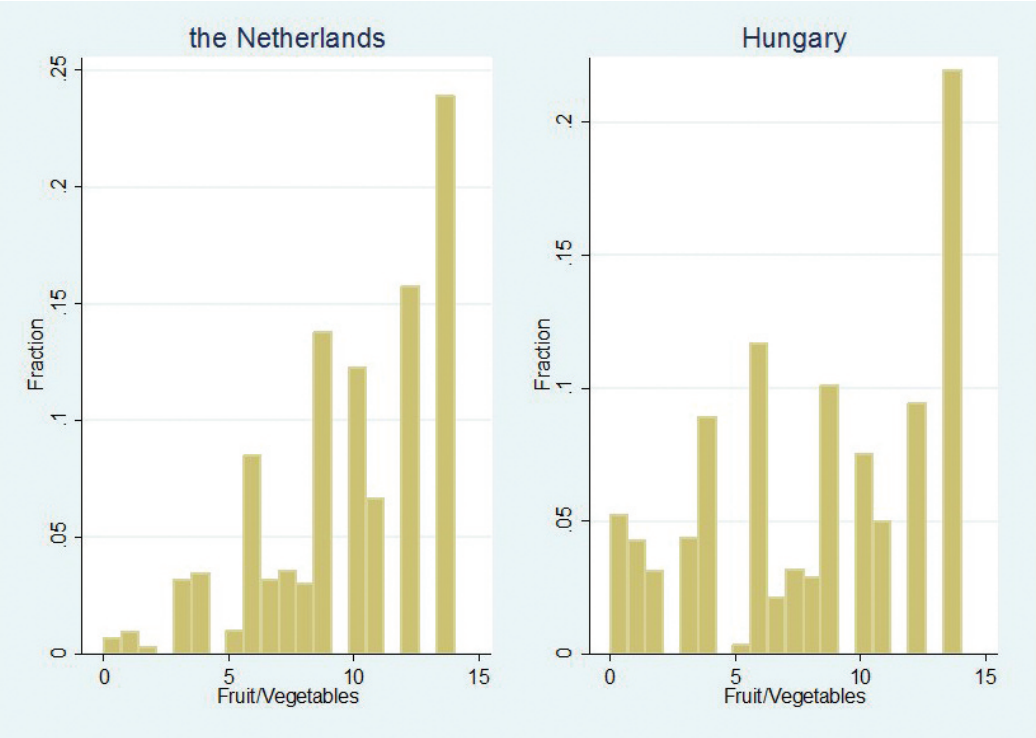
Source: HBSC 2013/14.

Figure A2 – ***Distribution of the physical activity scale (the Finland vs Romania)***



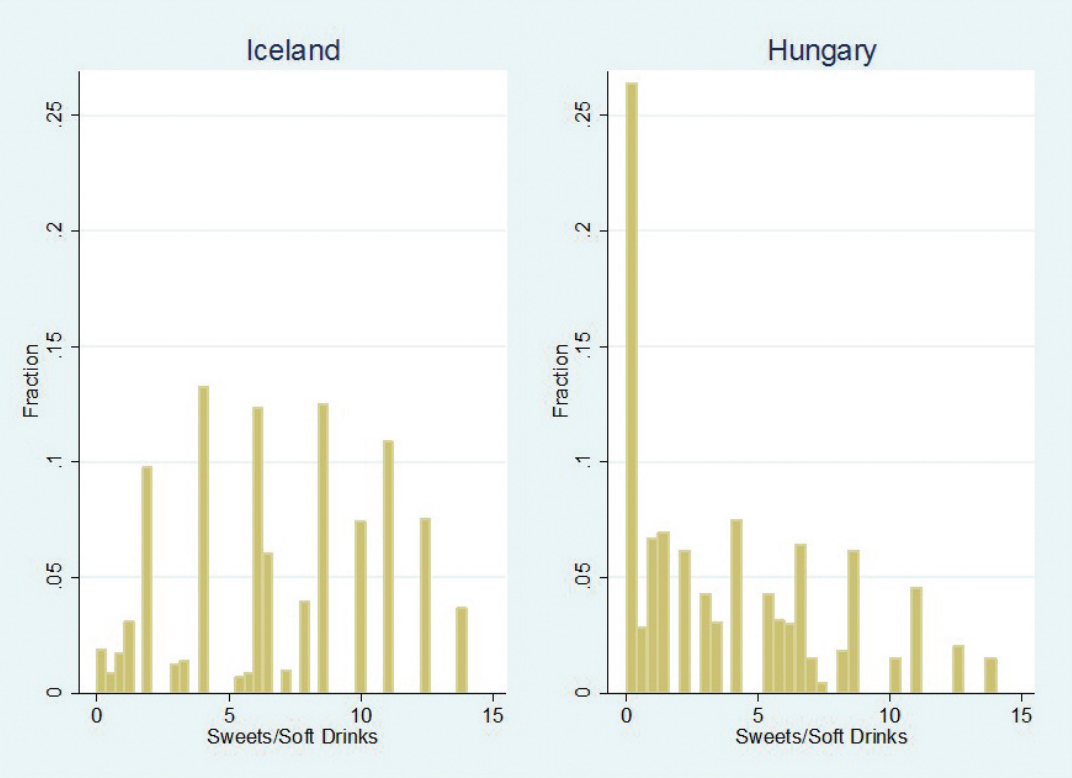
Source: HBSC 2013/14.

Figure A3 – ***Distribution of the 'fruit and vegetables' scale (Netherlands vs Hungary)***



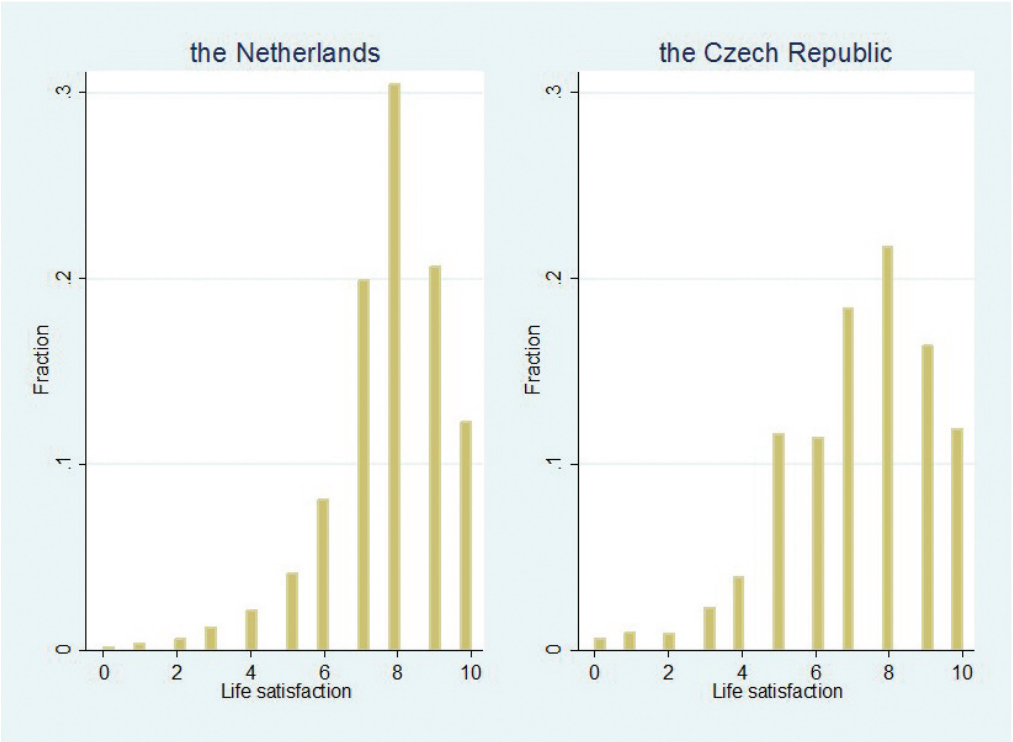
Source: HBSC 2013/14.

Figure A4 – ***Distribution of the 'sweets and soft drinks' scale (Iceland vs Hungary)***



Source: HBSC 2013/14.

Figure A5 – ***Distribution of the life satisfaction scale (Netherlands vs Czech Republic)***



Source: HBSC 2013/14.

Table A1 – ***Relative inequality in health symptoms (0-32), HBSC 2013/14***

Country	Median	Mean below the median	Gap	Gap (% median)	% missing values
Austria	27	20.62	6.38	23.64	3.01
Belgium	25	17.96	7.04	28.14	2.62
Bulgaria	25	17.65	7.35	29.39	3.25
Canada	25	17.68	7.32	29.27	4.09
Croatia	26	18.83	7.17	27.59	9.58
Czech Republic	25	18.29	6.71	26.84	1.3
Denmark	26	19.37	6.63	25.5	5.55
Estonia	26	18.81	7.19	27.65	1.92
Finland	24	17.79	6.21	25.89	0.91
France	23	16.29	6.71	29.18	2.06
Germany	26	19.56	6.44	24.76	1.93
Greece	26	18.89	7.11	27.37	2.27
Hungary	24	17.09	6.91	28.79	3.71
Iceland	24	16.54	7.46	31.08	1.74
Ireland	26	18.48	7.52	28.9	3.1
Italy	22	15.38	6.62	30.11	1.45
Latvia	25	17.85	7.15	28.61	2.77
Lithuania	26	18.38	7.62	29.31	1.41
Luxembourg	24	16.74	7.26	30.27	2.83
Malta	24	16.66	7.34	30.56	4.77
Netherlands	26	19.05	6.95	26.74	2.3
Norway	26	19.46	6.54	25.15	5.63
Poland	25	16.49	8.51	34.05	2.9
Portugal	28	20.61	7.39	26.39	4.39
Romania	25	16.51	8.49	33.95	5.6
Slovakia	25	17.76	7.24	28.96	2.31
Slovenia	26	18.65	7.35	28.29	2.12
Spain	27	19.63	7.37	27.31	12.01
Sweden	24	17.02	6.98	29.08	2.68
Switzerland	24	18.01	5.99	24.95	2.59
United Kingdom	26	18.49	7.51	28.87	3.84

Table A2 – ***Relative inequality in physical activity (0-7), HBSC 2013/14***

Country	Median	Mean below the median	Gap	Gap (% median)	% missing values
Austria	4	2.12	1.88	46.97	1.24
Belgium	4	2.03	1.97	49.21	1.02
Bulgaria	5	2.45	2.55	51.08	2.38
Canada	5	2.66	2.34	46.87	1.69
Croatia	5	2.66	2.34	46.82	3.69
Czech Republic	4	2.15	1.85	46.15	0.87
Denmark	4	1.99	2.01	50.28	0.9
Estonia	4	2.09	1.91	47.81	0.74
Finland	5	2.88	2.12	42.48	0.68
France	4	1.99	2.01	50.25	5.22
Germany	4	2.09	1.91	47.66	2.3
Greece	4	1.95	2.05	51.15	0.7
Hungary	4	1.91	2.09	52.28	2.44
Iceland	5	2.62	2.38	47.7	3
Ireland	5	2.69	2.31	46.11	4.29
Italy	3	1.3	1.7	56.78	2.09
Latvia	4	2.14	1.86	46.49	0.9
Lithuania	4	2.09	1.91	47.87	1.08
Luxembourg	4	2.07	1.93	48.24	4.61
Malta	4	1.77	2.23	55.63	2.25
Netherlands	4	2.1	1.9	47.45	1.44
Norway	4	2.1	1.9	47.62	6.74
Poland	5	2.57	2.43	48.56	1.28
Portugal	3	1.59	1.41	46.89	5.67
Romania	4	1.65	2.35	58.79	0.83
Slovakia	4	2.09	1.91	47.66	1.44
Slovenia	4	2.07	1.93	48.21	0.3
Spain	5	2.75	2.25	45.09	5.11
Sweden	4	2.06	1.94	48.58	2.92
Switzerland	4	2.19	1.81	45.27	1.64
United Kingdom	4	2.11	1.89	47.31	2.69

Table A3 – ***Relative inequality in healthy eating (0-14), HBSC 2013/14***

Country	Median	Mean below the median	Gap	Gap (% median)	% missing values
Austria	8.5	4.49	4.01	47.22	0.81
Belgium	10	5.81	4.19	41.87	0.47
Bulgaria	10	5.54	4.46	44.62	3.11
Canada	11	6.28	4.72	42.95	0.93
Croatia	8.5	4.39	4.11	48.35	2.96
Czech	8.5	4.6	3.9	45.85	0.87
Denmark	11	6.36	4.64	42.18	1.57
Estonia	8.5	4.56	3.94	46.4	0.42
Finland	8.5	4.37	4.13	48.64	0.2
France	8.5	4.49	4.01	47.15	1.32
Germany	8.5	4.37	4.13	48.57	1.38
Greece	8.5	4.67	3.83	45.00	0.68
Hungary	8.5	4.21	4.29	50.51	1.32
Iceland	8.5	4.43	4.07	47.86	1.13
Ireland	10	5.33	4.67	46.72	0.83
Italy	8.5	4.42	4.08	47.95	0.56
Latvia	8.5	4.59	3.91	45.97	0.41
Lithuania	8.5	4.64	3.86	45.38	0.3
Luxembourg	8.5	4.36	4.14	48.66	2.14
Malta	7.3	4.33	2.92	40.32	0.57
Netherlands	10	6.46	3.54	35.37	0.51
Norway	10	5.6	4.4	43.98	5.79
Poland	8.5	4.55	3.95	46.41	0.48
Portugal	8.5	4.4	4.1	48.23	1.36
Romania	8.5	4.63	3.87	45.51	2.96
Slovakia	8.5	4.56	3.94	46.33	2.08
Slovenia	8.5	4.73	3.77	44.37	0.3
Spain	8.5	4.47	4.03	47.42	2.02
Sweden	8.5	4.63	3.87	45.49	0.83
Switzerland	10	5.54	4.46	44.61	0.44
United Kingdom	8.5	4.29	4.21	49.57	0.88

Table A4 – ***Relative inequality in unhealthy eating (0-14), HBSC 2013/14***

Country	Median	Mean below the median	Gap	Gap (% median)	% missing values
Austria	4	1.37	2.63	65.83	0.84
Belgium	3	0.71	2.29	76.21	0.46
Bulgaria	1.25	0.28	0.97	77.73	2.98
Canada	5.75	2.21	3.54	61.57	0.94
Croatia	3.25	0.96	2.29	70.48	2.91
Czech Republic	4	1.36	2.64	66.03	0.87
Denmark	6	2.43	3.57	59.54	1.57
Estonia	4	1.46	2.54	63.52	0.39
Finland	6	2.65	3.35	55.75	0.22
France	4	1.14	2.86	71.43	1.3
Germany	4	1.3	2.7	67.58	1.38
Greece	6	2.83	3.17	52.81	0.72
Hungary	3	0.62	2.38	79.22	1.32
Iceland	6.5	3.61	2.89	44.54	1.08
Ireland	5.5	1.81	3.69	67.08	0.98
Italy	4	1.32	2.68	67.04	0.59
Latvia	4	1.51	2.49	62.27	0.38
Lithuania	5.5	1.91	3.59	65.36	0.28
Luxembourg	3.25	1.09	2.16	66.56	2.11
Malta	3	0.92	2.08	69.36	0.66
Netherlands	2	0.61	1.39	69.35	0.51
Norway	4	1.57	2.43	60.84	5.76
Poland	3	0.81	2.19	72.89	0.51
Portugal	4	1.37	2.63	65.71	1.34
Romania	3	0.65	2.35	78.41	2.94
Slovakia	3	0.75	2.25	75.13	2.07
Slovenia	6.5	3.01	3.49	53.71	0.38
Spain	4	1.35	2.65	66.34	2.06
Sweden	4	1.68	2.32	58.1	0.79
Switzerland	3	0.79	2.21	73.5	0.45
United Kingdom	3.25	1.04	2.21	67.85	0.91

Table A5 – ***Relative inequality in life satisfaction (0-10), HBSC 2013/14***

Country	Median	Mean below the median	Gap	Gap (% median)	% missing values
Austria	8	5.85	2.15	26.9	2
Belgium	8	5.6	2.4	29.96	1.43
Bulgaria	8	5.77	2.23	27.9	1.25
Canada	8	5.65	2.35	29.37	3.61
Croatia	8	5.67	2.33	29.13	3.26
Czech Republic	7	4.8	2.2	31.5	0.61
Denmark	8	5.99	2.01	25.12	0.26
Estonia	8	5.84	2.16	26.95	0.42
Finland	8	5.84	2.16	27.01	0.56
France	8	5.63	2.37	29.56	0.91
Germany	8	5.63	2.37	29.58	1.64
Greece	8	5.94	2.06	25.72	1.98
Hungary	8	5.77	2.23	27.86	3.63
Iceland	8	5.73	2.27	28.38	3.83
Ireland	8	5.81	2.19	27.38	3.47
Italy	8	5.7	2.3	28.8	1.42
Latvia	8	5.91	2.09	26.09	1.48
Lithuania	8	5.64	2.36	29.44	1.22
Luxembourg	8	5.6	2.4	30.04	3.5
Malta	8	5.79	2.21	27.61	5.92
Netherlands	8	6.08	1.92	24.03	3.02
Norway	8	5.89	2.11	26.35	4.2
Poland	8	5.51	2.49	31.11	4.49
Portugal	8	5.76	2.24	28.03	4.35
Romania	9	6.65	2.35	26.06	2.59
Slovakia	8	5.65	2.35	29.41	1.38
Slovenia	8	5.82	2.18	27.21	0.18
Spain	8	5.66	2.34	29.23	9.82
Sweden	8	5.76	2.24	27.98	3.23
Switzerland	8	5.89	2.11	26.32	2.8
United Kingdom	8	5.73	2.27	28.42	2.88

Table A6 – ***Average outcomes for all children, those in the bottom of the distribution and children in the bottom group (HBSC 2013/14)***

	Psycho-somatic health (0-32)			Physical activity (0-7)			Fruit and vegetables (0-14)			Sweets and soft drink (0-14)			Life satisfaction (0-10)		
	All	*Bottom 50%*	*Bottom group*	*All*	*Bottom 50%*	*Bottom group*	*All*	*Bottom 50%*	*Bottom group*	*All*	*Bottom 50%*	*Bottom group*	*All*	*Bottom 50%*	*Bottom group*
Austria	25.5	20.6	15.8	4.2	2.1	1.5	8.9	4.5	2.5	4.5	1.4	0.6	7.9	5.8	4.1
Belgium	23.7	18.0	12.1	3.9	2.0	1.4	9.6	5.8	2.9	3.7	0.7	0.1	7.3	5.6	3.7
Bulgaria	23.4	17.7	12.1	4.4	2.4	1.3	9.1	5.5	2.5	3.3	0.3	0.1	7.8	5.8	4.3
Canada	23.7	17.7	12.0	4.7	2.7	1.3	10.2	6.3	4.1	5.7	2.5	1.1	7.4	5.7	4.0
Croatia	24.2	18.8	13.1	4.5	2.7	1.5	8.3	4.4	2.5	4.0	1.0	0.1	7.9	5.7	4.2
Czech Republic	23.6	18.3	13.6	4.3	2.2	1.5	8.7	4.6	2.7	4.5	1.4	0.7	7.2	4.8	2.9
Denmark	24.2	19.4	14.3	3.8	2.0	0.7	9.8	6.4	3.9	5.6	2.4	1.4	7.6	6.0	4.1
Estonia	24.0	18.8	13.4	4.0	2.1	1.4	8.5	4.6	2.8	4.8	1.5	0.7	7.8	5.8	4.2
Finland	23.0	17.8	13.0	4.8	2.9	1.4	8.2	4.4	2.5	5.5	2.6	1.6	7.7	5.8	4.1
France	22.2	16.3	11.8	3.7	2.0	0.7	8.7	4.5	2.5	4.4	1.1	0.4	7.3	5.6	4.0
Germany	24.6	19.6	14.2	3.9	2.1	1.4	8.3	4.4	2.7	4.3	1.3	0.6	7.4	5.6	4.0
Greece	24.4	18.9	13.4	3.7	2.0	0.6	8.7	4.7	2.9	5.9	2.8	1.2	7.7	5.9	4.3
Hungary	22.9	17.1	12.4	4.2	1.9	0.6	8.3	4.2	2.4	3.8	0.6	0.1	7.5	5.8	4.3
Iceland	22.6	16.5	11.3	4.5	2.6	1.2	8.9	4.4	2.4	6.9	3.6	1.7	7.7	5.7	3.9
Ireland	23.9	18.5	12.7	4.5	2.7	1.3	9.4	5.3	2.4	4.8	1.3	0.6	7.6	5.8	4.1
Italy	21.5	15.4	11.1	3.4	1.3	0.5	8.1	4.4	2.4	4.5	1.3	0.6	7.4	5.7	3.9
Latvia	23.4	17.8	12.3	4.1	2.1	1.5	8.2	4.6	2.9	4.8	2.0	0.7	7.4	5.9	4.2
Lithuania	24.3	18.4	12.5	4.2	2.1	1.4	8.7	4.6	2.7	5.1	1.9	0.6	7.9	5.6	4.1
Luxembourg	22.4	16.7	11.2	4.3	2.1	1.4	8.5	4.4	2.4	4.2	1.1	0.4	7.4	5.6	4.0
Malta	22.5	16.7	11.4	3.8	1.8	0.6	7.5	4.3	2.6	3.4	0.9	0.1	7.6	5.8	4.0
Netherlands	24.5	19.0	14.1	4.4	2.1	1.3	9.9	6.5	4.5	3.2	0.6	0.1	7.8	6.1	5.0
Norway	24.9	19.5	14.2	4.3	2.1	1.4	9.3	5.6	2.6	5.2	2.3	1.5	7.9	5.9	4.3
Poland	23.1	16.5	10.6	4.4	2.6	1.3	8.4	4.6	2.7	3.8	0.8	0.1	7.4	5.5	4.0
Portugal	26.4	20.6	14.5	3.8	1.6	0.6	8.4	4.4	2.5	5.0	1.4	0.6	7.5	5.8	4.3
Romania	23.4	16.5	10.8	3.8	1.6	0.6	8.6	4.6	2.6	3.9	0.6	0.1	8.1	6.7	4.7
Slovakia	23.4	17.8	12.3	4.4	2.1	1.4	8.2	4.6	2.7	3.7	0.7	0.1	7.4	5.6	4.2
Slovenia	24.6	18.6	13.1	4.1	2.1	1.4	8.9	4.7	2.8	6.1	3.0	1.3	7.7	5.8	4.0
Spain	25.1	19.6	13.7	4.5	2.7	1.4	7.9	4.5	2.6	5.2	1.9	0.6	7.9	5.7	3.9
Sweden	22.4	17.0	12.4	4.0	2.1	1.4	8.8	4.6	2.5	5.2	1.7	0.8	7.4	5.8	4.0
Switzerland	23.1	18.0	14.0	4.2	2.2	1.5	9.8	5.5	2.7	3.6	0.8	0.1	7.7	5.9	4.2
United Kingdom	24.1	18.5	12.8	4.2	2.1	1.4	8.8	4.3	2.4	3.9	1.0	0.4	7.5	5.7	4.1