Trends in excellent self-rated health among adolescents: A comparative Nordic study

Thomas Potrebny
PhD Candidate, Centre for Evidence-Based Practice, Faculty of Health and Social Sciences, Western Norway University of Applied Sciences, Norway
tpo@hvl.no

Torbjørn Torsheim
Professor, Department of Psychosocial Science, Faculty of Psychology, University of Bergen, Norway

Pernille Due
Professor, National Institute of Public Health, University of Southern Denmark and Novo Nordisk Fonden, Denmark

Raili Välimaa
Lecturer, Research Center for Health Promotion, Department of Health Sciences, University of Jyväskylä, Finland

Sakari Suominen
Professor, Department of Public Health, University of Turku, Finland and School of Health and Education, University of Skövde, Sweden

Charli Eriksson
Professor emeritus, Department of Public Health Sciences, Stockholm University, Sweden

Abstract

Background: Excellent self-rated health (SRH) can be seen as an important component of positive health among adolescents. The aim of this paper is to examine time trends of excellent health among adolescents in five Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) between 2002 and 2014, including differences between countries, gender and age. Methods: Nordic data from the Health Behaviour in School-aged Children (HBSC) survey (including 11-, 13- and 15-year-olds) from 2002 (n = 19,009), 2006 (n = 29,656), 2010 (n = 33,232) and 2014 (n = 31,540) were analysed by design-adjusted binomial logistic regression models. Results: The trend analysis of excellent SRH for Nordic adolescents indicates a small improvement between 2002 and 2006 but a stable trend in the following periods up until 2014. The time trends do, however, depend on the specific country. In general, a smaller proportion of girls compared to boys were found to rate their health as excellent. Over time, however, the proportion of boys rating their health as excellent decreased, while girls' ratings improved. Conclusions: From a public health perspective, indications of a changing trend in adolescent health coinciding with the 2007–2008 global recession warrant further attention from researchers and policy-makers and should be closely monitored in the future.

Keywords
self-rated health, recession, trends, Nordic countries, adolescents

Introduction

Self-rated health (SRH) is a subjective indicator of general health. SRH has been shown to reliably predict later morbidity, mortality and health service use in empirical studies on the general population (Benyamini & Idler, 1999; Idler & Benyamini, 1997). Adolescents perception of their own health status is thought to capture an overall conception of health that is shaped by broader dimensions of health and well-being, such as sense of functioning, general well-being, social relationship with friends and family, and health behaviours (Breidablik, Meland & Lydersen, 2008; Vingilis, Wade & Seeley, 2002). Although the specific predictive importance of the measure in adolescence has not been directly estimated, it has been argued that an individual's health should not be assessed without including SRH due to its power to predict mortality in the general population (Boardman, 2006; Idler & Benyamini, 1997). Children as young as eight years old are able to adequately report on different aspects of their health when responding to health questionnaires (Riley, 2004). Therefore, children's personal reports provide a viable means of monitoring experiences of health and distress during childhood and adolescence that can enhance our understanding of the trajectories of adolescent health and illness (Riley, 2004). From a public health perspective, adolescents' own perception of health is of particular value, as it may include important information about future population health.

Only a few studies have examined the historical trends of SRH among adolescents. In North America, Wade and Vingilis (1999) studied temporal trends of SRH among 19,153 Canadian adolescents aged 12 to 18 in five waves from 1989 to 1997. The authors found that the mean score of SRH declined from 1989 through 1995 and remained unchanged in 1997. The authors also found that girls rated their health consistently lower than males for all ages and that there were two-way interactions between both sex and age, and age and year, indicating that girls' ratings decline more steeply from age 12 to 18 compared to boys and that a decline with age became more pronounced across survey years. Another study of 7,087 US adolescents aged 12–17 showed a stable pattern of very good/excellent SRH from 2001 through 2004, but a decreasing prevalence of very good/excellent SRH from 2004 to 2010 (Cui & Zack, 2013). Both aforementioned studies highlight the potential impact of recessionary periods (both in the 1990s and 2000s) as a possible contributing factor to declines in SRH in North America.

Studies on European adolescents have also shown historical changes similar to the trends seen in North American countries. Cavallo et al. (2015) studied rates of excellent SRH among 11-,13- and 15-year-olds in 32 countries (mostly European) and reported an overall positive trend in the prevalence of health rated as excellent from 2002 to 2010. Interestingly, however, a high number of affluent countries showed a deterioration in excellent health from 2005/2006 to 2009/2010. According to Cavallo et al. (2015), parts of the observed decrease could be attributed to the adverse impact of the 2007–2008 economic recession. The authors also found that girls consistently rated their level of excellent health as poorer compared to boys in all the 32 countries. A limitation of this research is that it was conducted only a short time after the recessionary period and therefore it only assesses the short-term impact of the recession.

In absolute terms, a comparative survey indicates that the prevalence of poor SRH among 15-year-olds differs between North America and the Nordic countries. In Canada, 23% of girls and 17% of boys reported poor SRH in 2014. In the Nordic region, Iceland has very similar prevalence rates as those observed in Canada, while the other Nordic countries mostly have lower rates of poor SRH, ranging from 20% in Denmark to 15% in Sweden among girls, and 17% in Finland to 9% in Sweden among boys (Inchley et al., 2016). This

suggests that the SRH profiles of adolescents in the Nordic region might be more favourable compared to North America in absolute terms, even though there is a lot of variation in the prevalence rates within the Nordic region. The question of why such a large variation exists within a region that is considered to be relatively homogenous, remains unanswered.

The current study examines historical time trends of excellent SRH among adolescents in the Nordic countries, with a particular focus on consistency and heterogeneity of trends by age, gender and country. Adolescent perceptions of health are partly determined by contextual factors and could change as a function of contextual fluctuations (Breidablik et al., 2008; Vingilis et al., 2002), such as during a recessionary period. The Nordic countries represent an interesting research target, as there are many key similarities between the countries. Even though the Nordic countries are considered to be quite homogenous in terms of social and cultural heritage, there are differences in time trends of SRH between the Nordic countries (Cavallo et al., 2015) in addition to differences in the trajectories of SRH among adolescents after the 2007–2008 economic crisis (Cavallo et al., 2015). Thus, the Nordic region is a relevant case for studying how SRH differs as a function of age, gender and historical context.

The aim of the current paper is to examine time trends of excellent health among adolescents in Denmark, Finland, Iceland, Norway and Sweden between 2002 and 2014, including differences between countries, gender, age and historical time. In regard to the historical context, previous research has suggested that the 2007–2008 financial crisis may have had an impact on adolescent health in the Nordic region, although limited to investigating only the short-term impact following the 2007–2008 economic recession. Therefore, more research is warranted to look at trajectories of SRH in adolescence post-recession, and after 2009–2010, in order to further explore the possible impact of the recession on young people's health and well-being.

Methods

Sample and procedure

The current research analysed data from the cross-national HBSC study, in particular, data from five Nordic countries: Denmark, Finland, Iceland, Norway and Sweden, over four waves of data from 2002, 2006, 2010 and 2014. The HBSC study includes cross-sectional data collections on nationally representative samples of 11-, 13- and 15-year-olds every four years. In all countries, the study follows a standardised protocol for sampling, survey instruments and data collection. To obtain a representative sample, each country uses cluster sampling of classes or schools from randomly selected schools at a national level, and collection of data, which is provided anonymously by children in written form during school hours (Table 1). Each country selects approximately 1,500 adolescents in each of the three age groups (i.e. 11, 13 and 15-year-olds). As Iceland only joined the HBSC study in 2005, the sampled data collection for this country covers 2006, 2010 and 2014. It should also be noted that a census of age groups from Iceland is drawn, since the population is smaller than the rest of the Nordic countries. More details on the study and the participants can be found elsewhere (Schnohr et al., 2015; Inchley et al., 2016).

Table 1. Sample size by country and survey year (N)

Country	2002	2006	2010	2014
Denmark	4,672	5,741	4,330	3,891
Finland	5,388	5,249	6,723	5,925
Iceland	[a]	9,540	11,119	10,602
Norway	5,023	4,711	4,342	3,422
Sweden	3,926	4,415	6,718	7,700
Total sample	19,009	29,656	33,232	31,540

[a] No survey conducted.

Variables and measures

SRH was measured by the single item: "Would you say your health is…?"

Participants were asked to rate their general health by choosing one of the four response categories: "excellent", "good", "fair" or "poor". As the current study highlighted the positive aspects of adolescent health, a cut-off was created to distinguish between those who reported their health as excellent versus all other categories. This approach is also recommended to reduce language-related bias, so called "semantic bias", between countries with different native languages (Schnohr et al., 2016). Gender, age group and country were included as demographic variables.

Data analysis

Time trends in excellent SRH were analysed with binomial logistic regression analyses. The design effects related to clustering, while strata and study weights were modelled using the Stata Svy routines for complex data (StataCorp, 2017). In the HBSC study, school classes are the primary sampling unit and the survey round was used as a stratification variable. A test for higher-order interactions using adjusted Wald F-tests was performed in order to test the significance of two-way interactions between gender, age, country and survey year. Tests of contrasts and marginal predictions from the model were obtained using Stata's MARGINS routine. All model coefficients were adjusted to control for family structure and family affluence.

Results

Time trends in excellent health

Table 2 shows the estimated prevalence of excellent SRH among adolescents in the Nordic countries. The significant main effect of time indicated that the prevalence of excellent health differed across time points ($F_{(3, 4239)}=3.41$, $p<0.05$). Polynomial contrast showed that there was a significant quadratic ($F_{(1, 4239)}=7.99$, $p<0.01$) component overall effect of time, indicating there was an overall nonlinear pattern of change. The contrast analysis showed a significant increase from 2002 to 2006 ($F_{(1, 4239)}=6.00$, $p<0.05$), a non-significant decrease in 2010 ($F_{(1, 4239)}=2.47$, $p<0.12$), and a non-significant decrease between 2010 and 2014 ($F_{(1, 4239)}=2.33$, $p<0.13$).

Simple contrasts revealed a statistically significant trend in Denmark ($F_{(3, 4239)}= 4.70$, $p<0.01$), while Finland ($F_{(3, 4239)}=6.34$, $p<0.001$) and Sweden ($F_{(3, 4239)}=40.84$, $p<0.001$)) had a significant decreasing trend and Norway had a significant increasing ($F_{(3, 4239)}=17.90$, $p<0.001$) trend of excellent SRH. Iceland did not show a significant trend

from 2006 to 2014 (F(2, 2079)=1.12, p<0.33). Polynomial contrast showed that there was both a significant linear trend and a higher-order nonlinear quadratic component in Finland, Norway and Sweden. In Finland, there was a linear deterioration of excellent SRH from 29.5% in 2002, with an abrupt change in 2006 to 25.3%, while remaining lower than the baseline at 26.3% in 2014. In Sweden, there was also a linear decrease among adolescents, with 43.8% reporting excellent SRH in 2002, the situation remaining rather stable until an abrupt deterioration of around 10% observed in 2014, resulting in a rate of 34.5% of adolescents reporting excellent SRH. In Norway, the trend appears to be opposite to that of Finland and Sweden. In 2002, 32.7% of adolescents rate their health as excellent, with the rate increasing abruptly to 39.3% in 2006 then remaining rather stable and ending at 40.8% in 2014. In Denmark, only a nonlinear cubic effect was observed, indicating a "up-and-down" trend over time, with 34.5% of adolescent reporting excellent SRH in 2014. For Icelandic adolescents, there were no general effects of time and, in 2014, 26.4% of adolescents rated their health as excellent.

Table 2. Marginal effects in excellent SRH among adolescents over time, by country, age and sex

Group	2002		2006		2010		2014		Overall trend[b]
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	
Total	34.2	(33.4 to 35)	35.7a	(34.8 to 36.6)	34.7	(33.9 to 35.5)	33.8	(33 to 34.7)	Q
Boy	41.3	(40.2 to 42.4)	41.9	(40.7 to 43.2)	39.8[a]	(38.6 to 40.9)	38.4	(37.2 to 39.6)	L
Girl	27.7	(26.6 to 28.7)	29.9[a]	(28.8 to 31)	30	(29 to 31)	29.5	(28.5 to 30.6)	L,Q
11-year-olds	40.3	(39 to 41.7)	42.7[a]	(41.1 to 44.4)	40.5[a]	(39.2 to 41.8)	40.1	(38.6 to 41.6)	S
13-year-olds	33.5	(31.9 to 35)	34.8	(33.3 to 36.3)	33.3	(32 to 34.7)	31[a]	(29.6 to 32.4)	L,Q
15-year-olds	29.2	(27.9 to 30.5)	30	(28.4 to 31.7)	30.7	(29.2 to 32.1)	30.7	(29.3 to 32.1)	S
Denmark	31.4	(29.8 to 33)	35.3[a]	(33.4 to 37.3)	31.6[a]	(29.8 to 33.4)	34.5	(32.6 to 36.3)	C
Finland	29.5	(28.1 to 30.9)	25.3[a]	(23.9 to 26.7)	26.4	(25.1 to 27.7)	26.3	(24.9 to 27.8)	L,Q
Iceland	NA	NA	27.3	(26.2 to 28.5)	27.4	(26.4 to 28.4)	26.4	(25.4 to 27.4)	S
Norway	32.7	(31.3 to 34.2)	39.3[a]	(37.4 to 41.2)	37.7	(35.9 to 39.5)	40.8	(38.8 to 42.7)	L,Q
Sweden	43.8	(41.8 to 45.8)	44.2	(42.3 to 46.1)	44.4	(42.9 to 45.9)	34.5[a]	(33.2 to 35.8)	L,Q

[a] Previous time point is different.

[b] Overall trend: L= linear trend, Q=quadratic trend, C=cubic trend, S=stable.

Age and gender differences in excellent health

The logistic regression models, including main and interactive effects of age group, sex and time, indicated strong main effects in terms of age group (F(2, 4239)=223.36, p<0.001), sex (F(1, 4239)=85.85, p<0.001), country (F(3, 4239)=245.30, p<0.001), as well as strong interactive effects of age and gender (F(2, 4239)=51.88, p<0.001). This suggests that boys, in general, had a higher prevalence of excellent health compared to girls, while 15-year-olds have a lower prevalence of excellent health than 11-year-olds. The age-sex interaction was also statistically significant and indicated that excellent SRH was lowest among 15-year-old girls (Table 2). A simple effects analysis revealed a statistically significant age-sex interaction was present in all countries except Denmark.

Testing the time-sex interaction effect indicated that the effect of time differed across sexes (F(3, 4239)=7.99, p<0.001), with a slight decrease for boys of around 3% (from 41.3% in 2002 to 38.4% in 2014) and a slight increase for girls of around 2% (27.7% in 2002 to 29.5% in 2014) (Table 2). Polynomial contrast analysis suggests that significant, but minor, decreases occurred post-2006. Finally, the country-time interaction revealed that the overall trend differed across countries (F(9, 4239)=20.58, p<0.001).

Regarding age, analyses of age categories by time indicated that among 13-year-olds in particular, there was a decrease in excellent SRH compared to the 11- and 15-year-old age groups.

Discussion

Adolescents' appraisals of their own health are shaped by their overall sense of functioning, which includes both physical health and non-physical health dimensions. The results of this study indicate that the rate of excellent SRH among adolescents in five Nordic countries has remained rather stable between 2002 and 2014 overall, with a period of a small abrupt change before and after 2006. The effect of time does, however, depend on the specific country and sex in question. Differences in SRH among adolescents at the country level vary somewhat in absolute terms, ranging from 26% to 41% in 2014. In relative terms, different trends over time in the different countries are evident. In Denmark and Iceland, only minor changes were observed when comparing 2002 with 2014, while Finland and Sweden saw a deteriorating trend, and Norway had an opposite trend in terms of increasing rates of excellent SRH among adolescents.

The results of this study also indicate that while girls generally rate their health as lower than boys, the time trends are different between sexes, where a small decrease of excellent SRH was observed for boys, while girls have had a small increasing trend in the Nordic countries. The 13-year-old age group increased the most, compared to the other age groups. The gender and age effects do however depend on the specific country.

Temporal trends and the financial crisis

Previous research on historical time trends for adolescent SRH in Europe and North America has reported a deterioration in SRH after the 2007–2008 global economic recession, hypothesising that these acute changes in macroeconomic conditions may have had an impact on adolescent health (Cavallo et al., 2015; Cui & Zack, 2013). The Nordic countries were all exposed to the financial crisis, but to varying degrees. Iceland has been highlighted as the country that was most severely impacted in the Nordic region, while Norway is believed to have been comparatively less affected. Iceland experienced one of the biggest systemic banking collapses in history after the financial crisis, which led to a severe economic depression, political unrest and increased unemployment rates in the years that followed (IMF, 2015). We find that the rate of excellent SRH among adolescents in Iceland remained rather stable during this period, all things considered. Other researchers have reported an increase in both anxiety and depressive symptoms among Icelandic adolescents following the financial crisis (Thorisdottir, Asgeirsdottir, Sigurvinsdottir, Allegrante & Sigfusdottir, 2017). Two reviews on adolescent health impacts of the financial crisis in Iceland, however, conclude that there have been few noticeable short-term effects of the financial crisis on key child health indicators, and further suggest that the robust protective welfare policies aimed at families with children may have alleviated some of the potential adverse health impacts of the crisis in Iceland, while implying that this could also have been the case

for the other Nordic countries, as they share many of the same protective public policies (Gunnlaugsson, 2016; Gunnlaugsson & Einarsdóttir, 2016). Cavallo and colleagues (2015) did not include Iceland in their analysis of SRH trends in Europe and North America, but highlighted Denmark as one of the Nordic countries that saw a decrease in SRH among adolescents after the recessionary period. Our findings do support previous findings about a deterioration in excellent SRH among adolescents in Denmark in 2010, directly after the recession; however, we find that the rates of excellent SRH increased again in 2014. It should be noted that our analysis is based on parts of the same data material from 2002–2010. Finland, on the other hand, witnessed a clear decrease in excellent SRH among adolescents between 2002 and 2014, but the main change occurred between 2002 and 2006; therefore, this change cannot be primarily attributed to the 2007 global recession. Sweden was the Nordic country that saw the highest rate of excellent SRH among adolescents in 2002; but, after a substantial decrease between 2010 and 2014, Norway preceded Sweden as the country with the highest rate of excellent SRH. Norway was the only country in our analysis that experienced any substantial increase in excellent SRH between 2002 and 2014. Even though Norway had a linear increase over time, the trend was different pre-recession.

Bynner, Elder, Heinz and Schoon (2017) recently investigated the potential effects of the global recession and concluded that it did have a short-term impact on young people's health, even though they do not consider it to be the principal influence on young people's changing life course post–2007. This finding has been confirmed in a systematic review by Rajmil et al. (2014). Bynner and colleagues instead suggest that the sudden economic recession amplified pre-existing economic and social processes influencing young people's lives. Based on the findings of this study, we cannot exclude the possibility of there being some short-term effects of the 2007 recession on the rate of excellent SRH among adolescents in the Nordic countries, as previously highlighted by Bynner and colleagues. The effect, however, is difficult to isolate on an individual country level but becomes more apparent when looking at the Nordic region as a whole. Any potential pathways from a recessionary impact on SRH among adolescents have not been confirmed empirically. However, evidence from a quasi-experimental study from Greece suggests a causal relationship between declining rates of poor SRH and the 2007 recession (Vandoros et al., 2013). The authors suggested that these findings may apply to other countries in similar financial circumstances, such as Iceland. The authors further suggest that the full impact of the recession on health is yet to come, as the long-term effect of austerity measures unfolds on the population.

Both Bynner and colleagues (2017) and Gunnlaugson and Einarsdóttir (2016) highlight concerns about potential lagged effects (i.e., the long-term health consequences). This is understandable as there was a sharp increase of both youth and adult unemployment in Europe directly following the recession (Pförtner et al., 2014). Despite the negative shift in unemployment rates, adolescent health did not appear to be affected in the short term following the recession when examining psychological health complaints (Pförtner et al., 2014). Long-term parental unemployment however, is known to be negatively associated with a range of health outcomes, including SRH, among adolescents (Sleskova et al., 2006). Therefore, attention must be given to adult unemployment rates following a recession. Bynner and colleagues (2017) and Gunnlaugson and Einarsdóttir (2016) suggest continued monitoring of the health of young people. Based on the findings of this study, we support the recommendations that future research should investigate any potential long-term health consequences and closely monitor the health of young people in the Nordic countries through both high-quality population studies and targeted research on the cohorts affected directly by the recession.

In conclusion, although a recession poses a risk to the health of adolescents and their families, social policies protecting families with children, such as the ones that are in place in the Nordic welfare states, might be an important determinant of health during times of economic crises in Europe (Gunnlaugsson, 2016; Gunnlaugsson & Einarsdóttir, 2016; Karanikolos et al., 2013). It has been suggested that fiscal austerity in combination with economic shocks and weak social protection might be what ultimately escalates health and social crises in Europe, and that this may explain why health outcomes differ between Nordic countries, specifically Iceland, and other countries in Europe, such as Greece (Karanikolos et al., 2013). In the Nordic countries, policy decisions about how to respond to an economic crisis will therefore have important implications for future population health.

Age and sex differences

Regarding the indications that the trend of excellent SRH depends on gender, it has been previously confirmed that girls generally rate their health lower compared to boys (Cavallo et al., 2015). This pattern is also observed in the present study. Surprisingly, however, we find that the trend is significantly different between boys and girls, whereby boys seemingly had a small deteriorating trend of excellent SRH, compared to girls, whose rate of excellent SRH improved over time. This finding is particularly interesting as research on other measures of adolescent health, such as recurring health complaints, typically find the opposite – that is, that girls' health outcomes show some deterioration over time, while boys remain stable or in some cases improve. Previous research on the 2007 recession from the UK and Greece, based on the general population, suggested that health, specifically among men, deteriorated post-recession while effects for women were generally weaker (Katikireddi, Niedzwiedz & Popham, 2012; Vandoros et al., 2013). Our study also finds that the rate of excellent SRH among young boys had an abrupt decline between 2006 and 2010 in the Nordic countries, which coincides with findings from general population studies. Possible explanations highlighted in the literature suggest that this might in part be related to unemployment and future job insecurity having a larger effect on men's health, particularly in countries where males tend to have higher labour force participation then females (Katikireddi, Niedzwiedz & Popham, 2012). However, this might be a less relevant hypothesis when trying to explain changes in the health of young boys aged 11–15 following a recession, although it might suggest that the level of unemployment and job insecurity among adults may be a potential mediator for the health of young boys and a recession effect. Different gender trends do, however, depend to some extent on the specific Nordic country concerned and, as such, more research is needed to confirm these findings. In addition, further research is required in order to examine how boys and girl responded differently to recessionary events. That being said, our findings do highlight the importance of considering boys' experiences of health and illness, which have received scant attention from previous public health research (Ridge, Emslie & White, 2011).

Limitations

This study assessed adolescent trends of excellent SRH. This is a useful tool for assessing trends of positive health; indeed, investigating prevalence at the top end of SRH is recommended by Schnohr et al. (2016) to reduce semantic-bias between countries. This is, however, the most stringent category of response in the health survey and therefore any potential variation between the other response categories is not considered and the results should therefore be interpreted cautiously.

It should also be noted that that there were some differences regarding sample size between countries and survey rounds in our data. The differences in sample size were non-intentional, and likely due to specific differences between countries, such as sampling methods, modes of data collection, and oversampling, despite all countries adhering to the same sampling procedure described in the projects' protocol. In our analysis, however, the varying sample sizes had no impact on the estimated coefficients, but did affect precision (i.e.: larger standard errors). In the marginal predictions, every included factor was treated as balanced to ensure that the differences did not affect the obtained predictions.

Conclusion

SRH is considered to be an important indicator of positive health in adolescence and a powerful tool for public health monitoring. This study investigated the temporal trends of excellent SRH among adolescents in five Nordic countries. Overall, the results of this study show that around one-third of adolescents in the Nordic countries rate their own health as excellent, although this does depend on country, sex, age and point in time.

A changing trend in adolescent SRH was observed before and after 2006 in the Nordic countries as a whole, coinciding with the 2007–2008 global economic recession. Other researchers have suggested that the recessionary period may have had an adverse impact on adolescent health. From a public health perspective, it is important to acknowledge possible macro-level influences on health and continue to pursue public policies that protect families with children from major financial events in the future. It is also important to continue to closely monitor adolescent health with regard to any potential long-term health consequences associated with the 2007–2008 global recession in all Nordic countries.

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