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COMPARATIVE STUDY OF HEALTH-RELATED QUALITY OF LIFE AMONG FINNISH 12- TO 15-YEAR-OLD ADOLESCENTS IN 1996 AND 2013

ABSTRACT

Health-related quality of life (HRQoL) has improved in adults in Finland. Much less is known about HRQoL of adolescents. The aim of the present study was to compare HRQoL between school samples from 1996 and 2013. Furthermore, we investigated age and gender differences in HRQoL. The study samples comprised 239 adolescents in 1996 and 373 adolescents in 2013 from schools in the Helsinki Metropolitan area, and in Helsinki, respectively. The mean age of the adolescents was 13.6 years in 1996 and 13.7 years in 2013. According to Tobit regression there was no statistically significant difference (difference 0.001, p=0.767) in the mean 16D scores between samples from 1996 and 2013. Ageing had a statistically significant decreasing effect (-0.005, p=0.014) and male gender a statistically significant increasing effect (0.015, p<0.001) on the mean 16D score.

In conclusion: HRQoL showed no change from 1996 to 2013 among Finnish 12- to 15-year-old adolescents. Adolescent boys had better HRQoL than girls and HRQoL scores deteriorated with increasing age.

KEYWORDS: ADOLESCENTS, AGE, GENDER, HEALTH-RELATED QUALITY OF LIFE, TIME TREND STUDY

INTRODUCTION

One way to monitor the success of health and social policies is to study changes in the population's health-related quality of life (HRQoL), defined as an individual's satisfaction or happiness in various life domains that are affected by health (1). The Finnish Health 2011 survey suggests that HRQoL of the adult population has improved from that observed in a national health survey performed in 2000 (2,3). Until now, there had been no research focusing on changes in HRQoL among Finnish adolescents. In Germany, HRQoL of 11- to 18-year-old children and adolescents was studied in 2007 (4) and the study was replicated five years later, using the same instrument, among 9- to 18-year-old individuals (5). The HRQoL had improved and substantial changes were observed in physical well-being, emotional well-being, self-esteem and family relations.

Michel et al. (6) studied HRQoL in more than 20,000 children and adolescents from 12 countries, including one Nordic country (Sweden). Children generally showed better HRQoL than adolescents. At the age of 8 years, boys and girls showed a similar average score, but a substantial gender difference was observed from ages 13 or 14 years onwards. In adolescence, boys scored higher in general HRQoL, physical well-being, psychological well-being, mood and emotions and self-perception. Additionally, boys also scored higher in autonomy, financial resources and relations with parents, but these effect sizes remained low. Girls scored higher in peer and social support and social acceptance, but the effect sizes were low. HRQoL decreased along with ageing in both genders, but this tendency was more pronounced among girls.

In 1996, HRQoL of 12- to 15-year-old Finnish school girls and boys was measured using the 16D instrument (7). A similar study was carried out in 2013. The aim of this paper was to analyse these data sets separately and pooled in a methodologically uniform way to see: whether there had been a change in HRQoL between these years, whether the possible changes had been similar for boys and girls and whether age already has an effect on HRQoL in this narrow age group. Based on earlier research, we hypothesized that: 1) HRQoL would be better in the latter sample, 2) the overall 16D score would deteriorate with increasing age and 3) the overall 16D score would be higher in boys than in girls.

SUBJECTS AND METHODS

THE SAMPLES

The study sample by Apajasalo et al. (7) was collected from 4 comprehensive schools in the Helsinki metropolitan area. The selection of comprehensive schools was based on best judgement to include adolescents with different socioeconomic backgrounds in the sample. Of 263 pupils aged 12 to 15 years, whose parents had given an informed consent for the child to participate, 239 (91%) eventually filled in the 16D questionnare (115 girls and 124 boys). The mean age of respondents was 13.6 years (SD 0.92). The mean age of girls was 13.6 years (SD 1.08) and that of boys 13.7 years (SD 0.76).

In 2013 the data were collected in 13 randomly sampled schools in Helsinki, focusing on grades 6 to 9. The first author (A.R.) randomly assigned a running number for each school, separately for primary schools and for junior high schools. She then contacted the school headmasters in order of the numbers. If the headmaster did not grant research permission, she contacted the next school in order until the desired number of pupils was reached. Guardians of the pupils received an information letter about the study by mail. They were invited to give an informed consent allowing their offspring to participate. In case the guardians were divorced, informed consent was obtained from both parents. The first author (A.R.) then attended a class meeting with those adolescents whose parents had given a written informed consent and provided information about the study project. Of pupils with their parents permission, 363 (74.5%, 210 girls and 163 boys) wanted to participate, gave their written informed consent and completed the 16D questionnaire. The mean age of respondents was 13.7 years (SD 1.04; range 12-15). The mean age of girls was 13.7 years (SD 1.04) and that of boys similarly 13.7 years (SD 1.04).

THE HRQOL INSTRUMENT

The 16D© is a generic, standardized and self-administered HRQoL instrument for early adolescents aged 12-15 (7). The 16D is based largely on the 15D instrument designed earlier for adults. The structure and the valuation system (an application of the multi-attribute utility theory) of these HRQoL instruments are the same. These instruments can be used as both a profile and single index utility score measures. When developing the age-appropriate instrument for early adolescents, the questions of the 15D were modified (e.g. usual activities reformulated to school and hobbies), one

question was deleted (sexual activity), and, in addition, two other questions were added (physical appearance, friends). The 16D questionnaire consists of 16 multiple choice questions each representing one dimension of health (vitality, seeing, breathing, distress, hearing, sleeping, eating, discomfort and symptoms, speech, physical appearance, school and hobbies, moving, friends, mental function, excretion, depression). For each dimension, the respondent is advised to choose one of the five levels best describing his/her state of health at the moment (the best level=1; the worst level=5). The single index score (16D score), representing the overall HRQoL on a 0-1 scale (1=full health, 0=being dead) and the dimension level values, reflecting the goodness of the levels relative to no problems on the dimension (=1) and to being dead (=0), are calculated from the health state descriptive system (questionnaire) by using a set of population-based preference or utility weights. Mean dimension level values are used to draw 16D profiles for groups (Apajasalo et al. 1996). The 16D health-related quality of life (HRQoL) instrument is available from: http://www.15d-instrument.net/16d-and-17d/16d/ [Internet, cited on 26.05.2019].

ETHICS

The protocol of the 1996 study sample was approved by the Institutional Ethics Committee of the Helsinki University Children's Hospital, and the protocol of the 2013 study sample was approved by the Institutional Ethics Committee of the Helsinki and Uusimaa Hospital District on November 21, 2012 (registration number 341/13/03/03/2012). For both studies, the permission of each school headmaster was a prerequisite for conducting the study. In addition, the protocol of the 2013 study was approved by the Helsinki City Education Department.

STATISTICAL ANALYSES

The data were analysed using the SPSS for Windows statistical software version 25.0 (SPSS, Inc., Chicago, IL, USA). The statistical significance of the differences in the mean dimension level values (the 16D profiles) between 1996 and 2013 data, and between gender groups, was tested with independent samples t-test, and as distributions of level values were skewed, differences in medians were tested with Mann-Whitney U-test as well. To check whether possible differences in the age and gender structure of the 1996 and 2013 data might have had an effect on the result when comparing the mean 16D scores between these points of time, the variance of the 16D score in the combined data was explained by Tobit regression with age, gender and year dummy as explanatory variables. In addition, Tobit models were run to check whether the effects of age and gender had changed over time. The Tobit model was deemed suitable for two reasons. Firstly, the distribution of the dependent variable (16D score) was skewed and censored at 0 and 1 (the range of the scores 0–1) and, secondly, a substantial proportion of the observations was at the upper limit of 1 (21.7%). The Tobit model accounts for these special features of the distribution (8,9).

The differences between groups (based on means and 95% confidence intervals (CIs)) are reported for the main results. P-values <0.05 were considered statistically significant.

RESULTS

COMPARISON BETWEEN THE TWO SAMPLES OF THE 16D PROFILES

The 16D profile of adolescents from 1996 did not differ significantly from that of adolescents from 2013, with two exceptions: adolescents from 2013 scored significantly higher on seeing and vitality (*Figure 1*). When girls from 1996 were compared to those from 2013, girls from 2013 scored significantly higher on the dimensions seeing and vitality, whereas girls from 1996 scored significantly higher on friends (*Figure 2a*). Regarding boys, none of the dimensions showed a statistically significant difference between the samples (*Figure 2b*).

GENDER DIFFERENCES IN THE 16D PROFILES

In 1996, boys were significantly better off than girls on the dimensions of seeing, sleeping, depression and physical appearance (*Figure 2c*). In 2013, boys scored significantly higher on the dimensions of hearing, discomfort and symptoms, depression, distress and physical appearance (*Figure 2d*). In all these comparisons, t-test and Mann-Whitney produced virtually identical results.

VARIABLES ASSOCIATED WITH THE 16D SCORE

In the sample from 1996, the mean 16D score was 0.949 (SD 0.049) and in the sample from 2013 0.947 (SD 0.058). When age and gender were adjusted for in the Tobit regression analysis of the pooled data, there was no statistically significant difference in the mean 16D scores between the samples (difference 0.001, p=0.767). However, although the

age range in the data was narrow, the marginal effect of age (-0.005) turned out to be statistically significant (p=0.014) as did the coefficient of gender (0.015, p < 0.001), indicating better HRQoL in boys both in 1996 and 2013.

In the sample from 1996, girls´mean 16D score was 0.944 (SD 0.045), and that of boys 0.954 (SD 0.052). In the sample from 2013 it was 0.939 (SD 0.062) in girls, and 0.957 (SD 0.052) in boys. In the sample from 1996, the marginal effect of age was -0.008 (p=0.013) and that of gender 0.012 (p=0.038), whereas in the sample from 2013 the corresponding effects were -0.004 (p=0.175) and 0.017 (p=0.003), respectively. Thus from 1996 to 2013 the deteriorating effect of age may have decreased, whereas the HRQoL difference in favour of boys had increased.

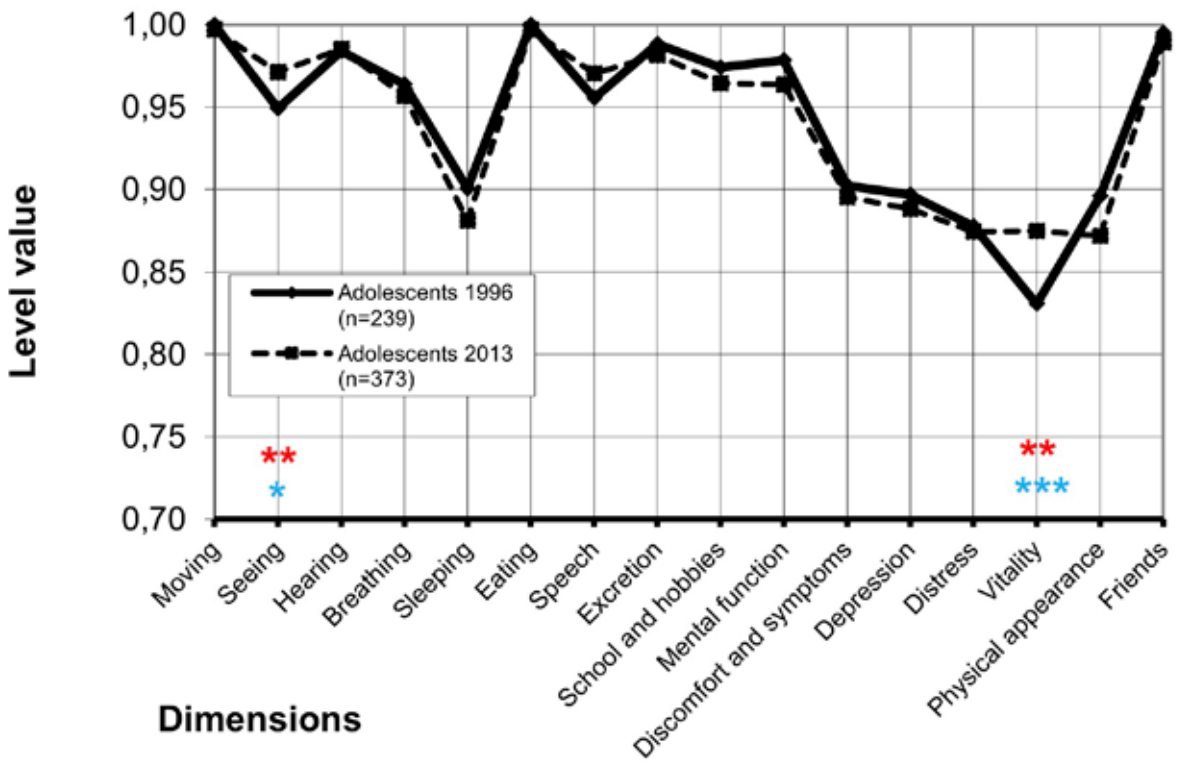

Figure 1. The adolescents' mean 16D profiles 1996 (n=239) and 2013 (n=373). Statistical significance tested between samples.

Student's independent samples t-test. ** = significant difference at p < 0.01
Mann-Whitney U-test
* = significant difference at p < 0.05, *** = significant difference at p < 0.001of applied sciences or university degree

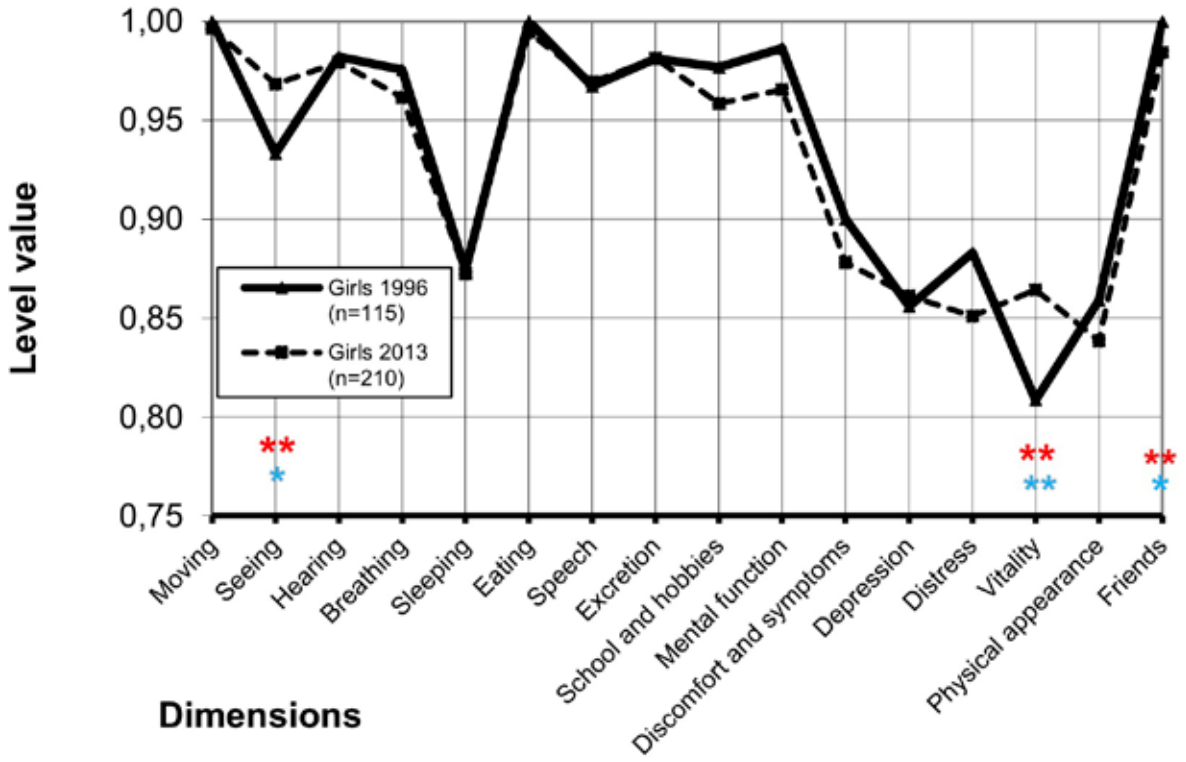

Figure 2a. The girls' mean 16D profiles 1996 and 2013. Statistical significance tested between samples.

Student's independent samples t-test. ** = significant difference at $p < 0.01$
Mann-Whitney U-test
* = significant difference at $p < 0.05$, ** = significant difference at $p < 0.01$

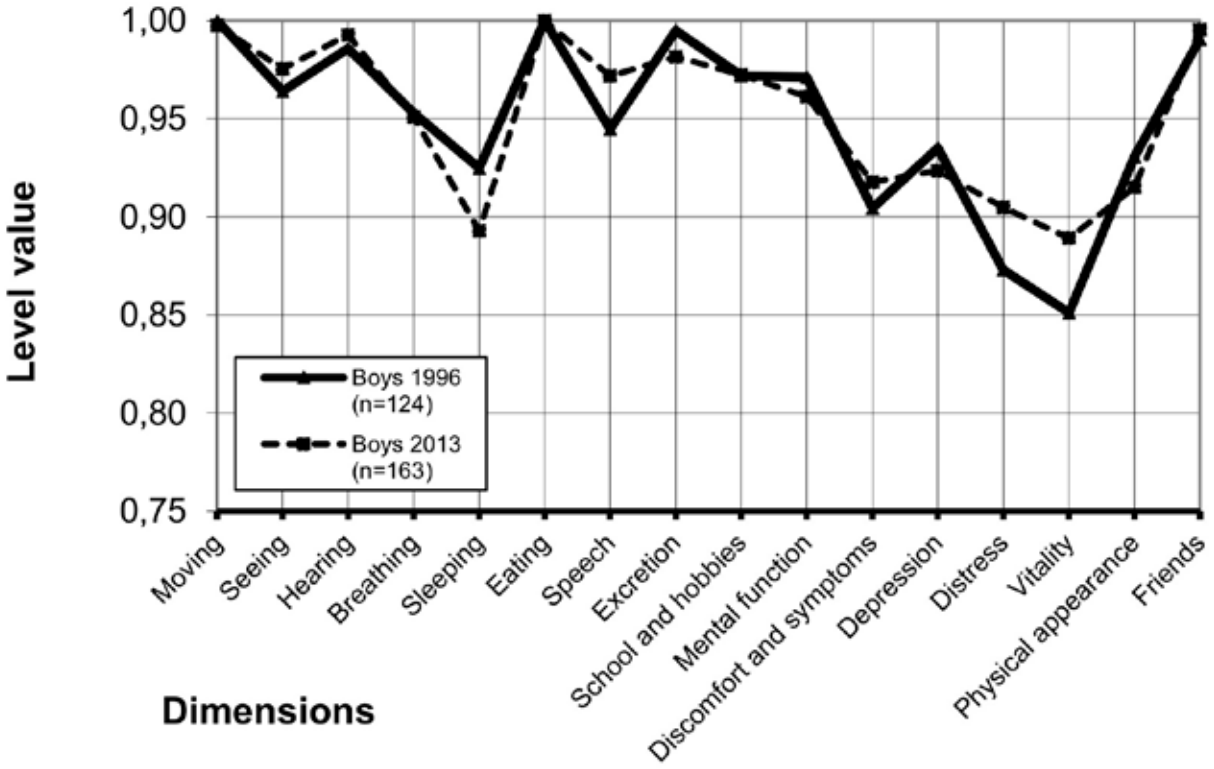

Figure 2b. The boys' mean 16D profiles 1996 and 2013. Statistical significance tested between samples.

Student's independent samples t-test. NS
Mann-Whitney U-test NS

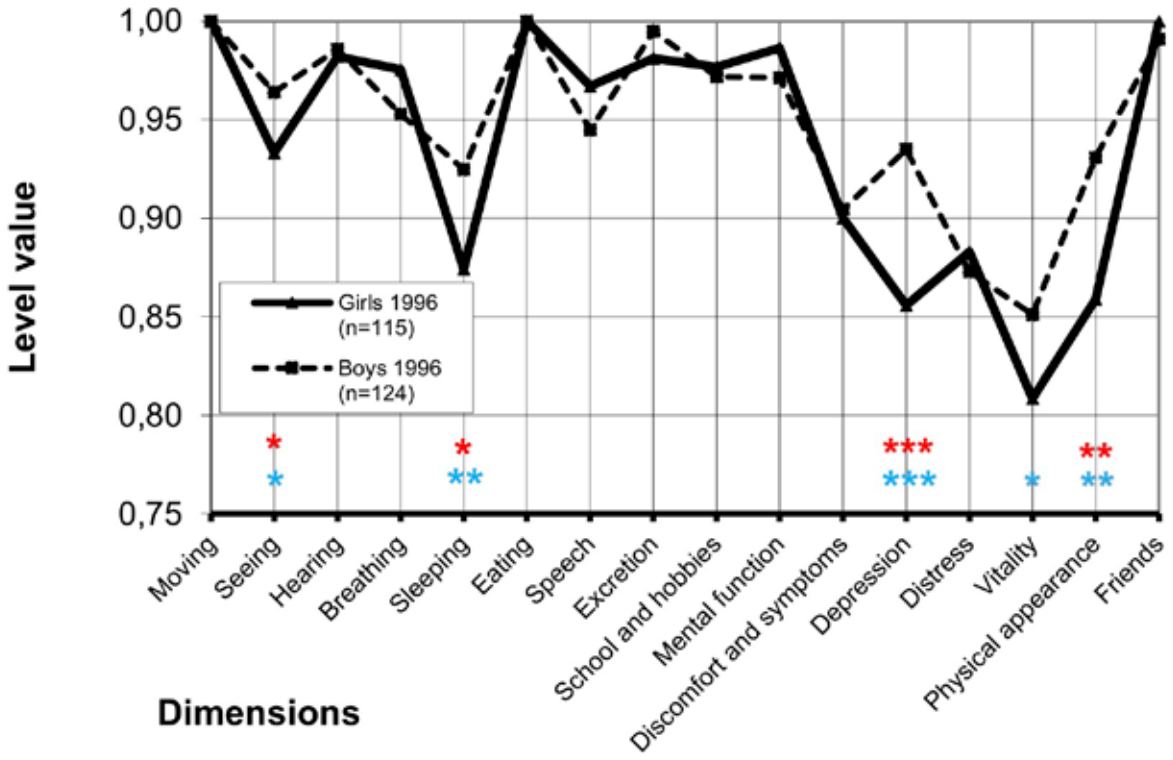

Figure 2c. The girls' and boys' mean 16D profiles 1996. Statistical significance tested between gender groups.

Student's independent samples t-test.
* = significant difference at $p < 0.05$, ** = significant difference at $p < 0.01$,
***=significant difference at $p < 0.001$
Mann-Whitney U-test
* = significant difference at $p < 0.05$, ** = significant difference at $p < 0.01$, *** = significant difference at $p < 0.001$

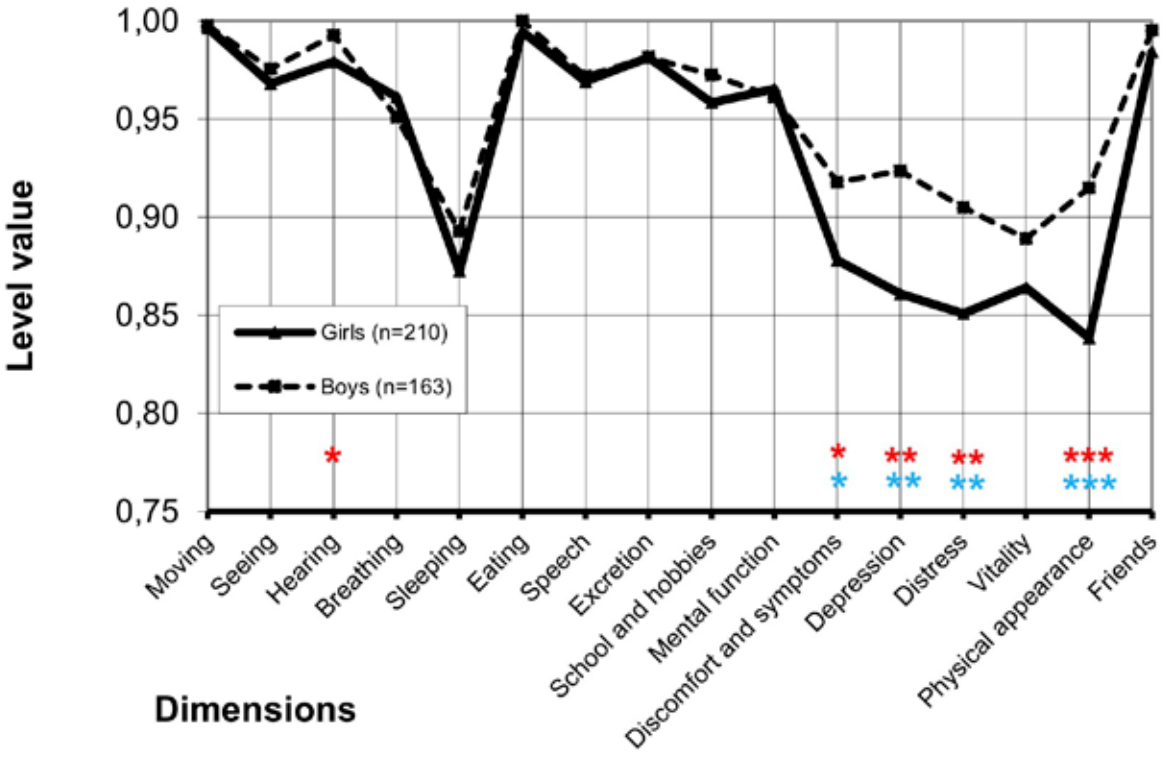

Figure 2d. The girls' and boys' mean 16D profiles 2013. Statistical significance tested between gender groups.

Student's independent samples t-test.
*=significant difference at $p < 0.005$, ** = significant difference at $p < 0.01$,
***=significant difference at $p < 0.001$
Mann-Whitney U-test
* = significant difference at $p < 0.05$, ** = significant difference at $p < 0.01$, *** =
significant difference at $p < 0.001$

DISCUSSION

This study provides updated population reference values for the 16D HRQoL instrument among Finnish 12- to 15-year-old adolescents. Such data are important for the comparison of the HRQoL of patients with various diseases to that of the general population.

Our first hypothesis that HRQoL of Finnish adolescents would have improved over the years was not supported. Similar positive development in HRQoL as reported among middle-aged and older Finnish people (3) was not observed among adolescents. Interestingly, recently published articles, comparing results of the Finnish nationwide School Health Promotion Studies from 2000 and 2015, reported inequality trends in school bullying and smoking: the likelihood of bullying and being bullied, as well as the likelihood of smoking, increased markedly among adolescents with the most socioeconomic adversity (10,11). Torikka et al. (12,13) examined depression and alcohol use comparing the School Health Promotion Studies from 2000 to 2011. They found that the largest increase in the prevalence of self-reported severe depression was seen among socioeconomically disadvantaged pupils, whereas the overall decreasing trend in frequent alcohol consumption was not observed among them. These studies clearly demonstrate the trend of polarization of adolescent health and well-being in Finland. It is possible that our results, indicating that there had been no substantial change in HRQoL between the school samples from 1996 and 2013, reflect the sum effect of this polarization.

Our second hypothesis about a deteriorating 16D score with increasing age was supported. This finding was in line with several earlier studies (5,6,14-17). The impaired HRQoL, especially in girls, has been associated with challenges in coping during developmental transition from childhood to adolescence (5,6,15). The upper graders´ impaired HRQoL, when compared to that of the lower graders, may also have implications for the need of healthcare services (17). Although the age range of adolescents in this study was narrow (12-15 years), the 16D score deteriorated as age increased. Self-reported pubertal development has been shown to have a strong deteriorating impact on HRQoL when 13- to 17-year-old girls were compared to 11- to 12-year-old girls (18). There are also some conflicting findings regarding the deteriorating effect of age on adolescents´ HRQoL, as an earlier one-year follow-up of healthy adolescents showed recalibration effects of some HRQoL domains (19), and adolescents´ chronological age and biological maturation, measured by bone age, were found to have different effects on some HRQoL dimensions (20). Moreover, among normal weight girls, biological maturation, measured by percentage of predicted adult height, was reported to be a confounding factor between chronological age and general HRQoL (21).

As postulated in our third hypothesis, the mean 16D score of boys was better than that of girls. This finding is in line with a recent Finnish study (17) and several other studies from all over the world (6,14-16,22,23). This gender difference has been associated with physiological and psychological vulnerability of adolescent girls, as well as with the social demands that girls encounter (6,24). It is also known that adolescent girls express better self-observation readiness than boys. For example, studies using the Youth Self-Report (YSR) instrument by Achenbach and Rescorla (25) have repeatedly found that girls report more problems in their emotional and behavioural functioning than boys (26,27). In agreement with previous studies by Bisegger et al. (24), Michel et al. (6) and Svedberg et al. (15), girls from the 2013 sample disclosed substantially more depression, distress and dissatisfaction with their physical appearance than boys.

STRENGTHS AND LIMITATIONS

An obvious strength of this study is that it reports adolescents´ own perceptions of their quality of life. This is important since it has previously been shown that HRQoL ratings of parents correlate weakly, or at best moderately, with the ratings of their offspring (28,29). Furthermore, the study instrument was originally developed for adolescents and it has shown good psychometric properties (7). However, the samples were collected from the capital city area of Finland, and this might limit the generalizability of our findings to the whole country.

CONCLUSIONS

Our data provides updated population reference values for the 16D HRQoL instrument, and shows that positive development in HRQoL that has been reported in middle-aged and older people has not taken place in adolescents. Our results confirm the earlier finding of substantially better HRQoL in adolescent boys than in girls and that the 16D scores on average deteriorate as age increases.

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