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Original article

Measuring mental health and well-being of school-children in 15 European countries using the KIDSCREEN-10 Index

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Abstract

Objectives: To test the psychometric properties and measurement results of the KIDSCREEN-10 Mental Health Index in school children from 15 European countries.

Methods: Within the cross-sectional Health Behaviour in School-aged Children 2005/2006 Survey, 78,000 pupils aged 11, 13, 15 answered the KIDSCREEN and additional measures. Cronbach's alpha, Rasch partial credit model itemfit and ANOVAs were conducted.

Results: Cronbach's alpha was 0.81, Rasch infit mean square residuals were 0.7–1.3. Mean scores varied 0.8 standard deviation across countries. Older pupils (effect size [ES] = 0.6), girls (ES = 0.2), pupils with low socio-economic status (ES = 0.5) or frequent health complaints (r = 0.5) reported decreased mental health.

Conclusions: The KIDSCREEN-10 displayed good psychometric properties. Measured differences between countries, age, gender, SES, and health complaints comply with theoretical considerations.

Keywords: Children & adolescents – Mental health – Well-being – HBSC Study – KIDSCREEN-10 Index.

Introduction

Mental health problems constitute a burden for those affected, for their social environment and society in general[1,2]. Nonetheless, there is still an ongoing debate on the potential rise of psychological problems in children and adolescents[3,4]. Thus, screening for mental health problems und lower subjective well-being is important for early identification of children and adolescents at risk for psychological problems or with hidden morbidity[5]. The early detection of hidden or manifest mental health problems is a prerequisite for any preventive action.

A good screening instrument should be psychometrically sound, effective and easy to administer, score and interpret. Because a single item could hardly provide enough reliability and validity, ideally a set of items – addressing those aspects which are relevant for the issue to assess – should be applied. The KIDSCREEN-10 index is an internationally developed and usable short instrument to screen for deficits in mental health and well-being in 8 to 18 year olds. The measure

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was originally developed from the longer KIDSCREEN-52 and -27 quality of life instruments[6,7]. Previous examinations showed the KIDSCREEN-10 to exhibit good psychometric properties in terms of Rasch measurement properties, reliability and validity of its scores[6].

However, in these previous analyses the KIDSCREEN-10 items were only applied in connection with the original KIDSCREEN-52 instrument[6]. Thus, there is uncertainty whether the psychometric properties will still be retained if the items of the KIDSCREEN-10 are applied alone and not within the (item-) context of the longer KIDSCREEN-52 instrument[7].

Upon this background, the aim of this paper is to examine the psychometric properties of the KIDSCREEN-10 as an independent instrument. It is important to know whether the responses to the items of the KIDSCREEN-10 could be still explained well with the Rasch Model – by calculation of the infit mean square residual itemfit statistic – as this would justify the aggregation of items to a single index value and would allow the resulting Rasch scores to be treated as interval scaled values. The Rasch model assumes that items (thresholds between answer categories) and persons can be ordered along the same latent trait continuum and that the probability of responding to the answer categories can be explained by a logistic function of the difference between the persons and the item-threshold position on the latent trait. The response to an item should not be related to the response to any other item of the scale except through their common contribution to the common score (local independence of item responses)[8].

Another aim was to test if the KIDSCREEN-10 scores displayed a similar pattern of association with additional features of the respondents as in the KIDSCREEN study[6]. It was a priori hypothesized that health complaints and low socio-economic status are associated with lower KIDSCREEN scores. A statistical interaction between age and gender was expected – in the sense that girls display lower KIDSCREEN scores and that the difference increases with higher age. The opportunity arose to test the measure within the large international Health Behaviour in School-aged Children (HBSC) 2005/06 survey.

Methods

Study design and procedure

The 2005/06 HBSC survey took part in 41 European and North-American countries and Israel. The target population of the HBSC Study were children aged 11, 13 and 15 (5th, 7th and 9th grade) visiting regular schools. The sample unit were school classes. Interviewers or teachers distributed the study questionnaire in class. In the last survey, a total of 204,534 children filled in the study questionnaire and returned it in anonymous envelopes. Fifteen countries included the KIDSCREEN-10 as an optional package in addition to the mandatory (core) package questionnaire. The inclusion as an optional package aimed at testing the feasibility of the instrument as a candidate for inclusion into the mandatory HBSC survey armamentarium for further HBSC surveys. Thus the selection of these 15 countries represents an ad hoc sample of countries which decided to include the measure on the basis of administrative and scientific consideration. A total of 78,383 girls (50.9 %) and boys (49.1 %) were surveyed with the KIDSCREEN-10. They were from Austria (n = 4,848), Belgium (n = 8,787), Bulgaria (n = 4,854), Germany (n = 7,274), Greenland (n = 1,366), Luxembourg (n = 4,387), Macedonia (n = 1,896), Portugal (n = 3,919), Romania (n = 1,605), Russia (n = 8,231), Slovenia (n = 5,130), Spain (n = 8,891), Switzerland (n = 4,621), Turkey (n = 1,668) and United Kingdom (n = 15,382). The participants were 11 years (30.2 %), 13 years (31.8 %) and 15 years (38.1 %) old. In Macedonia, Romania and Turkey only 15 year olds answered the KIDSCREEN-10. The national samples were representative for school children of the particular grades visiting regular schools. The methods and design of the HBSC study are described in detail elsewhere in this supplement[9,10].

Instruments and variables

The 10 items of the KIDSCREEN-10 Index address affective symptoms of depressed mood, cognitive symptoms of disturbed concentration, psycho-vegetative aspects of vitality, energy and feeling well, and psychosocial aspects correlated with mental health, such as the ability to experience fun with friends or getting along well at school.

("Felt fit and well", "felt full of energy", "felt sad", "felt lonely", "had enough time for yourself", "been able to do the things that you want to do in your free time", "parent(s) treated you fairly", "had fun with your friends" "got on well at school", "been able to pay attention"). For each item, five answer categories ranging from "never" to "always" or from "not at all" to "extremely" were provided. Item-answers were (re-)coded so that higher values indicate better well-being, and the sum score was transformed into Rasch person parameters (PP). The PPs were transformed into values with a mean of approximately 50 and standard deviation (SD) approximately 10[6]. The translation of the KIDSCREEN into language not already covered by an existing KIDSCREEN language version followed the standardized translation procedures and protocols of the KIDSCREEN manual[6]. These procedures included two independent forward translations, a back translation of the reconciled forward translation by a third translator and a final harmonization conference on the phone with the authors of the KIDSCREEN[6].

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Table 1. Missings, Cronbach´s alpha, corrected item-total correlation and Rasch measurement itemfit (infit mean square residual) of the KIDSCREEN-10 Items in 15 European countries.

			Infit mean square residual[e]									
	% Missing responses (1–10)	Cronbach alpha	Fit and well	Energy	Sad	Lonely	Enough time	Able do things	Parents	Friends	School	Attention
Austria (n = 4,848)	7.0 %	0.83	0.89	0.84	1.12	1.15	1.05	1.07	1.03	1.09	0.50	[d]
Belgium[a] (n = 4,311)	5.2 %	0.81	0.91	0.97	1.18	1.13	1.07	1.09	0.94	1.05	0.69	[d]
Bulgaria (n = 4,854)	5.5 %	0.80	0.94	0.92	1.05	1.08	1.07	0.96	0.96	1.10	0.65	[d]
Germany (n = 7,274)	5.7 %	0.81	0.90	0.88	1.06	1.05	1.12	1.08	1.02	1.08	0.55	[d]
Greenland (n = 1,366)	13.9 %	0.78	1.08	0.95	1.19	1.21	0.98	1.08	0.93	1.05	0.73	[d]
Luxembourg (n = 4,387)	8.4 %	0.83	0.89	0.92	1.12	1.20	1.08	1.06	0.98	1.09	0.59	[d]
Portugal (n = 3,919)	4.8 %	0.77	0.98	0.99	1.07	1.10	1.03	1.06	1.13	1.06	0.62	[d]
Romania[b] (n = 1,605)	11.4 %	0.81	0.93	0.92	1.09	1.15	1.05	1.07	0.98	1.03	0.71	[d]
Russian Federation (n = 8,231)	7.9 %	0.79	0.91	0.84	1.32	1.30	1.11	0.96	1.01	0.80	0.78	[d]
Slovenia (n = 5,130)	2.9 %	0.81	0.96	0.93	1.05	1.05	1.02	1.08	0.96	1.25	0.67	[d]
Spain (n = 8,891)	8.6 %	0.81	1.01	0.91	1.07	1.11	1.08	1.12	1.01	1.05	0.61	[d]
Switzerland (n = 4,621)	7.9 %	0.81	0.76	0.95	1.10	1.13	1.03	0.94	0.92	0.94	0.72	[d]
Turkey (n = 1,668)[b]	6.2 %	0.80	0.84	0.88	0.96	1.07	1.08	0.95	1.08	1.00	0.68	[d]
Macedonia (n = 1,896)[b]	4.0 %	0.75	0.99	0.92	1.14	1.17	1.06	1.05	1.05	1.11	0.84	[d]
United Kingdom (n = 15,382)	4.3 %	0.79	0.98	1.00	1.08	1.15	1.10	1.05	0.96	1.07	0.62	[d]
11 years (n = 23,540)	7.9 %	0.81	0.96	0.93	1.14	1.15	1.04	0.99	0.95	0.98	0.67	[d]
13 years (n = 24,794)	6.2 %	0.80	0.94	0.95	1.14	1.15	1.05	1.01	0.98	1.05	0.64	[d]
15 years (n = 29,705)	5.0 %	0.80	0.93	0.91	1.10	1.13	1.09	1.03	1.03	1.05	0.67	[d]
Girls (n = 39,881)	5.7 %	0.82	0.91	0.90	1.07	1.10	1.07	1.03	0.99	1.06	0.65	[d]
Boys (n = 38,502)	6.9 %	0.80	0.94	0.93	1.15	1.17	1.05	1.01	0.97	1.00	0.65	[d]
All (n = 78,383)	6.3 %	0.81	0.93	0.92	1.12	1.14	1.06	1.02	0.98	1.03	0.65	[d]

[a] VLG; [b]15 years old; [c] 344 cases with missing gender information; [d] Parameter is redundant; [e] infit mean squares residual values between 0.7 and 1.3 denote a good itemfit

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The respondents were also asked about age and gender. The socio-economic status of the respondent's families was assessed with the Family Affluence Scale (FAS)[11]. The FAS asks about family car ownership, having an (own) unshared room, the number of computers at home, and the number of times the child was on holidays in the past year. The FAS was collected in categories ranging from 0 to 7 which were recoded into low (0–3), intermediate (4–5), and high (6–7) FAS level.

Psychosomatic health complaints were assessed with the HBSC symptom checklist (HBSC-SCL), a brief screening instrument that asks about the frequency of occurrence of symptoms, such as headache, stomach-ache, irritability/bad temper, feeling nervous, etc[12]. A sum score is calculated.

Of the 15 countries that applied the KIDSCREEN-10 Bulgaria, Romania and Slovenia also applied the Strength and Difficulties Questionnaire (SDQ) a brief screening questionnaire that asks about children's and teenagers' symptoms and positive attitudes[13]. The SDQ asks about positive or negative attributes in 20 items regarding emotional symptoms, conduct problems, hyperactivity/inattention and peer relationship problems. A total difficulties score is generated.

Statistical analyses

The percentage of respondents with missing values was calculated. The internal consistency of the item responses was assessed via Cronbach's alpha as a measure of the reliability of the KIDSCREEN scores. A reliability of 0.7 (0.9) or higher is required for group (individual) comparisons[14]. It was tested if the 10 KIDSCREEN items fulfilled the assumptions of the probabilistic Rasch partial credit model (PCM)[15] by calculating the infit mean square residual (MSQ). Infit MSQ between 0.7 and 1.3 indicate a good fit to the Rasch model[16]. Analyses were conducted on the entire sample as well as for age-groups, gender and countries separately. The mean and standard deviation (SD) of the KIDSCREEN-10 scores were computed. Mean differences across countries, age, gender and SES were calculated and tested with ANOVA. Standardized mean differences ("d" effect size) were calculated and interpreted according to the conventions of Cohen[17]. Analyses across countries were adjusted for age and gender. The correlation between the KIDSCREEN and the HBSC-SCL was calculated.

Results

Tab. 1 shows 6.3 % of the respondents had one or more missings in the KIDSCREEN-10. The prevalence was slightly higher in younger children and some differences between countries were observed. The internal consistency of the KIDCREEN item-responses was Cronbach's alpha = 0.81 and ranged from 0.75 (Macedonia) to 0.83 (Austria / Luxembourg). The Rasch Infit MSQ ranged from 0.65 to 1.14, indicating a good fit to the Rasch PCM. The largest Infit MSQ observed in any country was 1.32; the smallest value observed in any country was 0.50. The first value denotes a neglectable slightly lower discrimination for the particular item. The second value hints at overfit – i.e. the particular item is overdiscriminating.

Tab. 2 shows an average score of 47.5 for the KIDSCREEN, the standard deviation was 9.7. For countries which applied the KIDSCREEN across the entire 11- to 15 year age range, the highest mean value observed was 50.7 in Austria. The lowest mean score was 43.2 and was observed in Russia. This difference is approximately 0.8 SD and thus could be classified as a large effect[17].

Countries surveying only 15-year olds achieved on average lower mean scores (41.2 to 47.7). Older respondents reported lower KIDSCREEN values. For the total sample the standardized mean differences between 11 and 15 year olds was 0.58, denoting a medium effect size. The effect was largest for Bulgaria (0.75) and smallest for Greenland (0.24). Boys scored higher than girls, the standardized mean difference was 0.24 (small effect) and ranged from 0.14 (Russia) to 0.56 (Romania) with no statistically significant difference for Greenland.

As a priori expected, a statistical interaction between age and gender was observed: For the 11 year olds mean values of 51.1 (boys) and 50.3 (girls) were observed. For the 13 year olds the mean values were 48.8 (boys) versus 46.1 (girls). This difference further increased to 46.7 (boys) versus 43.5 (girls) for the 15 year olds.

A low socio-economic status – measured with the FAS – was associated with lower KIDSCREEN values. The standardized mean difference between low and high FAS was 0.46 (small / medium effect) on the overall sample and ranged from 0.21 in Slovenia to 0.42 in Russia.

In the overall sample the KIDSCREEN-10 correlated r = 0.48 with the HBSC psychosomatic complaints Symptom Checklist. The range across countries was 0.26 (Greenland) to 0.55 (Luxembourg).

Correlation between KIDSCREEN-10 and SDQ Total Difficulties Score was r = -0.49 and ranged from -0.48 (Bulgaria) to -0.53 (Romania).

Discussion

The psychometric results showed the KIDSCREEN-10 items to be accepted and understood by the majority of the respond-

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Table 2. Age, gender and socio-economic status differences in mental health: Means and SDs of the KIDSCREEN-10 index in 15 European countries.

Countries	All		11 years		13 years		15 years		boys		girls		FAS low		FAS medium		FAS high	
	Mean[b]	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ALL	47.45	9.73	50.67	10.71	47.39	9.42	45.05	8.39	48.65	9.78	46.31	9.55	44.62	9.41	47.45	9.58	49.05	9.71
ES[a]			0.58**						0.24**				0.46**					
Austria	50.71	11.10	54.77	11.90	50.06	10.74	47.17	8.98	52.21	11.33	49.29	10.68	48.01	11.52	50.65	10.57	51.65	11.41
ES[a]			0.69**						0.26**				0.33**					
Belgium[b]	49.92	9.58	53.29	10.26	49.46	9.30	47.01	8.24	50.52	9.69	48.87	9.40	48.17	9.28	49.38	9.48	50.47	9.68
ES[a]			0.66**						0.17**				0.24**					
Bulgaria	46.26	9.69	50.39	10.43	45.14	9.17	43.11	7.90	47.59	9.80	44.75	9.39	44.23	9.32	46.87	9.65	47.78	10.00
ES[a]			0.75**						0.29**				0.37**					
Germany	49.62	10.16	52.86	11.31	49.12	9.82	46.91	8.52	50.89	10.20	47.98	9.90	47.80	10.65	48.81	9.99	50.56	10.08
ES[a]			0.59**						0.29**				0.27**					
Greenland	47.72	10.94	48.71	12.03	48.30	10.55	46.05	9.96	48.23	10.93	47.32	10.95	46.87	10.67	48.93	11.31	49.67	11.32
ES[a]			0.24**						0.08				0.25**					
Luxembourg	46.80	10.36	50.50	11.20	46.48	10.13	43.41	8.67	48.49	10.52	44.68	9.84	43.97	10.72	45.56	10.30	47.55	10.22
ES[a]			0.68**						0.37**				0.35**					
Portugal	48.88	8.44	51.65	9.02	48.73	8.22	45.99	7.16	49.82	8.33	47.56	8.39	47.34	8.28	48.62	8.48	49.71	8.44
ES[a]			0.67**						0.27**				0.28**					
Romania[b]	43.16	7.41					42.60	7.41	49.82	8.33	47.56	8.39	41.22	7.32	43.67	7.38	44.27	7.00
ES[a]									0.56**				0.41**					
Russian Federation	43.25	8.43	43.79	9.29	43.31	8.58	42.47	7.32	43.81	8.90	42.62	7.95	42.03	7.92	43.87	8.46	45.53	9.51
ES[a]			0.16**						0.14**				0.42**					
Slovenia	46.84	9.67	50.48	10.70	45.48	8.73	44.55	8.37	47.96	9.66	45.74	9.56	45.25	10.12	46.78	9.63	47.25	9.45
ES[a]			0.61**						0.23**				0.21**					
Spain	48.59	9.77	53.00	10.38	47.75	9.28	44.98	7.81	49.37	9.64	47.62	9.81	46.01	9.58	48.26	9.63	49.57	9.72
ES[a]			0.82**						0.18**				0.37**					
Switzerland	50.07	9.40	51.72	9.99	50.05	9.02	48.34	8.91	51.35	9.35	48.75	9.26	47.93	9.97	49.16	9.17	51.20	9.32
ES[a]			0.36**						0.28**				0.35**					
Turkey[b]	41.18	8.92					41.28	8.92	42.51	8.99	39.84	8.61	40.24	8.85	42.82	8.37	42.80	8.70
ES[a]									0.30**				0.29**					
Macedonia[b]	47.72	8.71					47.71	8.71	49.28	8.77	46.17	8.38	45.83	8.20	48.92	8.63	49.30	9.39
ES[a]									0.36**				0.40**					
United Kingdom	47.50	8.91	49.75	9.56	47.50	8.76	45.19	7.80	48.40	8.62	46.49	9.07	45.89	8.99	47.07	9.05	48.13	8.75
ES[a]			0.51**						0.21**				0.25**					

[a] "d"-effect size (0.20 = small; 0.5 = medium; 0.8 = large); *p <0.05; **p <0.01; [b] controlled for age and gender

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ents in the different countries. The items were answered in a consistent manner and thus provide the reliability required for the comparison of even small groups. The actual response behaviour of the children and adolescents could be explained well by the probabilistic Rasch PCM and the estimated position of the respondents on the assumed latent trait "mental health and well-being". Thereby the KIDSCREEN enables an interval scaled measurement of mental health and well-being[8]. The calculation of difference scores and the application of parametric test statistics is thus justified. These results confirmed the good psychometric properties – including Rasch scalability and high internal consistency – already demonstrated in the European KIDSCREEN survey[6]. The present results showed the KIDSCREEN-10 Items to be functioning as good indicators irrespective of the actual context they are applied within.

The measurement results revealed noticeable differences between the 15 countries. Seemingly, the former Eastern European countries achieved – on average – lower scores. Similar findings were observed for other HBSC health indicators[18]. The 15 countries under study achieved – on average – slightly lower scores than in the KIDSCREEN survey where the mean score was 50. While this difference could be attributed in part to the different selection of countries, for similar countries small differences were observable, too: Austria (50.7 vs. 53.3), Switzerland (50.1 vs. 52.8); Germany (49.6 vs. 52.1), Spain (48.6 vs. 52.7) and UK (47.5 vs. 48.3) participated in both surveys. These differences might be explained by the different age ranges (KIDSCREEN survey: 8–18 years; HBSC study: 11–15 years) and the different procedures (school- versus postal survey). However, the rank order between these countries was retained for the most part.

Lower scores for older and female children were observed, whereby the gender differences increased with higher age. This might reflect increasing school and gender role pressures, especially for girls as they grow older. Similar results were issued from the KIDSCREEN survey[19] and are also known from other indicators of subjective health[11].

The a priori hypotheses and previous results[20] on lower KIDSCREEN scores in respondents with lower family affluence were confirmed. Multiple recurrent health complaints and mental health problems were also associated with lower KIDSCREEN scores which is a finding that was a priori hypothesized and is known from other studies. The magnitude of the effects resembled those reported in the KIDSCREEN survey[6] and confirmed the construct validity of the KIDSCREEN-10. Both psychosomatic health complaints and the KIDSCREEN-10 mental health Index might be regarded as indicators of underlying mental health problems. Furthermore, it is likely that both are sensitive to the impact of psychosocial strains and stresses. Yet, psychosomatic health complaints themselves could be viewed as burdensome, too, and thus impact upon mental health[21]. Mental health problems on the SDQ were associated with lower scores on the KIDSCREEN-10 which was also a priori hypothesized. Both measures address mental health of children and adolescents. The strength of this association could be classified as a nearly large correlation. Large effect sizes between responders with and without mental health problems had been observed in previous studies as well[6,22]. Thus, our results confirmed the convergent validity of the KIDSCREEN-10 scores with regards to mental health problems. Differences in the access to material resources or reactions to stress are discussed as mechanisms linking SES to adolescents well-being[22]. Taking into account the content of the FAS scale, adolescents with better access to places for e. g. social and educational purposes due to possession of a car in the family; with more privacy because of an own bedroom; with experience of different cultures while on holidays and better access to media due to computer ownership report better well-being[20].

Limitations of the current work concern the fact that no explicit tests of unidimensionality and differential item functioning of the KIDSCREEN items across countries were performed[8]. Further investigations should also focus on trying to separate effects on the individual level from those on country level by means of multilevel analysis. However, the actual number of countries might not enable reliable and valid estimation of the distribution of the slopes (strengths of association) and intercepts (prevalence) across countries, because there are only 15 aggregated units (data points) available on the country level. Another methodological consideration concerns the validity of the measures FAS and the HBSC-SCL when used for validation. One has to bear in mind that, e. g. the FAS only addresses material aspects of socio-economic status and omits important aspects, such as e. g. parent's job status and education level; and the HBSC-SCL only represents a strictly non-clinical measure of subjective health complaints.

In summary, the KIDSCREEN-10 proved to function as a Rasch scaled measure with good psychometric properties in the 15 European countries under study. Its use as a screening instrument for mental health problems and impaired well-being could be recommended for the HBSC study, but also other national and international surveys. Further research should focus on testing the KIDSCREEN-10 in clinical settings and populations.

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References

1. World Health Organization. Caring for children and adolescents with mental disorders: setting WHO directions. Geneva, Switzerland: World Health Organization, 2003.

2. World Health Organization. Atlas: child and adolescent mental health resources: global concerns. Geneva, Switzerland: World Health Organization, 2005.

3. Roberts RE, Attkinsson CA, Rosenblatt A. Prevalence of psychopathology among children and adolescents. Am J Psychiatry 1998;155:715–25.

4. Collishaw S, Maughan B, Goodman R, Pickles A. Time trends in adolescent mental health. J Child Psychol Psychiatry 2004;45:1350–62.

5. Varni JW, Burwinkle TM, Lane MM. Health-related quality of life measurement in pediatric clinical practice: an appraisal and precept for future research and application. Health Qual Life Outcomes 2005;3:34.

6. Ravens-Sieberer U, the KIDSCREEN Group Europe. The KIDSCREEN questionnaires. Quality of life questionnaires for children and adolescents – handbook. Lengerich, Germany: Papst Science Publisher, 2006.

7. Ravens-Sieberer U, Gosch A, Rajmil L, et al. The KIDSCREEN-52 Quality of Life measure for children and adolescents: psychometric results from a cross-cultural survey in 13 European Countries. Value Health 2007: doi:10.1111/j.1524-4733.2007.00291.x.

8. Embretson SE, Reise SP. Item response theory for psychologists. Mahwah, USA: Lawrence Erlbaum Associates, 2000.

9. Currie C, Nic Gabhainn S, Godeau E. The Health Behaviour in School-Aged Children: WHO Collaborative Cross-National (HBSC) Study: origins, concept, history and development 1982–2008. Int J Public Health 2009; DOI: 10.1007/s00038-009-5404-x.

10. Roberts C, Freeman J, Samdal O, et al. & MDG and the HBSC study group. The Health Behaviour in School-aged Children (HBSC) study: methodological developments and current tensions. Int J Public Health 2009; DOI: 10.1007/s00038-009-5405-9.

11. Currie CE, Nic Gabhainn S, Godeau E, et al. Inequalitites in young peoples health. HBSC international report from the 2005/2006 Survey. Copenhagen, Denmark: WHO Regional Office for Europe (Health Policy for Children and Adolescents, No. 5), 2008.

12. Ravens-Sieberer U, Erhart M, Torsheim T, et al. and the HBSC Positive Health Group. An international scoring system for self-reported health complaints in adolescents. Eur J Public Health, 2008 doi: 10.1093/eurpub/ckn001.

13. Goodman R. The Strengths and Difficulties Questionnaire: a research note. J Child Psychol Psychiatry 1997;38:581–6.

14. Nunnally JC, Bernstein IR. Psychometric Theory (3rd edition). New York, USA: McCraw-Hill, 1994.

15. Masters E. A Rasch model for partial credit scoring. Psychometrika 1982;47:149–74.

16. Bond TG, Fox CM. Applying the Rasch Model. Mahwah, USA: Lawrence Erlbaum, 2001.

17. Cohen J. Statistical Power Analysis for the Behavioural Sciences. New York, USA: Erlbaum, 1988.

18. Ravens-Sieberer U, Ottova V, Torsheim T, Hetland J, Vollebergh W, Cavallo F, Jericek H, Alikasifoglu M, Välimaa R, Erhart M, and the Positive Health Focus Group. Subjective health, symptom load and quality of life of children and adolescents in Europe. Int J Public Health 2009; DOI: 10.1007/s00038-009-5406-8.

19. Bisegger C, Cloetta B, von Rueden U, et al. Health-related Quality of Life: gender differences in childhood and adolescence. Soz Praventivmed 2005;50:281–91.

20. Eriksen HR, Svendsrod R, Ursin G, et al. Prevalence of subjective health complaints in the Nordic European Countries in 1993. Eur J Public Health 1998;8:294–8.

21. von Rueden U, Gosch A, Rajmil L, et al. Socioeconomic determinants of health related quality of life in childhood and adolescence: results from a European study. J Epidemiol Community Health 2006;60:130–5.

22. Ravens-Sieberer U, Erhart M, Gosch A, et al. Mental health of Children and Adolescents in 12 European Countries – Results from the European KIDSCREEN Study. Clin Psychol Psychother 2008;15:154–63.

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