Subjective health complaints in adolescence

A cross-national comparison of prevalence and dimensionality

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Background: The purpose of this work was to study the prevalence and dimensionality of subjective health complaints in a cross-national population of adolescents. Methods: The analyses were based on data from a WHO cross-national survey, Health Behaviour in School-aged Children (HBSC). The study included a representative sample of 11, 13 and 15-year-old adolescents from Finland, Norway, Poland and Scotland. Data were collected in 1993–1994 and the total sample included 20,324 adolescents. Subjective health complaints were measured by the HBSC Symptom Checklist (HBSC-SCL), including headaches, abdominal pain, backache, feeling low, irritability, nevousness, sleeping difficulties and dizziness. Descriptive analyses, MANOVA and structural equation modelling (EQS) were conducted. Results: Patterns of reporting were consistent for all four countries. A large number of students reported a high level of symptoms. The reporting of most symptoms increased with age. Girls reported significantly more symptoms than boys and the gender differences also increased with age. Structural equation modelling suggests a model of two correlated factors, which can be labelled psychological and somatic. Conclusion: The findings of this study indicate that students report a high level of subjective health complaints already at the age of 11 years. The reporting of most symptoms increases with age and more so for girls than for boys. The finding of two dimensions that differ qualitatively, suggests that these dimensions may have different etiologies.

Keywords: adolescence, confirmatory factor analysis, cross-national, subjective health complaints

Subjective health complaints refer to symptoms experienced by the individual with or without a defined diagnosis: e.g. abdominal pain, headache, backache, nervousness, sleeping difficulties, etc., and constitute a diverse set of symptoms where few are related to a defined diagnosis or disease.[1] Headache and abdominal pain were the somatic symptoms most often reported in previous studies.[1,2–5] Backache and muskuloskeletal symptoms were also frequently reported[4,6–9] whereas irritability, lack of concentration and nervousness were prevalent psychological complaints.[4,9,10] Studies in non-clinical populations indicated that most health complaints increase with age.[4–6,10,11] Previous studies consistently found that girls reported more symptoms than boys did and that these gender differences increased with increasing age.[5,6,10]

Research from several countries demonstrates a coexistence of health complaints, in that the reporting of one symptom significantly increases the probability of reporting one or more others.[3,6,7,12] This clustering of health complaints emphasizes the need to study underlying dimensions, rather than specific symptoms or illnesses. Factor analytic studies in adolescent populations suggest that subjective health complaints may reflect two or more underlying dimensions. Hopland et al.[13] studied eight health complaints and proposed a two-factor model, with one somatic (e.g. headache, abdominal pain) and one psychological factor (e.g. feeling low, irritability). Hurrelman et al.[14] studied 18 complaints and suggested three underlying factors. These were labelled as vegetative (e.g. nervousness, trembling hands), physiological (e.g. headache, gastric disorders) and area-specific complaints (e.g. backache, chest pains). Wisniewski et al.[15] studied the Psychosomatic Symptom Checklist (PSC) in a sample of 11–14-year-olds, where 17 common complaints were listed. Factor analysis demonstrated that 70% of the total variance was accounted for by one factor (headache, stomach pain, insomnia, fatigue, depression, nausea, general stiffness, heart palpitation, and eye pain associated with reading, diarrhoea/constipation, dizziness and weakness). A second factor was interpreted as a vocabulary factor, containing items, which were hard to understand, by this age group (e.g. spastic colitis). These items were later excluded from a children's version of the PSC. The PSC showed modest, though significant, correlation with common measures of depression and anxiety in this age group.

Attanasio et al.[16] studied the Psychosomatic Symptom Checklist in late adolescence (mean age 18.5). Factor

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analysis revealed one major factor on which all but two of the items loaded significantly. However, in late adolescence the correlation between the psychosomatic complaints assessed by the PSC and measures of psychological distress were found to be low. In a population of healthy adults, Ursin et al.[17] demonstrated four consistent and independent factors, where each factor represented different organ systems: muscle pain, gastrointestinal problems, allergies/colds and pseudoneurological complaints (e.g. dizziness, anxiety).

Comparison and interpretation of previous studies is complicated by methodological differences (e.g. definition of symptoms and time frame). Cross-national studies may reveal patterns of reporting and contribute to a further understanding of the phenomenon of health complaints. Against this background, and focusing on cross-national consistencies, the aim of the present paper is:

- to examine and compare the prevalence of subjective health complaints according to age and gender in adolescents from Finland, Norway, Poland and Scotland and
- to identify the dimensions of subjective health complaints in each country.

METHODS

The analyses were based on data from a WHO cross-national survey, Health Behaviour in School-aged Children (HBSC).[10,18] All participating countries followed the same protocol.[18] The HBSC studies were carried out every fourth year in the period from 1983–1984 and onwards. In 1993–1994, 25 countries participated. The data presented here is from the 1993–1994 study in Finland, Poland, Scotland and Norway. These countries fulfilled the following criteria: nationally representative data sets, complete and comparable data for the variables under study, four countries that depict different parts of Europe, and more pragmatic reasons such as space considerations (for publication) and established collaborative research.

Sample and design

The sample was drawn by systematic cluster sampling in each country.[10] The primary sampling unit was the school class. A design factor model was therefore used to predict standard errors. Design factors were calculated using the 1989–1990 survey data from Canada, Scotland and Wales. These indicate that nearly all design factors lie within the range 1.0–1.5. The sample size in each country for the 1993–1994 survey was therefore based on a design factor of 1.5; thus, a sample size one and one-half times larger than would be the case if individual students were selected randomly.[10] Allowing for this, the samples can be treated as representative of the age groups studied in each country (note: the Swedish-speaking population was not included in the Finnish sample). The total sample of participating students was 20,324. In Finland 5,886 pupils participated, in Norway 4,952, in Poland 4,527 and in Scotland 4,959 pupils. The samples were drawn from three age-groups with mean ages 11.8, 13.8 and 15.8 in Finland; 11.5, 13.5 and 15.5 in Norway; 11.7, 13.7 and 15.7 in Poland and 11.5, 13.5 and 15.6 years in Scotland. Both sexes were equally represented in all countries.

Missing responses

Missing responses were mainly due to non-cooperation of classes or schools, or students being absent when the questionnaire was administered. The response rate was 93% in Finland, 82% in Norway, 91% in Poland and 78% in Scotland. During the cleaning procedure, students who had 25% missing or more on 20 core variables were excluded. So were students who were more than one year above or below the age means of 11.5, 13.5 and 15.5 years, and students with data missing on the variable 'sex'.[18] These procedures excluded 88 (1.5%) students in Finland, 99 (2.0%) students in Norway, 72 (1.6%) students in Poland and 111 (2.2%) students in Scotland. For the present analyses, students who were non-respondents on any of the eight health complaints were also excluded. This procedure excluded 61 students in Finland (1.0%), 116 in Norway (2.3%), 130 in Poland (2.9%) and 98 in Scotland (2.0%).

Data collection

In Finland, the data was collected in March 1994; in Norway, December 1993 and in Poland and Scotland in February 1994. Data was collected through anonymous, self-completion questionnaires, which were pre-coded. Teachers administered the surveys in the classroom and the students returned the questionnaires in sealed envelopes.

Measurement

- Subjective health complaints

Subjective health complaints were measured by the HBSC Symptom Checklist (HBSC-SCL). This includes the items headache, abdominal pain, backache, feeling low, irritability or bad mood, feeling nervous, sleeping difficulties and dizziness. The students reported on a five-point scale if each symptom was experienced most days, more than once a week, about once every week, about once every month, or seldom or never. Ratings were made on a 0–4 scale, where non-occurrence of a symptom was rated as 0 and occurrence most days rated as 4. Sum-scores were calculated for each student with a minimum=0 and maximum=32. The health complaints studied were included in previous HBSC-studies [19,20] and in symptom checklists used in other studies.[9,15] The eight symptoms included were previously found to be sensitive to the presence of psychosomatic disorders and psychological distress.[1,5,21] The items have shown adequate psychometric properties in symptom checklists.[15]

- Validity and reliability

Previous studies lend support to the assumption that adolescents are capable of evaluating and reporting feelings and complaints reliably.[15] Pilot testing and previous studies suggest that 11, 13 and 15-year-olds are able to understand and complete the questionnaire used in this study. The health complaints included are thought to be well defined and measure experienced complaints,

without significant problems of face validity. The questionnaire was translated from English to the language of each country and later retranslated back to English. Item-total correlation was computed for each of the eight items. This showed significant ($p<0.001$) correlation for all of the items in all four countries. Cronbach's alpha was computed for the total list of items and represents the expected correlation of one test with an alternative form containing the same number of items. The alpha coefficient was 0.79 for Finland, 0.78 for Norway, 0.75 for Poland and 0.78 for Scotland, indicating an adequate internal reliability. The items included in the HBSC-SCL were included in a test–retest study carried out in May 1998 in a sample of 510 adolescents aged 10–16 years. The test–retest was conducted with a one-week interval in a convenience sample from four schools participating in the European Network of Health Promoting Schools. Intraclass correlations (ICC) were for headache: 0.68, abdominal pain: 0.69, backache: 0.74, feeling low: 0.64, irritable: 0.63, nervous: 0.65, sleeping difficulties: 0.71 and dizziness: 0.72.

All of the symptoms included in this study except irritable/bad temper and nervousness were included in The Children's Psychosomatic Symptom Checklist.

A test–retest study carried out by Wisniewski[15] on 11–14-year olds using the 17-item Psychosomatic Symptom Checklist with one and five-week intervals, generally showed significant correlation. All items included in the present study, with the exception of dizziness, were significant and exceeded 0.60 at both one and five-week intervals. Dizziness showed a low correlation coefficient at a five-week interval; 0.71 at one week and 0.21 at the five-week retest.

- Statistical analyses

All analyses were repeated for each of the four countries separately. Frequency distributions were examined for each health complaint. Group differences were examined by analysis of variance (MANOVA). Significance levels of bivariate associations between variables were assessed by chi-square tests. Analyses were carried out by means of SPSS for Windows (7.0 and 9.0). The dimensionality of health complaints was tested by confirmatory factor analysis, using structural equation modelling (EQS for Windows, version 5.4).[22]

- Goodness of fit measures

EQS provides several measures of the fit between a hypothesized model and the data set. Three of these goodness-of-fit indices will be discussed here: Comparative Fit Index (CFI), chi-square and Akaike's Information Criterion (AIC). The Comparative Fit Index (CFI) varies from zero to 1.00 and is derived from the comparison of a hypothesized model with the null model. It provides a measure of complete covariation in the data. A value greater than 0.90 indicates an acceptable fit to the data. The independent chi-square statistic serves as a measure against which to compare alternative models. Controlling for degrees of freedom, a high chi-square indicates bad fit.[22] The chi-square is known to be a sensitive measure and is inflated with increasing N. Change in chi-square is used to test for changes in goodness of fit for nested models, e.g. for models where one or more paths have been removed from the original model. The Akaike's Information Criterion (AIC) addresses the statistical goodness of fit taking into account the number of estimated parameters. This measure is useful to compare non-nested models (models which cannot be derived from an original model by deleting paths). A low AIC indicates a good fit to the data.[22]

RESULTS

The main findings were consistent among the four countries studied. *Table 1* shows the frequency of subjective health complaints according to age, sex and country. The categories are combined to illustrate symptoms about every week or more often, and about every month or more seldom. Headache was the most common somatic complaint and irritability was the psychological symptom most often reported. Nervousness was also frequently reported and the reporting of this symptom varied more between countries. In Poland 15-year-old girls reported the highest prevalence of being nervous weekly or more often.

Variations according to age, gender and country

Generally, the pattern of complaints was found to be consistent between countries, although the prevalence varied. Finnish students reported the highest prevalence of complaints, followed by Scotland, Poland and Norway. The prevalence rates of symptoms reported every week or more often are presented in *table 1* since these are thought to be of greatest interest. The following analysis was based on mean scores to study age, gender and country effects. A three-way MANOVA was conducted with the scores on eight items as dependent variables. The results are based on Pillai's trace. Multivariate F values are listed in *table 2*. The three-way interaction between age, gender and country was not significant. All other two-way and main effects were significant. Based on the univariate F, significant interactions for age and country were found for all of the health complaints with the exception of irritability. By looking at the mean values (note: available from the authors) and the results displayed in percentage terms in *table 1*, it can be seen that there is an increase in reporting of symptoms with increasing age. In Finland the increase takes place between 11 and 13 years of age and then levels off. In Scotland most of the increase is before the age of 13, but there is also an increase from 13 to 15 years. In Poland and Norway there is a more gradual increase across the age groups studied. Based on the mean values, girls reported significantly more symptoms than boys in all countries and the gender differences also increased with age. Significant interaction for age and gender was found for headache, feeling low, nervousness and sleeping difficulties ($p<0.05$) so that girls reported more symptoms than boys weekly or more often. Significant interaction for gender and country were found for the items of headache, backache, irritable/bad temper and nervousness ($p<0.05$). The level of symptom reporting

between girls and boys differed most in Poland for all of these symptoms. For the items of headache, backache and irritability the gender differences were least pronounced in Scotland. The difference between boys and girls in reporting nervousness was least pronounced in Finland.

Structural equation modelling (EQS)

Previous studies suggest that the health complaints studied here reflect two or more underlying dimensions.[13,15–17] However, a one-factor model could also be supported on empirical and theoretical grounds.[15,17] According to these findings, one- and two-factor models were tested in the present study to fit the eight items of health complaints. A two-factor model was proposed where the symptoms of headache, abdominal pain, backache and dizziness represented one factor, and feeling low, irritable, nervousness and sleeping difficulties represented a second factor.

Table 3 shows the comparison of the models tested. Model 1 had a single factor for all eight measures. The parameter estimates were allowed to be different for each of the

Table 2 Results of multivariate analysis (MANOVA)

Term	F	df	p
Age * sex * country	1.28	48, 119358	ns
Age * country	4.43	48, 119358	<0.001
Sex * country	4.43	24, 59670	<0.001
Sex * age	7.44	16, 39778	<0.001
Country	122.96	24, 59670	<0.001
Age	34.31	16, 39778	<0.001
Sex	82.49	8, 19888	<0.001

Table 1 Subjective health complaints experienced weekly or more often, according to country, age and gender

	Age	Finland %		Norway %		Poland %		Scotland %	
	(years)	Boys[1,2,3]	Girls[4,5,6]	Boys[1,2,3]	Girls[4,5,6]	Boys[1,2,3]	Girls[4,5,6]	Boys[1,2,3]	Girls[4,5,6]
Headache	11	25	36	14	24	14	29	22	27
	13	27	42	17	21	14	26	26	35
	15	24	47	17	31	14	33	22	44
	p (sex/age)	***/***		***/**		***/ns		***/***	
Abdominal pain	11	17	25	16	24	12	24	17	23
	13	16	25	13	18	7	18	18	25
	15	14	23	11	18	6	13	10	21
	p (sex/age)	***/ns		***/***		***/**		***/**	
Backache	11	9	9	8	10	3	9	8	7
	13	12	15	12	13	7	8	14	11
	15	17	17	18	19	8	11	13	14
	p (sex/age)	ns/***		ns/***		***/**		ns/***	
Dizziness	11	10	13	10	14	6	12	17	20
	13	14	21	11	15	6	14	20	24
	15	19	25	14	20	11	18	19	22
	p (sex/age)	***/***		***/***		***/***		**/ns	
Feeling low	11	27	30	15	21	8	13	16	19
	13	29	39	17	23	10	20	17	27
	15	23	37	15	29	12	29	17	31
	p (sex/age)	***/***		***/*		***/***		***/***	
Irritable	11	52	57	34	45	33	40	46	44
	13	54	64	42	46	38	45	49	48
	15	49	59	39	47	36	50	49	46
	p (sex/age)	***/**		***/*		***/**		ns/ns	
Nervous	11	39	36	17	23	41	50	29	29
	13	41	44	20	23	52	62	29	37
	15	36	45	17	22	52	69	27	36
	p (sex/age)	ns/**		***/ns		***/***		***/*	
Sleeping difficulties	11	29	31	26	34	20	22	38	38
	13	30	33	24	27	16	20	27	33
	15	28	30	21	29	15	24	29	38
	p (sex/age)	*/ns		***/**		***/ns		**/***	

* p<0 05, ** p<0.01, *** p<0.001
Boys 11 years; Finland, n=1208; Norway, n=765; Poland, n=681; Scotland, n=948
Boys 13 years; Finland, n=869; Norway, n=849; Poland, n=705; Scotland, n=768
Boys 15 years, Finland, n=844; Norway, n=816; Poland, n=782; Scotland, n=632
Girls 11 years; Finland, n=1171; Norway, n=793; Poland, n=740; Scotland, n=995
Girls 13 years; Finland, n=868; Norway, n=821; Poland, n=773; Scotland, n=789
Girls 15 years; Finland, n=865; Norway, n=792; Poland, n=716; Scotland, n=729

countries, i.e. there were no constraints. This model has an adequate fit (0.91) and is better than model 2, which has two uncorrelated factors; there is no mechanism for linking items 1–4 with items 5–8. The best model was a two-factor model (model 3), where the factors were allowed to correlate, the factor loading to be different for each of the countries and allowed the correlation between factors to differ between countries. *Table 4* lists the parameter values and factor correlation for a model with two correlated factors. There were some variations between countries in factor loading, but these variations were quite slight. More interesting were the patterns that emerged when looking at the variations between countries in the factor correlation. In Scotland, the two sets of symptoms (factor 1 and factor 2) were quite substantially correlated (0.83), whereas in Poland the correlation was somewhat lower (0.64).

DISCUSSION

The health complaints studied are common ailments in a normal population. They are also cardinal symptoms of psychiatric disorders such as depression, personality disorders and anxiety. The findings here are based on self-report data from questionnaires. We do not know how the reported symptoms influence the lives of adolescents. However, from a public health perspective, a large number of adolescents reported a high level of symptoms, likely to influence both wellbeing and functional ability.

Cross-national differences

The results of this study suggest that the level of self-reported health complaints differ between adolescents in Finland, Norway, Poland and Scotland, but the patterns emerging according to age and gender were consistent among the four countries. The Finnish sample reported most symptoms, closely followed by Scotland. Differences between countries may be due to differences in the expression of symptoms, as well as culturally related differences in the willingness to report illness. Other explanatory factors are diversity in language and discrepancies due to translation of the questionnaire. To determine the relevance of these findings further studies must be carried out on each country's data set, also including contextual variables.

Age and gender

In the present study, girls reported more symptoms than boys and the gender differences increased with age. It has been argued that women and girls are more aware and sensitive to their bodies, more accepting of a disease status and more willing to talk about experienced symptoms.[23] Previous research suggests that emotional disturbances may be expressed as health complaints in girls and acting-out or aggressive behaviour in boys.[24] Thus, behavioural role differences, rather than bodily experience, may determine gender differences. Behavioural roles may also demonstrate gender differences in the way that these

Table 3 Comparison of models fitted to subjective health complaints; data from Finland, Norway, Poland and Scotland combined

Model	χ^2	df	p	Change	χ^2	df	p	AIC	CFI
1	3207.15	80	<0.001		–	–	–	3047.14	0.906
2	7162.44	80	<0.001		–	–	–	7002.44	0.788
3	920.36	76	<0.001	2 vs 3	6242.08	4	<0.001	768.35	0.975
4	3765.28	127	<0.001	4 vs 3	2844.92	51	<0.001	3511.28	0.891
5	1754.99	103	<0.001	4 vs 5	2010.29	24	<0.001	1548.99	0.951
6	1675.91	100	<0.001	5 vs 6	79.08	3	<0.001	1475.91	0.953

Model 1: 1 factor solution, no constraints between countries
Model 2: 2 uncorrelated factors, no constraints between countries
Model 3: 2 correlated factors, no constraints between countries
Model 4: 2 correlated factors, all parameters constrained between countries
Model 5: 2 correlated factors, factor loading and factor correlation constrained between countries
Model 6: 2 correlated factors, factor loading constrained between countries
CFI: Comparative Fit Index
AIC: Akaike's Information Criterion

Table 4 Parameter values for a two correlated factor solution with no constraints between countries

		Finland	Norway	Poland	Scotland
a)	Factor 1 – Headache	0.67	0.66	0.66	0.65
b)	Factor 1 – Abdominal	0.65	0.64	0.56	0.63
c)	Factor 1 – Backache	0.46	0.45	0.40	0.47
d)	Factor 1 – Dizziness	0.52	0.62	0.54	0.62
e)	Factor 2 – Feeling low	0.72	0.72	0.59	0.66
f)	Factor 2 – Irritable	0.75	0.67	0.77	0.60
g)	Factor 2 – Nervous	0.75	0.57	0.73	0.55
h)	Factor 2 – Sleeping difficulties	0.45	0.49	0.40	0.52
r)	Factor 1, Factor 2	0.68	0.76	0.64	0.83

influence the development of disease. The present study does not have data on puberty status, but more girls than boys will have reached puberty in the age groups studied (11, 13 and 15 years).

Girls who mature early were previously found to report more health complaints.[25] Developmental processes may therefore contribute to gender differences in the present study. Gender differences may also originate from cyclical hormonal change (e.g. period pain), but does not explain an increased reporting of symptoms weekly or more often.

In keeping with previous research, this study showed an increase in reporting of symptoms between the ages of 11 and 15 years. There was a peak prevalence of recurrent abdominal pain in the youngest age group. For most other complaints this age group reported the lowest prevalence. Peak prevalence for headache in previous studies was found to be 12 years of age, deviating from the present study. Recurrent abdominal pain was found to increase gradually from three to nine years of age and then decrease up to adolescence.[1] The present study is based on a cross-sectional sample and does not allow conclusions about age effects. To draw conclusions on the developmental aspect there is a need for prospective, longitudinal studies. Further, this study do not explain the strength and substantive meaning of the association between the studied variables and calls for future studies where explanatory factors (e.g. social) are included.

The nature of health complaints

Results of factor analyses were consistent among the countries studied. Structural equation modelling suggests a model where the symptoms studied are expressed by two correlated factors. These factors can be labelled as psychological and somatic. However, a model with one single factor for all eight items also demonstrated an adequate fit (*table 2*, model 1; CFI=0.91). Dimensionality did not differ between boys and girls or between different age groups. The symptoms studied here seem to constitute two dimensions that differ qualitatively. However, this does not imply a dualistic understanding of the underlying causes of symptoms. Stress was previously found to have an impact on the development of subjective health complaints.[17,21] Thus, the impact of stressors may vary, so that certain types of stressors may be associated with one category of symptoms, whereas other types may correspond with a different set of symptoms. Symptoms may also differ in timing, e.g. psychological symptoms may be initial expressions of perceived stress and later expressed as somatic symptoms. The factor correlation was found to differ between the four countries. Cultural differences in the expression of symptoms and differences in behavioural roles may contribute to explain these findings. Differences in language and vocabulary may also influence the expression of symptoms, as some countries may have several synonyms for one or more complaints.

Implications for health promotion

The findings of this study indicate that adolescents report a high level of subjective health complaints already at the age of eleven years. Although the level of reported symptoms varied between the four countries, the patterns were highly consistent.

Both gender differences and the reporting of most health complaints increased with age. The findings here suggest that subjective health complaints may be seen as a negative outcome of the developmental process. Such an understanding of health complaints indicates that successful intervention may need to address the environment and human resources where adolescents live and work, e.g. schools, parents and teachers. Studies that include measures to explain how and why symptom reporting is differentially distributed may contribute to providing a scientific rationale for mode of prevention. The finding of health complaints being two dimensions that differ qualitatively, suggests that these dimensions may have different etiologies and require differentiated intervention. Future studies (e.g. qualitative) may identify underlying generic causes to each category of symptoms.

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REFERENCES

1 Garralda ME. A selective review of child psychiatric syndromes with a somatic presentation. Br J Psychiatry 1992;161:759-73.

2 Goodman JE, McGrath PJ. The epidemiology of pain in children and adolescents: a review. Pain 1991;46:247-64.

3 Alfven G. The covariation of common psychosomatic symptoms among children from socio-economically differing residential areas: an epidemiological study. Acta Paediatr 1993;82(5):484-7.

4 Knishkowy B, Palti H, Tima C, Adler B, Gofin R. Symptom clusters among young adolescents. Adolescence 1995;30(118):351-62.

5 Aro H, Paronen O, Aro S. Psychosomatic symptoms among 14-16 year old Finnish adolescents. Soc Psychiatry 1987;22:171-6.

6 Klepp KI, Aas H, Maeland JG, Alsaker F. Selvrapportert helse blant yngre tenåringer: en tre års oppfølgingsstudie (Self-reported health problems among school-students: a three-year follow-up study). Tidsskr Nor Laegeforen 1996;116(17):2032-37.

7 Mikkelsson M, Salminen J, Kautiainen H. Non-specific muskuloskeletal pain in preadolescents: prevalence and 1-year persistence. Pain 1997;73:29-35.

8 Marschall P. Self-report and stability of physical symptoms by adolescents. Adolescence 1989;24(93):209-16.

9 Kolip P, Hurrelmann K. Coping strategies of Dutch and German adolescence: psychosomatic complaints, aggressive behaviour, and the consumption of legal and illegal drugs. In: Du Bois-Reymond M, Diekstra R, Hurrelmann K, Peters E, editors. Childhood and youth in Germany and The Netherlands: transitions and coping strategies of adolescents. Berlin: Walter de Gruyter, 1995:183-97.

10 King A, Wold B, Tudor-Smith C, Harel Y. The health of youth: a Cross-National Survey. European Series No 69. Copenhagen: WHO Regional Publications, 1996.

11 Belmaker E. Nonspecific somatic symptoms in early adolescent girls. J Adolesc Health Care 1984;5(1):30-3.

12 Starfield B, Katz H, Gabriel A, et al. Morbidity in childhood: a longitudinal view. N Eng J Med 1984;310(13):824-9.
13 Hopland K, Aaroe LE, Wold B. Sosialt nettverk, einsemd og kvardagsplager: ein epidemiologisk undersøking blant 9. Klassinger (Social network, loneliness and everyday complaints: an epidemiological survey among adolescents). Tiddsskr Nor Psykologfor 1993;30:1174-81.
14 Hurrelmann K, Engel U, Holler B, Nordlohne E. Failure in school, family conflicts, and psychosomatic disorders in adolescence. J Adolesc 1988;11:237-49.
15 Wisniewski JJ, Naglieri JA, Mulick JA. Psychometric properties of a Children's Psychosomatic Checklist. J Behav Med 1988;11(5):497-507.
16 Attanasio V, Andrasik F, Blanchard EB, Arena JG. Psychometric properties of the SUNYA revision of the Psychosomatic Symptom Checklist. J Behav Med 1984;7(2):247-58.
17 Ursin H. Sensitization, somatization, and subjective health complaints. Int J Behav Med 1997;4(2):105-16.
18 Wold B, Aaroe LE, Smith C. Health behaviour in school-aged children: a WHO cross-national survey (HBSC). Research protocol for the 1993-94 study. University of Bergen, Norway, 1994.
19 Aaroe LE, Wold B. Health behaviour in school aged children: a WHO cross-national survey. Research protocol for the 1985-86 study. University of Bergen, Norway, 1986.
20 Aaroe LE, Wold B. Health behaviour in school aged children: a WHO cross-national survey. Research protocol for the 1989-90 study. University of Bergen, Norway, 1990.
21 Garralda ME. Somatisation in children. J Child Psychol Psychiatry 1996;37(1):13-33.
22 Byrne B. Structural equation modelling with EQS and EQS/Windows. Thousand Oaks: Sage, 1994.
23 Wool CA, Barsky AJ. Do women somatize more than men? Gender differences in somatization. Psychosomatics 1994;35:445-52.
24 Alsaker F. Timing of puberty and reactions to pubertal changes. In: Rutter M, editor. Psychosocial disturbances in young people. New York: Cambridge University Press, 1995:37-83.
25 Aro H, Taipale V. The impact of timing of puberty on psychosomatic symptoms among fourteen to sixteen-year-old Finnish girls. Child Devel 1987;58:261-8.

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