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Psychometric properties of the DUKE Health Profile-adolescent version (DHP-A): A generic instrument for adolescents

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Abstract

Purpose: Quality of life in general population of adolescents has been scarcely documented. The study was aimed at evaluating the psychometric properties of the DUKE Health Profile-Adolescent version (DHP-A), an adaptation from the adult version. *Material and method*: Feasibility and construct validity were assessed in a sample of 618 adolescents from school settings. Test–retest reliability was assessed in another sample of 100 adolescents at 2 weeks interval. Construct validity was assessed in groups by gender, age and existence of a health problem. *Results*: The DHP-A, a short instrument of HRQOL, easy to administer, proved its ability to discriminate between boys and girls, with or without a health problem, for all of health and dysfunction dimensions ($p < 0.05$). Its reliability is also acceptable for three health dimensions and anxiety, depression (ICC = 0.68–0.72), moderate for social, perceived health, self-esteem and pain (ICC = 0.43–0.59), and debatable for disability (ICC = 0.22) (single item). *Conclusion*: The initial testing of the adolescent version (DHP-A) indicates that the psychometric properties are acceptable and will provide a useful tool for the assessment of health status in adolescents. Three single-item dimensions (perceived health, pain and disability) should be interpreted with caution.

Key words: Adolescent, Duke Health profile, Health Status, Health Related Quality of life, Reliability, Validity

Introduction

The measurement of health status and health-related quality of life (HRQOL) in children and adolescents has experienced a considerable expansion in recent years [1, 2]. If health research has taken an interest in sick children and adolescents with a view to assessing therapeutic strategies, sadly little has been done on adolescents enjoying satisfactory health [3]. Some generic instruments, such as the 16-D questionnaire [4], or the quality of life profile-adolescent version (QOLA) [5], have been tested and have shown satisfactory validity and reproducibility, in the English-language versions. Since 2000, two generic instruments, the CHQ [6] and VSP-A [7] were validated in healthy adolescents in French language. However, these questionnaires are long which might be a limitation to acceptability: the first CHQ has 50 items in a 4 or 5-Likert scale format and the second has 40 items in a 5-Likert scale format.

Most of generic instruments are for adults, such as WHOQOL [8], the Sickness Impact Profile [9], the Nottingham Health Profile [10], the SF-36 [11], and the DUKE Health Profile [12]. However the question remains whether such generic instruments are suitable for young French people. With a view to comparing adolescent and adult quality of life [13], the French Committee for Health Promotion

decided in 1998 [14] and in 2000 [15] to use a single instrument, the DUKE Health Profile, in a version suited to assess quality of life in the 12–19 age group. There is an interest in finding a simple short instrument, self-report measurement of HRQOL in healthy adolescents in French language. The aim of the present study was to test the feasibility, construct validity and reliability of the DUKE Health Profile adapted to adolescent (DHP-A) in a French population.

Methods

Sample selection

Two studies were designed in separate samples in two settings to test its feasibility, construct validity and reliability:

A first study was carried out to test for the reliability of the instrument at the Preventive Medicine Center of Nancy. This center conducts routine family health examinations for the Lorraine region, inviting all social security insured persons and their children over 4 years. This study was conducted with 100 young people of both sexes aged from 13 to 18 included at a health check-up recruited over 2 months (test), and then 2 weeks later at systematic follow-up consultation (retest). They completed the questionnaire in the waiting room so as to ensure confidentiality. The inclusion of 100 subjects in this reproducibility study makes it possible to estimate an intra-class correlation coefficient with a 95% confidence interval width of 0.20 around expected ICC of 0.70 [16].

For testing the feasibility and construct validity, a second sample was constituted from a random two-stage cluster of school and class, in the county of Meuse (Lorraine, in eastern France). 618 young people in 24 classes of the college or high school were invited to complete the questionnaire. 57.3% were 15 years old or more (mean age was 15.0 years (1.63 SD)), 55.1% were male and 47.7% reported at least one chronic health problem (among them, 43.7% dental problem, 38.3% audio-visual problem, 15.2% locomotive problems, 17.0% chronic illness). The questionnaires were completed anonymously in the classrooms in the course of ordinary lesson time. The protocol was approved by schools authorities.

Measurement

The DHP for adult is a 17-item generic self-report instrument, derived from 63 items Duke University North-Carolina Health Profile [17], adapted and validated with adults 18 years old and over in French [12]. It contains six health dimensions such as physical, mental, social, general health, perceived health, self esteem, and four dysfunction dimensions such as anxiety, depression, pain and disability (Table 1). Each item has three response options *'Yes, describes me exactly', 'Somewhat describes me'* et *'No, doesn't describe me at all'*, on an ordinal scale (namely *'Oui, c'est tout à fait mon cas', 'Oui, c'est à peu près mon cas'* et *'Non, ce n'est pas mon cas'* in French).

The adaptation of the DUKE health profile for adolescents was conducted by adult experts, members of the French Committee for Health Promotion, after they had tested acceptability of the original adult questionnaire in a pilot study of 50 adolescents [14]. It consisted in altering the wording of one of the questions on social well-being: *'During the past week how often did you socialize with other people (talk or visit with friends or relatives)'* (original English), altered into *'In the last week have you got together with people in your family who do not live in your home, or with friends outside school (for 12–17 years old)'* (from French: *'Vous vous êtes retrouvé(e) avec les gens de votre famille qui n'habitent pas chez vous, ou avec des copains en dehors de l'école (posée aux 12–17 ans'*). Other items were found relevant to adolescent perception and way of life.

Questionnaires were coded and calculated according to instructions in the DHP manual [17]. The scores of each dimension is the sum of the items, then standardized, from 0 indicating the worst quality of life to 100 indicating the best, for all health and dysfunction dimensions. Missing dimension scores were imputed if fewer than 50% of items for a dimension were missing, using the subject mean score of the items completed within that dimension.

Data analysis

Construct validity was evaluated based on hypotheses from existing literature and the original authors' work. Differences should be found when the DHP-A was administered to adolescents known to differ by

Table 1. DHP-A items by dimensions and missing data

#	Items	Dimensions*	Missing data (%)
1	Je me trouve bien comme je suis	Mental, self-esteem	0.1
2	Je ne suis pas quelqu'un de facile à vivre	Social, self-esteem, anxiety	1.4
3	Au fond, je suis bien portant	Perceived health	2.8
4	Je me décourage trop facilement	Mental, self-esteem, depression	1.1
5	J'ai du mal à me concentrer	Mental, anxiety, depression	1.0
6	Je suis content de ma vie de famille	Social, self-esteem	1.8
7	Je suis à l'aise avec les autres	Social, anxiety	1.1
8	Vous auriez du mal à monter un étage	Physique	0.4
9	Vous auriez du mal à courir une centaine de mètres	Physique	0.7
10	Vous avez eu des problémes de sommeil	Physique, anxiety, depression	0.4
11	Vous avez eu des douleurs quelque part	Physique, pain	1.1
12	Vous avez eu l'impression d'être vite fatigué(e)	Physique, anxiety, depression	1.0
13	Vous avez été triste ou déprimé(e)	Mental, depression	1.1
14	Vous avez été tendu(e) ou nerveux(se)	Mental, anxiety	1.1
15	Vous vous êtes retrouvé(e) avec les gens de votre famille qui n'habitent pas chez vous, ou avec des copains en dehors de l'école (posée aux 12–17 ans) Vous avez rencontrédes parents ou des amis au cours de conversations ou de visites (posée aux 18 ans et plus)	Social	1.1
16	Vous avez eu des activiťs de groupes ou de loisirs	Social	0.85
17	Vous avez dûrester chez vous ou faire un séjour en clinique ouà l'hôpital pour raison santé	Disability	0.85

* All items, except 3 and 17, compose general health dimension.

age, gender, and health status [6, 12, 18]. For example, boys, older adolescents, who did not declare health problem were expected to have a higher score of health-related quality of life (HRQOL) than girls, youngers, and than those who have any health problem. Mean scores between the subgroups were compared for each of dimension by *t*-test.

Test–retest reliability was assessed by the intra-class correlation coefficient, calculated in a mixed covariance analysis model. Reliability was differentiated into six levels according to Landis and Koch [19]: slight from 0.0 to 0.20, fair from 0.21 to 0.40, moderate from 0.41 to 0.60, substantial from 0.61 to 0.80, and excellent 0.81 and over.

Results

Feasibility

The questionnaire was administered to 718 adolescents, including 618 pupils in school samples and 100 youths in the Preventive Medicine Center sample. None refused to participate. Adolescents filled in the questionnaire in 5 min on average. Ten (1.4%) questionnaires poorly completed were excluded from analysis. Missing data were 2.8% for item 3, 1.8% for item 6, 1.4% for item 2, and less than 1.2% for remaining items (Table 1). Overall, five of seven multi-item dimensions had no missing data and two remaining composite dimensions had less than 0.5% missing data resulting in subjects not kept in the analysis. Three single item dimensions had ceiling and floor effect over 14 and 13% (Table 2).

Test–retest reliability ICC

The intra-class correlation was good (>0.60) for five dimensions (physical, mental and general health, anxiety and depression), moderate (0.41–0.60) for four dimensions (social health, self-esteem and perceived health and pain, and fair (0.21–0.40) for disability. Reliability estimates for the DHP-A scale from this study are shown in Table 2.

Construct validity

The discriminating capacity is highlighted by a lower score of quality of life in those reporting a current health problem than in healthy subjects

Table 2. Distribution and test–retest reliability of the DUKE dimensions

DUKE dimension	Ceiling effect (%)	Floor effect (%)	US adults (17)	French adults (12)	French adolescents	
			ICC		ICC	95% CI
Physical health	13.6	0.2	0.66	0.72	0.69	0.60–0.77
Mental health	8.1	0.5	0.73	0.74	0.69	0.59–0.77
Social health	4.9	0.3	0.65	0.67	0.54	0.42–0.65
General health	0.3	0.2	0.78	0.80	0.72	0.62–0.79
Perceived health*	53.2	14.4	0.63	0.63	0.50	0.39–0.62
Self-esteem	6.3	0.2	0.71	0.74	0.59	0.48–0.69
Anxiety	0.2	2.8	0.72	0.73	0.68	0.59–0.76
Depression	0.8	8.1	0.74	0.76	0.70	0.60–0.78
Pain*	13.1	40.1	0.47	0.46	0.43	0.28–0.55
Disability*	2.9	88.2	0.13	0.14	0.22	0.06–0.38

* Single item dimensions.
ICC: intra-class correlation coefficient, calculated in a mixed covariance analysis model.

for all of 10 DUKE dimensions. With regards the demographic characteristics, HRQOL is significantly lower in the girls for 9 of 10 dimensions, except disability. The average scores of social health and disability are higher in older pupils aged 15 and more ($p < 0.001$ and $p = 0.004$, respectively). On the other hand, the score for perceived health was considerably lower in older pupils than younger ($p = 0.0015$).

Discussion

This study presented a new generic self-report measure of health status in France acceptable for adolescents, the DHP-A, devised from an adapted and validated tool for adults.

The principal study sample was from public school in Meuse (Lorraine) where there are general classes and remedial classes. Since school attendance is mandatory for French students, our random sampling strategy was likely to provide a sample close to the general population regarding their HRQOL and health status perception.

All the pupils present on the day of the survey responded, nobody refused to participate. The acceptability of DHP-A is very high with 0–0.5% missing scores in comparison with 0.2–8.6% missing scores in CHQ [6], and with 1.1% missing values in comparison with 25% in VSP-A [7].

Table 3. Construct validity of DHP-A: comparaison of DUKE mean scores (SD) by gender and existence of a health problem (bivariate analysis)

Dimension	Gender		Existence of a health problem	
	Boys (N = 333)	Girls (N = 270)	Yes (N = 150)	No (N = 448)
Physical health	78.8 (18.4)	68.5 (19.3)**	63.7(21.3)	77.3 (17.8)**
Mental health	68.5 (22.0)	55.2 (23.6)**	52.7(22.4)	66.0 (23.1)**
Social health	65.4 (20.3)	60.8 (19.5)*	60.9(21.3)	64.1 (19.7)
General health	70.9 (14.8)	61.2 (15.4)**	59.1(16.6)	69.2 (14.8)**
Perceived health	75.2 (35.7)	64.8 (37.8)**	61.6(39.0)	73.4 (36.0)**
Self-esteem	71.5 (20.2)	61.2 (19.8)**	60.5(22.1)	69.1 (14.8)**
Anxiety	65.8 (20.0)	58.0 (19.9)**	53.8 (20.1)	65.2 (19.4)**
Depression	67.8 (22.5)	57.1 (23.7)**	53.5(21.8)	36.3 (23.3)**
Pain	69.9 (34.6)	56.6 (32.8)**	47.3 (37.7)	69.7 (31.4)**
Disability	92.6 (21.6)	92.0 (22.8)	86.5 (28.9)	094.2 (19.2)*

* Statistical significant difference between groups, $p < 0.01$.
** Statistical significant difference between groups, $p < 0.001$.

Three dimensions addressing dysfunction (perceived health, pain and disability) were composed of a single item each. Therefore their distribution of the reponses on a 3 point Likert scale showed high ceiling and floor effect, and the interpretation of their psychometric properties should be taken with caution.

Test–retest reliability, is good to moderate for all dimensions combining several items, and it is equivalent to that for the adult version [12, 18], except for the dimensions social health, perceived health, and self-esteem where the intra-class correlation coefficient is a little lower than adults'. This could be explained, by (1) the difficulty of adolescents had in responding to items 2, 3, 6 which compose these dimensions, (2) by actual instability in young peoples' feelings over the period of time between test and retest (2 weeks interval), or (3) by greater error in measurement in these dimensions. To improve reliability of these three dimensions, it suggests an in-depth testing with adolescents, especially on the wording of items 2, 3, and 6. Perhaps an interval for test–retest in adolescents should be less than 2 weeks.

Appreciation of the discriminating capacity was obtained from the adolescent with or without health problems. Poorer quality of life for young people reporting a health problem was also found in previous studies [12, 18]. As expected, the boys were found to have higher scores than the girls on almost all dimensions. While older adolescents had higher scores than younger for the social dimensions, they had lower scores for perceived health. These differences reached significance both statistically and clinically, p values being below 0.005 (a conservative threshold taking into account multiple testing (10 dimensions) between groups), and differences largely exceeding 5 points – most frequently around 10 points – a difference considered clinically significant for the SF36, another generic instrument using a similar 0–100 scale metric [20]. Our results are in accordance with the results of two national studies conducted in 1998 and 2000 among French adolescents and general population [12, 13].

The advantage of the DHP for public health purpose is that it can be used to identify subgroups of the population with different patterns of health needs [12, 18]. We expect using the available DHP-A to describe health status in different adolescent subgroups, for example between adolescents in rural and urban settings, or pupils in general class and class in difficulty.

Adaptation of adolescent specific items to other culture and language should accompany its implementation in other countries where original adult DHP is available. Full process of cross-cultural adaptation is required in other setting/countries according to literature guidelines [21]. The adult DHP was adapted from English into French accordingly.

This study does not yet provide evidence on longitudinal construct validity or responsiveness. Further assessment of the instrument will include assessing the sensitivity to change in adolescents' health status in the clinical setting or in general population before and after health promotion interventions. Future research will aim at establishing population norms for French adolescents and measuring the effect of public health intervention.

In conclusion, the DHP-A is a short instrument (17 items) of HRQOL, auto-administered questionnaire, easy to administer, adapted and acceptable for adolescents. The initial testing of the adolescent version (DHP-A) indicates that the psychometric properties are acceptable and will provide a useful tool for the assessment of health status in adolescents. Three single-item dimensions (perceived health, pain and disability) should be interpreted with caution.

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