

# Prevalence of Low Back Pain and Its Effect on Health-Related Quality of Life in Adolescents

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**Objectives:** To assess the prevalence of low back pain (LBP) in adolescents and the clinical features of LBP in 2 European countries and to evaluate the effect of LBP on health-related quality of life (HRQOL) using standardized validated generic and disease-specific instruments.

**Design:** Cross-sectional study.

**Setting:** Secondary schools of Barcelona, Spain, and Fribourg, Switzerland.

**Participants:** Representative sample of adolescents from the 2 cities.

**Intervention:** Selected adolescents completed a questionnaire including a generic HRQOL (KIDSCREEN-52) and 2 LBP-specific instruments.

**Main Outcome Measures:** Results of KIDSCREEN-52, the Roland-Morris Disability Questionnaire, and the Hannover Functional Ability Questionnaire.

**Results:** A total of 1470 adolescents (52.6% male) with a mean (SD) age of 15.05 (1.17) years completed the questionnaires (response rate, 85.1%). Low back pain was reported by 587 adolescents (39.8%): isolated LBP in 250

(42.6%), LBP plus other pain in 271 (46.2%), LBP plus whole-body pain in 50 (8.5%), and unclassifiable LBP in 16 (2.7%). Five hundred adolescents (34.7%) reported no pain, and 369 (25.6%) reported other pain without LBP. In those with isolated LBP, the percentage of adolescent boys was higher (54.6%;  $P < .001$ ) and the LBP was mild. In those with LBP plus whole-body pain, the percentage of adolescent girls was higher (62%;  $P < .001$ ) and LBP was most severe. All KIDSCREEN scores in the group with LBP plus whole-body pain were significantly lower than in the other groups (effect size, 0.52-1.24). No differences were found between the groups who reported isolated pain, no pain, or other pain with no LBP. On the LBP-specific instruments, adolescents who reported LBP plus other pain had significantly poorer scores ( $P < .001$ ) compared with those with isolated LBP but better scores ( $P < .001$ ) than those with LBP plus whole-body pain.

**Conclusions:** Low back pain in adolescents is a prevalent symptom with overall low associated disability and little effect on health-related quality of life. A subset of adolescents in whom LBP is associated with whole-body pain report significant impairment and deserve more attention.

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**B**ACK PAIN IN CHILDREN AND adolescents was considered unusual and often a harbinger of serious organic disease.<sup>1</sup> Recent epidemiologic data have dispelled the misconception that low back pain (LBP) is unique to adults.<sup>2-5</sup> Depending on the definition of pain, study design, and age of the population, the prevalence of back pain in adolescents varies from 30% to 70%.<sup>2-6</sup> This high prevalence is a cause for concern, in particular because of the reported link between LBP in adolescence and chronic LBP in adulthood.<sup>7,8</sup> The strongest predictor of future LBP is a history of symptoms,<sup>9</sup> and onset early in life is predictive of chronicity.<sup>10</sup> These findings have led to the publication of many articles on this topic over the last years. However, most of these studies focus on epidemiologic aspects or ana-

lyze risk factors to elucidate potential causes.<sup>2,3,5-7,11</sup> The clinical relevance of adolescent LBP remains underreported.

After age 15 years, pain is independently and significantly related to impaired self-rated health.<sup>12</sup> Daily chronic pain seems to be linked to poor health even more strongly than chronic disease and has a greater effect on self-rated health in younger individuals than in older ones.<sup>12</sup> Several studies have shown that LBP may limit daily activities in 10% to 40% of adolescents.<sup>3-5,11,13,14</sup> However, the pattern seems to be heterogeneous, with minor functional impairment in the vast majority of adolescents and greater disability in a smaller group.<sup>3,15</sup> Low back pain could be a common symptom of various clinical entities because it can occur alone or in association with other somatic complaints.<sup>16,17</sup>

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To our knowledge, no studies have specifically analyzed the effect of LBP on adolescent health-related quality of life (HRQOL), using standardized validated instruments. The overall health status of adolescents who report LBP is unknown, and it is difficult to define the boundaries between pain as an experience and pain as a disease.<sup>18</sup> The use of standardized HRQOL instruments may disclose health status differences between the general population and individuals with LBP and in subgroups of adolescents reporting LBP. Differentiating disease from a common life experience on the basis of the effect on HRQOL should help to avert unnecessary treatment in otherwise healthy adolescents.

The objectives of our study were to assess the prevalence of LBP in adolescents and the clinical features of LBP in 2 European countries and to evaluate the effect of LBP on HRQOL using standardized validated generic and disease-specific instruments. We hypothesized that even if LBP might be highly prevalent in both countries, it would have a relevant effect on HRQOL in only a small percentage of adolescents.

## METHODS

### STUDY SAMPLE AND DESIGN

This cross-sectional study was conducted in secondary schools in Barcelona, Spain, and Fribourg, Switzerland. All adolescents attending the third year of secondary school were selected in Fribourg. In Barcelona, a representative sample of adolescents from public and private secondary schools (first through fourth years) was selected using 2-stage cluster sampling. The schools were stratified by type of school (public or private) and by the family economic capacity index<sup>19</sup> (high, medium, and low, in terciles). The family economic capacity index measures the socioeconomic level of the school, considering the neighborhood in which it is located. In the first stage, a random sample of schools stratified by type of school and family economic capacity index was selected, and in the second stage, classrooms were taken as the sampling unit. All adolescents in each classroom selected were included. Sample size was calculated as 900 adolescents, assuming a 15% prevalence of LBP and a response rate of 75%, with an  $\alpha$  risk of 5% and a statistical power of 80%.

After approval by the Ethics Committee of Vall d'Hebron Hospital and by Fribourg school authorities, 23 school administrators (20 in Barcelona and 3 in Fribourg) were contacted. A letter was sent to the parents or guardians of adolescents a few days before questionnaires were administered in each school. All adolescents self-completed the questionnaire during class time. In Barcelona, adolescents were supervised by school nurses from the Barcelona Public Health Agency. Questionnaires were completed from April 19, 2006, through May 25, 2006 in Barcelona and May 10, 2006, through June 23, 2006, in Fribourg (overall from April 19, 2006, through June 23, 2006).

The questionnaires were available in Spanish and Catalan, the official languages in Barcelona, and in French, the official language in Fribourg. The questionnaire included sociodemographic variables, 3 standardized HRQOL instruments, questions about LBP experience and pain in other body areas, and data on chronic illnesses.

### DEFINITION AND GRADING OF LBP

To identify adolescents with LBP, we applied the same method used in related epidemiologic studies<sup>5</sup>; that is, a direct question inquiring about pain in the lumbar area, which was shown on a

preshaded manikin (LBP definition item). Adolescents reporting pain in the shaded area lasting 1 day or longer during the preceding month were classified as having LBP. In participants reporting LBP, further information was required about the duration and intensity of pain and consultation with health professionals. Pain intensity (defined as the worst pain during the past month) was measured using a numerical rating scale from 0 (none) to 10 (maximum). The questionnaire also evaluated the prevalence of pain in other body areas during the preceding month and included an item to identify adolescents who considered themselves to have whole-body pain. The participants were divided into 5 groups according to the reported pain status during the past month: (1) a pain-free (PFree) group, which included all adolescents reporting no LBP and no other pain during the last month; (2) an other pain (OPain) group, which included all adolescents with no LBP during the last month but reporting other pain during that period; (3) an isolated LBP (IsoLBP) group, which included all adolescents with a positive answer to the LBP definition item and reporting no other pain during the last month; (4) an LBP plus other pain (LBP+OP) group, which included all adolescents with a positive response to the LBP definition item and reporting other pain but who did not consider themselves to have whole-body pain; and (5) an LBP plus whole-body pain (LBP+WBP) group, which included all adolescents answering yes to the LBP definition item, reporting other pain, and considering themselves to have whole-body pain.

### ASSESSMENT OF HRQOL

A generic HRQOL instrument, the KIDSCREEN-52, and 2 LBP-specific instruments, the Roland-Morris Disability Questionnaire and the Hanover Functional Ability Questionnaire, were administered. KIDSCREEN-52 is a questionnaire specifically designed to measure HRQOL in children and adolescents.<sup>20</sup> It was developed within a European cross-cultural representative health survey by using a simultaneous approach that ensures comparisons across countries. The questionnaire contains 52 items measuring 10 dimensions: (1) Physical Well-being (5 items) assesses the level of physical activity, energy, and fitness; (2) Psychological Well-being (6 items) examines positive emotions and satisfaction with life; (3) Moods and Emotions (7 items) assesses experiences of depressive moods and stressful feelings; (4) Autonomy (5 items) examines the opportunities to create social and leisure time; (5) Self-perception (5 items) includes positive or negative perceptions and satisfaction with body image; (6) Parents' Relations and Home Life (6 items) measures the atmosphere at home and relationships with parents; (7) Social Support and Peers (6 items) examines the nature of relationships with other children and adolescents; (8) School Environment (6 items) assesses the perceptions of cognitive capacity, learning and concentration, and feelings about school; (9) Social Acceptance (Bullying) (3 items) examines the aspect of feeling rejected by peers in school; and (10) Financial Resources (3 items) assesses the respondents' perceptions of the amount of pocket money they have. All items are answered on Likert-type rating scales with 5 response options. The instrument has shown acceptable levels of reliability as well as construct, convergent, and discriminant validity. The Cronbach  $\alpha$  value ranges from 0.77 to 0.89. Scaling success (Multitrait Analysis Program) is greater than 97.8% for all dimensions, and Rasch analysis item fit (INFITmsq) ranges from 0.80 to 1.27. The KIDSCREEN-52 HRQOL questionnaire discriminates well and in the hypothesized direction between children and adolescents in good health and those with poorer physical or mental health. No sizeable differential item functioning has been found by age, sex, or health status.<sup>20</sup> Scores were obtained by applying the algorithms recommended by the developers of the instrument. For each dimension, Rasch scores were computed and transformed into *t* values with a mean

**Table 1. Characteristics of the Samples**

Characteristic	Group			P Value <sup>a</sup>
	All Individuals	Barcelona, Spain	Fribourg, Switzerland	
Sex, No. (%)				
Female	697 (47.4)	433 (48.0)	264 (46.6)	.60
Male	773 (52.6)	470 (52.0)	303 (53.4)	
Age, mean (SD), y	15.07 (1.14)	14.63 (1.19)	15.75 (0.58)	<.001
Pain group, No. (%)				
LBP total	587 (39.8)	375 (41.3)	212 (37.4)	.14
IsoLBP	250 (17.4)	173 (19.5)	77 (13.9)	.01
LBP + OP	271 (18.8)	162 (18.2)	109 (19.7)	...
LBP + WBP	50 (3.5)	32 (3.6)	18 (3.3)	...
Pain free	500 (34.7)	303 (34.1)	197 (35.7)	...
Other pain	369 (25.6)	218 (24.5)	151 (27.4)	...

Abbreviations: IsoLBP, isolated low back pain; LBP, low back pain; LBP+OP, low back pain plus other pain; LBP+WBP, low back pain plus whole-body pain; ellipsis, not applicable.

<sup>a</sup> $\chi^2$  Test or *t* test of differences between respondents from Barcelona, Spain (n=903) and Fribourg, Switzerland (n=567).

(SD) of 50 (10) in the general European population. The higher the score the better the HRQOL and feeling of well-being.

The Roland-Morris Questionnaire is one of the most widely used validated instruments for measuring functional outcome in LBP. The Cronbach  $\alpha$  for different language versions ranges from 0.84 to 0.91.<sup>21-25</sup> The questionnaire has 24 items related to physical function qualified with the phrase "because of my back pain." Respondents must mark each item that applies to their current status. Each item checked receives a score of 1, and scores range from 0 (no disability caused by LBP) to 24 (maximum possible disability from LBP). The questionnaire has been recommended for assessing populations with mild to moderate disability.<sup>23</sup> The questionnaire has not yet been validated in adolescents but has been used in the adolescent population.<sup>15</sup> On the basis of those studies and the reported minimum clinically important difference in unselected patients,<sup>26</sup> a cutoff point of 6 was used to identify adolescents with moderate to severe disability.

The adapted Hanover Functional Ability Questionnaire, which has been used in previous studies in adolescents,<sup>3</sup> inquires about activity limitation and was used as another measure of disability. It includes 10 activities with yes/no answers, and the score ranges from 0 (no disability) to 10, with a cutoff point of 5 to classify adolescents as experiencing moderate to severe disability. The questionnaire has a high level of internal consistency (Cronbach  $\alpha=0.71$ ) and satisfactory item vs item-total correlations (0.35-0.47).<sup>5</sup>

## STATISTICAL ANALYSIS

Pain prevalence was 2#calculated according to sex. Differences between Barcelona and Fribourg were tested with the *t* test or  $\chi^2$  test, as appropriate. The characteristics of LBP in adolescents with IsoLBP were compared with those with LBP+OP and LBP+WBP by using the *t* test or  $\chi^2$  test, as appropriate. A difference was considered statistically significant at  $P < .001$  to account for the Bonferroni adjustment. Differences in sociodemographic characteristics and HRQOL scores between the pain subgroups were tested using  $\chi^2$  tests and 1-way analysis of variance, depending on the nature of the variables. We used the Tukey studentized range post hoc test for comparisons between group means. For the multiple comparisons of KIDSCREEN-52 dimensions, a difference was considered statistically significant at  $P < .005$  with the Bonferroni adjustment. The effect size, a standardized difference of means, was calculated to assess the magnitude of the difference in HRQOL scores between the groups. The effect size was obtained as the difference of means between each subgroup and the

PFree subgroup, divided by the standard deviation of the PFree subgroup. Generally accepted guidelines define an effect size of about 0.20 as low, 0.50 as moderate, and 0.80 or higher as large.<sup>27</sup> Commercially available software (SAS version 9.1 for Windows; SAS Institute, Inc, Cary, North Carolina) was used for the data analysis.

## RESULTS

The total number of adolescents in the selected classrooms was 1726, that is, 1126 from Barcelona, Spain, and 600 from Fribourg, Switzerland. On the day of the study, 256 adolescents were absent from school or refused to complete the questionnaire. Ultimately, 1470 adolescents (47.4% female), 903 from Barcelona and 567 from Fribourg, with a mean (SD) age of 15.07 (1.14) years, completed the questionnaire (response rate, 85.1%). Comparisons between the Barcelona and Fribourg samples (**Table 1**) showed the expected differences in age. Sex distribution, overall LBP prevalence, and prevalence of the LBP subgroups (IsoLBP, LBP+OP, and LBP+WBP) showed no differences. Overall, 39.8% of adolescents reported LBP lasting longer than 1 day during the last month. The IsoLBP group included 250 adolescents (17.4%); the LBP+OP group, 271 (18.8%); and the LBP+WBP group, 50 (3.5%). Five hundred adolescents (34.7%) were included in the PFree group, and 369 (25.6%) in the OPain group. Questionnaires from 16 adolescents (1%) with missing or contradictory responses preventing group classification were excluded from the final group analysis. Otherwise, the absence of 1 response or more on the rest of the questionnaire did not lead to exclusion of the subject from the analysis. Thus, the totals may vary slightly depending on the variable.

## CHARACTERISTICS OF LBP

The characteristics of LBP differed significantly among the groups with LBP (**Table 2**). Isolated LBP seemed to be milder and to last a shorter time. In contrast, LBP+WBP lasted longer, was more intense, and posed greater limitations on activity. The characteristics of LBP associated with LBP+OP were intermediate between these groups. We found no differences among the 3 LBP groups when comparing medi-

**Table 2. Characteristics of LBP Reported by Adolescents**

Characteristic	Pain Group			P Value	
	Iso-LBP	LBP + OP	LBP + WBP	Iso-LBP vs LBP + OP	Iso-LBP vs LBP + WBP
LBP, No. (%)					
Constant, all the time	16 (6.8)	32 (12.1)	16 (32.0)	<.001 <sup>a</sup>	<.001 <sup>a</sup>
Not constant, comes and goes	83 (35.0)	127 (47.9)	24 (48.0)		
Only a few minutes	138 (58.2)	106 (40.0)	10 (20.0)		
Maximum intensity of pain					
Mean (SD)	4.24 (2.22)	5.12 (2.26)	6.86 (2.24)	<.001 <sup>a</sup>	<.001 <sup>a</sup>
Median (range)	4 (0-9)	5 (0-10)	7 (1-10)		
Pain duration, No. (%)					
≤12 h	178 (73.9)	150 (56.2)	19 (38.8)	<.001 <sup>a</sup>	<.001 <sup>a</sup>
12-24 h	23 (9.5)	50 (18.7)	9 (18.4)		
1-7 d	31 (12.9)	46 (17.2)	10 (20.4)		
≥1 wk	9 (3.7)	21 (7.9)	11 (22.4)		
Pain onset, No. (%)					
≤1 mo ago	62 (24.8)	67 (24.7)	6 (12.0)	.001	.009
1-3 mo ago	43 (17.2)	37 (13.7)	4 (8.0)		
3 mo to 1 y ago	64 (25.6)	40 (14.8)	12 (24.0)		
≥1 y ago	81 (32.4)	127 (46.9)	28 (56.0)		
Age at onset, y					
Mean (SD)	12.98 (1.88)	12.53 (2.15)	12.24 (2.96)	.02	.10
Median (range)	13 (3.7-17)	13 (4-18)	13 (2-16)		
Medical visit, No. (%)					
GP or pediatrician	62 (24.8)	80 (29.5)	19 (38.0)	.23	.06
Physiotherapist	50 (20.0)	73 (26.9)	13 (26.0)	.06	.34
Nurse	40 (16.0)	42 (15.5)	10 (20.0)	.88	.49
Other	79 (31.6)	83 (30.6)	18 (36.0)	.81	.54
None	130 (52.0)	122 (45.0)	22 (44.0)	.11	.30
Medication					
Tablets or pain killers	14 (5.8)	27 (10.2)	10 (20.0)	.07	<.001 <sup>a</sup>
Other treatment	35 (14.8)	57 (21.3)	16 (32.7)	.06	.003
Activity limitation, No. (%)					
School	27 (10.8)	47 (17.3)	14 (28.0)	.03	<.001 <sup>a</sup>
Physical exercise	61 (24.4)	91 (33.6)	24 (48.0)	.02	<.001 <sup>a</sup>
Sports	59 (23.6)	94 (34.7)	25 (50.0)	.006	<.001 <sup>a</sup>
Part-time job	43 (17.2)	43 (15.9)	12 (24.0)	.68	.26
Going out with friends	40 (16.0)	55 (20.3)	13 (26.0)	.21	.09
Other	32 (12.8)	42 (15.5)	9 (18.0)	.38	.33
None	166 (66.4)	164 (60.5)	22 (44.0)	.16	.003

Abbreviations: GP, general practitioner; LBP, low back pain; LBP+OP, low back pain plus other pain; LBP+WBP, low back pain plus whole-body pain.  
<sup>a</sup>A difference was considered statistically significant at  $P < .001$  to account for Bonferroni adjustment.

cal or professional consultations. However, the percentage of adolescents who received treatment was higher in the LBP+WBP group than in the IsoLBP group. Differences were statistically significant for pain killers (20.0% vs 5.8%;  $P = .009$ ) but not for other treatments (32.7% vs 14.8%;  $P > .001$ ). In adolescents reporting other treatments, the most frequently specified was massage (35.2%), followed by physiotherapy (31.5%) and osteopathy (4.6%).

## HEALTH-RELATED QUALITY OF LIFE

### KIDSCREEN-52

The mean KIDSCREEN-52 score (**Figure** and **Table 3**) reported by adolescents with no symptoms of LBP (PFree group) was close to 50 and corresponded to the mean in the general European population in this age group. The KIDSCREEN-52 scores decreased as pain severity increased; however, there were no clinically relevant differences when comparing the PFree, OPain, and IsoLBP

groups. With the exception of Moods and Emotions (effect size 0.30), all comparisons between the IsoLBP and PFree groups had effect size values less than 0.2. Adolescents included in the LBP+WBP group demonstrated clearly impaired HRQOL with remarkably low scores in all the KIDSCREEN-52 dimensions. This group of adolescents reporting LBP scored significantly lower than the others in all KIDSCREEN-52 dimensions. Physical Well-being, Psychological Well-being, Moods and Emotions, Autonomy, Self-perception, and Parents' Relations and Home Life had the largest effect size values ( $>0.80$ ) when LBP+WBP was compared with PFree. Social Support and Peers, Social Acceptance (Bullying), and Financial Resources exhibited a more moderate difference, with effect size between 0.52 and 0.60. Five KIDSCREEN-52 dimensions (Physical Well-being, Psychological Well-being, Moods and Emotions, Self-perception, and Parents Relations and Home Life) showed statistically significant differences when the PFree group was compared with the LBP+OP group. Nevertheless, the effect size was always less than 0.40 in these comparisons.

## Disease-Specific HRQOL Instruments

Both the Roland-Morris Questionnaire and the Hanover Functional Ability Questionnaire (**Table 4**) showed statistically significant differences among the 3 groups of adolescents with LBP. Disability from LBP increased across the severity subgroups studied. According to both of these disease-specific instruments, adolescents in the LBP+WBP group were more markedly disabled than other adolescents reporting LBP. A high percentage of them had moderate to severe disability (Roland-Morris Questionnaire score  $>6$  [28.0%] or Hannover Functional Ability Questionnaire score  $>5$  [37.0%]). In contrast, a vast majority of adolescents (88.3%-96.8%) in the IsoLBP and LBP+OP groups reported negligible disability (Roland-Morris Questionnaire score of  $\leq 6$  or Hannover Functional Ability Questionnaire score of  $\leq 5$ ).

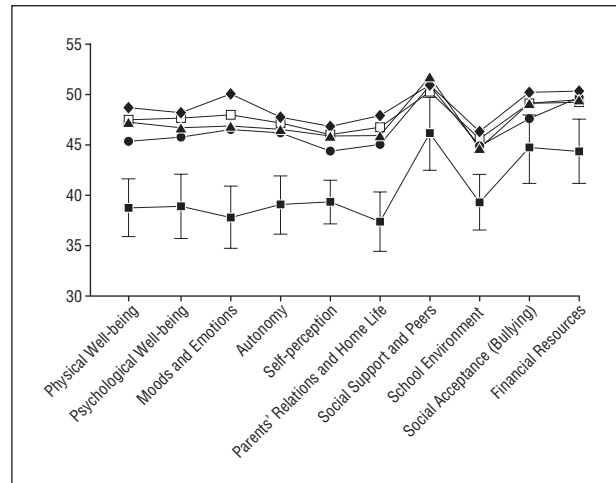
### COMMENT

Our study findings confirm the high prevalence of LBP in adolescents but show that overall LBP-associated disability is low and the effect on HRQOL is not clinically meaningful in a general population of adolescents. However, a subset of adolescents with LBP+WBP reported clinically significant functional impairment or low HRQOL. The heterogeneous effect on HRQOL among IsoLBP, LBP+OP, and LBP+WBP groups suggests that LBP may be a shared expression of pain and suffering in different clinical entities.

The study design explains the differences in age found between the 2 samples (Barcelona, Spain, and Fribourg, Switzerland). However, the absence of relevant differences in the other variables assessed between these samples, which represent 2 different settings, a large industrialized, southern city and a small northern country town, supports the general applicability of our findings, at least for Western and European countries.

The reported prevalence of LBP in adolescents varies greatly between studies and depends on the definition of pain, age of the sample, and recall period. Using a well-recognized and accepted definition of LBP (manikin and duration of pain  $\geq 1$  day)<sup>28,29</sup> and the recommended recall period of 1 month,<sup>5</sup> we found a prevalence of 40%, which compares well with previously published data.<sup>2-6</sup> Most subjects (55%) with LBP also reported other pain, and 9% reported whole-body pain. Only one-third of adolescents from the general population (34.7%) reported no pain during the previous month. These data and others clearly suggest that pain is a normal symptom in adolescents and a normal life experience at that age.<sup>30</sup>

Analysis of the pain characteristics, however, shows that adolescent LBP is not a homogeneous clinical entity. The LBP worsens as the number of pain sites increases. Adolescents with IsoLBP experience less intense and less frequent pain, lasting a shorter time, than those reporting LBP+OP. In keeping with previous reports,<sup>31</sup> more severe pain characteristics and multiple pain sites were associated with female sex. While links may be drawn between some pain and biological functions such as menstruation, most such pain seems to be associated



**Figure.** Mean KIDSCREEN-52 dimension scores by group: Solid diamonds indicate the pain-free group; open squares, other pain group; solid triangles, isolated low back pain group; solid circles, low back pain plus other pain group; and solid squares, low back pain plus whole-body pain group. Brackets indicate 95% confidence interval.

more strongly with social, environmental, and behavioral risk factors.<sup>32</sup> It has been suggested that these various pains are simultaneous signs of a multisymptom syndrome regarded as a potential general pain disorder.<sup>30,33</sup> Adults with LBP and multiple pain sites experience the greatest functional limitations and have the lowest HRQOL compared with other patients with chronic pain.<sup>34</sup>

To our knowledge, no previous study has analyzed the effect of LBP on adolescent HRQOL using standardized instruments. The KIDSCREEN-52 was developed in 13 European countries using a simultaneous approach that ensures its cross-cultural applicability.<sup>20</sup> Moreover, the instrument provides a useful tool for assessing HRQOL in children and adolescents from the general population as well as subgroups of adolescents. Children report excellent HRQOL that is largely independent of sex; however, after the age of 12 years, HRQOL decreases in most aspects, particularly in adolescent girls.<sup>35</sup> Pain in adolescence has been associated with daily activity restrictions, and pain intensity is the best predictive parameter.<sup>4,14</sup> Previous studies have evaluated some aspects of HRQOL in adolescents reporting LBP, mainly disability and functional limitations. Some of them found poorer HRQOL in adolescents with LBP.<sup>3,36</sup> Nevertheless, none of these efforts has compared HRQOL scores in adolescents with LBP with scores in adolescents without LBP from the general population using standardized instruments. As was hypothesized, and based on the KIDSCREEN-52 scores, our study shows for the first time that the overall effect of LBP on adolescent HRQOL is low. No differences were found between PFree individuals and those in the OPain, IsoLBP, or LBP+OP groups. This finding suggests that the effect of LBP per se on adolescent HRQOL might be irrelevant. However, a smaller group of adolescents reporting multiple pain sites and describing themselves as having whole-body pain had deteriorated HRQOL. In that specific group of adolescents, all KIDSCREEN-52 dimension scores were significantly lower compared with those of their peers without LBP, with large effect size in 7 dimensions linked to physical and mental health. In these cases, LBP seems to

**Table 3. Effect of Pain on HRQoL (KIDSCREEN Dimensions) for Each Group Compared With the Pain-Free Group of Adolescents, Expressed by Effect Size<sup>a,b</sup>**

Dimension	Mean (SD)		Effect Size		
	Pain-Free Group	Other Pain Group	IsoLBP Group	LBP + OP Group	LBP + WBP Group
Physical Well-being	48.40 (8.7)	+0.11	+0.14	+0.36 (1)	+1.12 (1, 2, 3, 4)
Psychological Well-being	48.15 (9.02)	+0.06	+0.16	+0.27 (1)	+1.03 (1, 2, 3, 4)
Moods and Emotions	49.94 (9.9)	+0.20	+0.30 <sup>b</sup>	+0.34 (1)	+1.24 (1, 2, 3, 4)
Autonomy	47.71 (8.91)	+0.06	+0.13	+0.16	+0.98 (1, 2, 3, 4)
Self-perception	46.94 (6.72)	+0.13	+0.15	+0.38 (1)	+1.14 (1, 2, 3, 4)
Parents' Relations and Home Life	47.87 (9.25)	0.12	+0.21	+0.31 (1)	+1.14 (1, 2, 3, 4)
Social Support and Peers	51 (9.48)	+0.09	-0.09	+0.03	+0.52 (3)
School Environment	46.41 (9.2)	+0.09	+0.19	+0.16	+0.78 (1, 2, 3, 4)
Social Acceptance (bullying)	50.1 (9.72)	+0.11	0.09	+0.26	+0.57 (1)
Financial Resources	50.15 (9.74)	+0.09	+0.08	+0.06	+0.60 (1, 4)

Abbreviations: HRQoL, health-related quality of life; IsoLBP, Isolated back pain; LBP, low back pain; LBP + OP, low back pain plus other pain; LBP + WBP, low back pain plus whole-body pain.

<sup>a</sup>Effect size = [(mean of Pain-Free group - Mean of group with pain)/SD of Pain-Free group].

<sup>b</sup>One-way analysis of variance was used to compare continuous variables between the 3 groups; Tukey studentized range (honestly significant) post hoc tests with  $P < .005$  for comparisons between groups: (1) Pain-Free group; (2) Other Pain group; (3) IsoLBP group; and (4) LBP + OP group.

**Table 4. Roland-Morris Questionnaire and Hanover Functional Ability Questionnaire Scores in Adolescents Reporting LBP**

Variable	Pain Group			P Value
	Iso-LBP	LBP + OP	LBP + WBP	
Roland-Morris Questionnaire				
Score, mean (SD)	1.5 (1.9)	2.2 (2.4)	5.1 (5.4)	<.001 <sup>a</sup> (1, 2, 3)
Score, No. (%)				
0-6	242 (96.8)	257 (94.8)	36 (72.0)	<.001 <sup>b</sup>
>6	8 (3.2)	14 (5.2)	14 (28.0)	
Hanover Functional Ability Questionnaire				
Score, mean (SD)	2.42 (2.05)	2.92 (2.09)	4.85 (2.29)	<.001 <sup>a</sup> (1, 2, 3)
Score, No. (%)				
0-5	182 (89.7)	204 (88.3)	29 (63.0)	<.001 <sup>b</sup>
>5	21 (10.3)	27 (11.7)	17 (37.0)	

Abbreviations: Iso-LBP, isolated low back pain; LBP, low back pain; LBP + OP, low back pain plus other pain; LBP + WBP, low back pain plus whole-body pain.

<sup>a</sup>One-way analysis of variance to compare continuous variables between the 3 groups; Tukey studentized range post hoc tests with  $P < .05$  for comparisons between groups: (1) LBP + WBP vs Iso-LBP, (2) LBP + WBP vs LBP + OP, and (3) LBP + OP vs Iso-LBP.

<sup>b</sup> $\chi^2$  Test to compare categorical variables.

be a symptom of a multidimensional process that should be identified and treated. The disease-specific HRQoL instruments provided similar information: adolescents reporting LBP either alone or associated with other pain had mild functional disability unless they considered themselves to have whole-body pain.

The cross-sectional design of the present study does not allow directionality to be established in any of the associations found. Therefore, even if our results suggest that adolescent LBP does not have an effect on HRQoL, longitudinal studies with long-term follow-up will be necessary to assess the importance of this clinical entity as a potential risk factor for developing chronic LBP in adulthood. Future studies also should analyze factors associated with seeking care for adolescents with LBP. In addition, the disease-specific Roland-Morris Questionnaire used in this study, which was designed to measure functional limitations in adults with LBP, has not been validated in adolescents. Nevertheless, the percentage of adolescents with LBP who endorsed each item was

higher than 10% except for the following 4 severe items ranging from 5.6% to 9.1%: "I only walk short distances because of my back pain," "I need help getting dressed," "I sit down most of the day," and "I stay in bed most of the time," indicating that the content of the items can also be considered suitable in this age group.

Children and adolescents are in a general learning process that includes expression of pain.<sup>18</sup> Our study results show that 9 of 10 adolescents reporting LBP can be considered healthy. The limited available societal resources should probably be focused on identifying and attending to the 10% of adolescents in whom LBP is a symptom of a multidimensional health problem. Because psychologic and psychosocial factors have an important role in adolescent LBP,<sup>28,29,37</sup> diagnosing or treating otherwise healthy teenagers should be discouraged. We should avoid lending exaggerated importance to symptoms in adolescents that might influence pain behavior and coping strategies.<sup>38</sup>

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