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The Severity of Chronic Pediatric Pain: An Epidemiological Study

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Abstract: This study was designed to (1) provide information on the prevalence of pediatric pain as well as other pain related characteristics in a sample of schoolchildren, and (2) study the suitability of a system to grade the severity of chronic pain problems among children. Participants in this cross-sectional study included 561 schoolchildren between the ages of 8 and 16 years. Besides collecting information about the presence of pain at the time of interview, and in the preceding 3 months, several characteristics of participants' pain experiences and several indicators of participants' quality of life were requested. Results showed that 37.3% had chronic pain, but only 5.1% had moderate or severe chronic pain problems. Gender and age differences were found in the prevalence of pain conditions. Children who had a chronic pain condition reported a worse quality of life, missed more days from school, and were more likely to use pain medication and seek medical care for pain relief. Our study shows that chronic pain is a highly prevalent condition in the community, one that can exert negative consequence for the child. But the prevalence of severe chronic pain cases is low. New studies are needed to further empirically test the proposed method of grading the severity of chronic pain in children.

Perspective:* *This article provides information on pain problems among schoolchildren. It also suggests a new grading system of chronic pediatric problems. This new system could help clinicians and researchers to diagnose pain problems in youth and design treatments suited to patients' characteristics and needs.

Key words: *Chronic pain, epidemiology, schoolchildren, prevalence, pain severity.*

Epidemiological studies of pediatric chronic pain have increased over the last years.[14-16,25,44,47,50] It is argued that chronic pain is a common problem among general pediatric population, which negatively affects everyday functioning of children and the family.[23,24,37,43] However, most published studies simply report estimations of pain prevalence, and very few studies provide additional information, such as intensity or frequency.[38,45]

Although some form of chronic pain is common, the severity of these problems varies considerably.[9] For instance, while published community studies show that pain impacts the overall health status of children,[22,45] clinical population studies—which report information from more severe cases—show that children with chronic pain have depression, anxiety, sleep disturbances, and developmental problems in comparison to peers.[12,13,30] Children with chronic pain are not a homogenous group. Nevertheless, published epidemiological studies have not provided information about the variation in severity of pain conditions in the general population. The need to create a classification system for chronic pediatric pain that goes beyond defining chronic pain simply by temporal criteria is being advocated by clinicians and researchers.[6,22,46] Previous attempts to classify chronic pain conditions have used standard diagnostic criteria,[33,42] or have been based in the rather confusing diagnostic of the idiopathic pain syndrome.[27] However, due to the multidimensional nature of pain it is unlikely that pathophysiologic signs or physical symptomatology could properly reflect by themselves the severity of a chronic pain syndrome, and much less be of any use to properly customize treatments to youth grouped under the same diagnosis category.

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Thus, the purpose of this epidemiological study was 2-fold: (1) To provide information on the prevalence of pediatric pain and other pain related characteristics, and (2) to study the severity of chronic pain in a sample of schoolchildren aged between 8 and 16 years.

Methods

Participants

A representative sample of 902 schoolchildren was invited to participate. They were recruited from nonspecial primary and secondary schools (from grades 3–10) randomly selected in Tarragona (an area in the southeast of Catalonia). Of these, 337 were not interested or noncompliant (ie, did not return the parental consent form), and 4 were deemed ineligible (ie, they had cognitive impairment as reported by their school's teacher). Thus, the total sample of participating schoolchildren was 561 (62.2% participation rate), parents of these children were also invited to participate in the study. The participating children did not differ from the eligible children who were invited but did not participate on school grade or sex ($P > .05$).

The age of the participating schoolchildren ranged from 8 to 16 years (mean age = 11.89 years; SD = 2.00); 51.7% of the sample was male. Table 1 presents relevant sociodemographic and medical data of participating schoolchildren.

Table 1. Characteristics of the Participating Children

Sociodemographic Data	Scale Range	Total Sample Mean (SD)
Age (years)	8–16	11.89 (2.00)
Gender (%, N)		
Boys	—	51.7 (290)
Girls	—	48.3 (271)
SES* (%, N)*		
High	—	40.3 (191)
Medium	—	32.5 (154)
Low	—	27.2 (129)
Parents' marital status† (%, N)		
Married	—	85.2 (473)
Separated or divorced	—	13.5 (75)
Widowers/widows	—	1.2 (7)
Family members at home (%, N)		
Immediate family members	—	86.3 (484)
Extended family members	—	13.7 (77)
Current General Health Status		
Medical diagnosis‡ (% of the total sample, n)		
Diabetes	—	0.7 (3)
Allergy	—	13.3 (59)
Asthma	—	3.2 (14)
Cardiology problems	—	2.3 (10)
Psychiatric/psychological problems	—	1.1 (5)
Others	—	5.2 (23)

SES, socioeconomic status.

*Information missing in 87 cases.

†Information missing in 6 cases.

‡Information missing in 119 cases.

Procedure

The protocol was reviewed and approved by the Department of Education of the Government of Catalonia, and by the boards of the participating schools. A total of 40 classes from grades 3 through 10 of 20 primary and secondary schools were randomly selected using a stratified sampling procedure from all eligible nonspecial education schools in the Tarragona area. All the schools approached agreed to participate, except for 1 which was involved in several other research projects at the time. After the schools had given their agreement, the children attending these classes and their parents were invited to participate. The parents were sent a letter in which they and their children were asked to participate. Children whose parents provided informed consent were individually interviewed at their school; they were asked to provide information about various domains of their health status and about their pain problems.

Since the children were asked retrospective questions, memory enhancing techniques were used.[35] For example, interviewers used open-ended questions, and important events as end point times, to prevent interviewer bias from affecting children's reports, and to increase the accuracy of the information. Several other quality control measures were implemented during data collection. First, the interviewers attended standardization classes in which they were instructed and trained on how to conduct the interview. Second, data sheets were carefully checked immediately after the interviews, and further monitored centrally to check for missing data or inconsistencies.

The parents of the participating children were surveyed separately. They were requested to provide some additional sociodemographic data (see below), and information about the child's health status.

Measures

Sociodemographic Measures

Information about age, sex, and school grade was collected at the time of interview. Based on the work of Domingo-Salvany et al[8] on the measurement of socioeconomic status based upon the Spanish Classification of Occupations (CNO-94). The highest occupation of the 2 parents was the 1 used to rate the socioeconomic status (SES) of the family.

Medical Condition

For descriptive purposes of the sample, parents were also requested to provide information regarding their children's current medical condition: That is, whether they had any illnesses at the time of interview. To gather this information, a list of illnesses (such as asthma, allergy, cardiovascular disease, diabetes, epilepsy, migraine, and psychiatric or psychological problems) was presented to them to choose from; if the appropriate illness was not on the list, parents were asked to report it.

Quality of Life

The Pediatric Quality of Life Inventory Version 4.0 (PedsQL)[53] was used to assess the children's perception of their quality of life. The PedsQL is a generic instrument that encompasses 2 subscales: (1) Physical Health Summary, and (2) Psychosocial Health Summary, which assess 3 functioning areas: (a) Social, (b) Emotional, and (c) School functioning. One overall score (Total Scale score) can also be calculated. Developmentally appropriate versions (ie, ages 8–12 and 13–18) were used. The child was asked how much of a problem each item had been in the past month. Items were scored on a 5-point Likert scale, from 0 (never a problem) to 4 (almost always a problem). Items were reverse-scored and linearly transformed to a 0 to 100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0), so that higher scores indicated a better quality of life. The feasibility, reliability and validity of the instrument have been demonstrated in Catalan-speaking schoolchildren by Huguet and Miró (Huguet A, Miró J. Development and Psychometric Evaluation of a Catalan Self- and Interviewer-Administered Version of the Pediatric Quality of Life Inventory Version 4.0. J Pediatr Psychol. In press, June, 2007).

Parents were asked to report about their child's quality of life in the prior month. An 11-point numerical scale was used with the following anchors: 0 = My child has been feeling very bad; 10 = My child has been feeling excellent.

School Attendance

Days of absence from school due to health problems in the month preceding the interview were reported by parents.

Pain

Based on suggestions and recommendations from the initiative known as the Pediatric Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (Ped-IMMPACT),[29] the *Faces Pain Scale–Revised* (FPS-R)[18] was the instrument used to gather information about the children's usual and highest pain intensity in the preceding 3 months as well as the pain intensity at the time of the interview (see also the recent work by Stinson et al[49]). The FPS-R is a 6-point scale designed to measure children's level of perceived pain intensity. The children's task is to choose the face that best reflects the intensity of the pain they have experienced. A numerical value from 0 to 10 (0-2-4-6-8-10) is assigned to each face. The end points are explained as "no pain" and "very much pain." We used the Catalan version of the scale, validated by Miró and Huguet.[34]

Pain frequency was measured by means of a categorical scale: More than once a week, about once a week, about once or twice a month, and once or twice in the last 3 months. Precoded categories are often used to assess the frequency of pain in pediatric populations.[38]

Some information about pain duration was also recorded. Specifically, we asked the participating schoolchildren to report whether they had been experiencing pain for more than 3 months.

Pain location was coded according to a list based on axis I of the IASP Classification of Chronic Pain.[32] This information was gathered by means of an open question about where their pain was located. At the same time, and on the basis of the work by Mikkelson et al,[33] children were requested to mark and color the painful area on a body figure,[17] to avoid potential misunderstandings.

In the case of children who reported to have more than 1 pain problem, they provided information about these pain characteristics (ie, intensity, frequency, duration and location) in relation to each pain complaint; finally, they were also requested to mention which pain complaint had troubled them most in the last 3 months.

Pain Severity

To our knowledge, there is no validated system to grade the severity of a child's pain problem. Therefore, since there is increasing evidence coming from the adult pain literature suggesting that pain intensity and pain-related interference with activities may underlie a single dimension of global pain severity,[55] we decided to follow Von Korff et al's[56] suggestions, and the scheme they developed and tested with general population and adult samples with chronic pain.[48,54,56] Based on their work, the severity of a child's pain was defined in terms of 3 axes: (1) Pain persistence (specifically, the presence of chronic pain), (2) pain intensity: Average intensity in the 3 months before the interview, that is the mean of the highest and the most usual pain intensity in the last 3 months), and (3) pain impact—the level of pain-related disability. The importance of these domains in the study and treatment of chronic pediatric pain has been recently underscored by Ped-IMMPACT.[29] Based on these 3 axes, pain severity was classified in 5 grades: (1) Grade 0: A nonchronic pain problem; (2) Grade I: Low pain intensity (intensity index $<5/10$) and low pain-related disability (FDI score $<10/52$), (3) Grade II: High pain intensity (intensity index $>5/10$) and low pain-related disability (FDI score $<10/52$); (4) Grade III: Moderate level of pain-related disability, regardless of pain intensity (FDI score $= 10–20/52$); and (5) Grade IV: High level of pain-related disability, regardless of the pain intensity (FDI score $>20/52$).

To proceed in this graded classification, chronic pain was defined as a pain lasting for 3 months at least,[16] that was experienced continuously or recurrently; a recurrent pain problem was one occurring once or twice at least each month (see Mikkelson et al[33] for a similar procedure). Thus, chronic pain was not only defined in terms of duration of pain, but also chronic pain was defined in terms of frequency of pain episodes in cases of recurrent pain; frequent pain episodes are potentially relevant. The intensity index [the average value of the highest and the most usual intensity of the chronic pain complaint] was dichotomized (ie, high intensity: Intensity index higher than 5 vs low intensity: Intensity index lower than 5).

Following with the recommendations of Ped-IMMPACT, the Functional Disability Inventory (FDI)[57] was used as a measure to assess pain-related disability. The FDI is one of the measures most commonly used to assess the impact of chronic pain in children[11] and it has shown evidence of good psychometric properties.[20,57] Published reports[23,44,57] have shown that mean self-reported FDI scores with clinical populations are always higher than 10, ranging from 11.25 (n = 4) to 34.5 (n = 10). Overall, nearly 50% of the examined clinical samples had mean FDI scores between 10 and 20, whereas the other 50% of the samples scored above 20. Thus, in our study, a cut off of 10 was used to define low to moderate disability, and a cut off of 20 for moderate to high disability.

Pain Medication and Pain-Related Visits to Health Care Professionals

Children were asked whether they had used pain medication or not, and whether they had consulted with a health care professional for each pain complaint reported within the previous 3 months.

Results

Sample Characteristics

Table 1 summarizes the main descriptive characteristics of participating schoolchildren. As can be seen, overall this is a healthy sample of children aged between 8 and 16 years. For instance, 25.8% of them had a confirmed medical diagnosis at the time of the interview with allergies and asthma being the most common reported health problems.

Prevalence of Pain and Other Related Characteristics

At the time of interview, 18.4% of the children (n = 102) were experiencing some pain; 26.5% of them (n = 27) had pain in more than 1 site.

Before the interview, 88% of the children (n = 493) had experienced at least 1 pain episode within the 3 months. Among them, more than half (59.43%) reported to have experienced pain at more than 1 site. The most frequently reported pain locations were the lower limb (47%), the head (43%), and the abdomen (34.3%). On the other hand, the less common pain locations were the back (11.3%), the neck (5%), the pelvis (2.9%), and the chest (2.3%). Lower limb pain was reported as the most troublesome pain location in the previous 3 months (ie, 29.4% of the children reported it). Headache and abdominal pain were more frequently reported by girls than boys (50% vs 36.68%; $\chi^2_{(1)} = 10.10$; $P < .01$; and 42.59% vs 26.64%; $\chi^2_{(1)} = 15.75$; $P < .001$, respectively), and lower limb pain was more frequently reported by boys (54.32% vs 39.26%; $\chi^2_{(1)} = 12.72$; $P < .001$). Age differences were only found for back pain such that children who reported back pain were significantly older than children without back pain (mean = 11.56, SD = 2.20 vs mean = 10.80, SD = 1.96; $t = -2.58$, $P < .05$).

Overall, the intensity for these pain complaints was mild-moderate, that is, the highest intensity of the pain that had troubled them most over the last 3 months was 5.35 (SD = 3.20, range: 0–10), and the most usual intensity for the same pain was 3.44 (SD = 2.36, range: 0–10). No differences in the ratings of pain intensity were found related to sex or age. A total of 38.3% of the children had consulted with a health care professional, and 42.2% had consumed pain medications (eg, paracetamol, ibuprofen, acetylsalicylic acid) for their most troublesome pain complaint. In comparison with boys, girls had a higher probability of having consumed pain medication (45.26% vs 59.75%; $\chi^2_{(1)} = 9.50$; $P < .01$), but not of having consulted a health professional for their pain. The age of the child was not related to the use of health care services or medication to get pain relief. Among the different pain problems, headache was the 1 requiring most medical consultation and medication for pain relief. Specifically, 42.9% of children who reported headache in the 3 months preceding the interview had consulted with a health care professional for their headache complaints, and 75.7% of children with headaches had consumed medication.

Table 2 presents descriptive statistics for children with chronic pain and without chronic pain.

According to the criteria used in this study to define chronic pain, the prevalence rate was 37.3% (n = 209). Almost one-third of the children with chronic pain problems (29.3%) reported pain in multiple sites (most frequently, 2 or 3 sites). The number of children with chronic pain on 1 site or multiple sites and the percentage of the total sample with chronic pain problems according to the location of pain is shown in Fig 1. Lower limb pain (41.3%), headache (36.1%), and abdominal pain (31.3%) were the most prevalent complaints among patients with chronic pain. A contrast of proportions showed that chronic pain at the lower limbs was more likely to be reported as an isolated complaint than headache and abdominal pain were ($z = 2.05$ and 2.04, $P < .05$; respectively).

The prevalence of chronic pain increased with age/*t* tests revealed that children with chronic pain were significantly older than children without chronic pain (mean = 11.49, SD = 2.08 vs mean = 10.53, SD = 1.86; $t = -5.67$, $P < .001$). This age difference was more evident among girls than boys (mean = 11.76, SD = 2.09 vs mean = 10.50, SD = 1.86; $t = -5.23$, $P < .001$; and mean = 11.07, SD = 2.09 vs mean = 10.54, SD = 1.86; $t = -2.14$, $P < .05$, respectively). The prevalence of chronic pain was higher for girls than for boys (46.84% vs 28.37%, $\chi^2_{(1)} = 20.32$; $P < .001$), irrespective of the child's age, statistically significant differences in χ^2 tests were found in both age groups: Eight to 12 years ($\chi^2_{(1)} = 5.83$; $P < .05$), and 13 to 16 years ($\chi^2_{(1)} = 16.58$; $P < .001$). It is important to note in this case that the youngest group included both pre- and post-menarchal girls, and this could masquerade potential gender differences.

Regarding location characteristics, lower limb chronic pain was more common among boys than girls (57% vs 19.65%; $\chi^2_{(1)} = 11.48$; $P < .001$), and chronic pain at multiple sites was more common among girls than boys

Table 2. Descriptive Characteristics of Health Status Indicators

	Total Sample	Nonchronic Pain	Chronic Pain	Grade 0	Grade I	Grade II	Grade III	Grade IV
Total quality of life (mean, SD)	81.41 (11.83)	83.02 (11.56)	78.77 (11.78)	83.02 (11.56)	81.61 (10.24)	76.12 (12.96)	75.30 (12.91)	71.87 (11.08)
Physical functioning (mean, SD)	86.35 (16.48)	87.32 (15.95)	84.75 (17.28)	87.32 (15.95)	88.29 (15.79)	81.54 (17.58)	76.98 (20.56)	75 (20.56)
Psychosocial functioning (mean, SD)	79.79 (12.91)	81.63 (12.56)	76.78 (12.90)	81.63 (12.55)	79.38 (11.35)	74.31 (14.52)	74.74 (12.10)	74.74 (12.10)
Pain medication (%)	44.9	39.3	46.9	39.3	42.3	64.1	80	83.3
Pain-related visits to a doctor (%)	38.3	29.7	53.1	29.7	44.2	59.4	80	83.3
Number of days missed school (mean, SD)	0.83 (1.95)	0.77 (1.85)	0.99 (2.14)	0.77 (1.85)	0.77 (1.71)	0.83 (1.73)	1.17 (1.80)	5.40 (5.94)

(50.6% vs 22.2%; $\chi^2_{(1)} = 6.32$; $P < .05$). No sex differences were found for any other locations.

The rate of prevalence of chronic pain was neither associated with child's socioeconomic level ($\chi^2_{(2)} = 4.97$; $P > .05$) nor with parents' marital status ($\chi^2_{(2)} = 3.64$; $P > .05$).

The impact of chronic pain on children's physical functioning was significantly higher than the impact of acute and occasional pain (FDI score mean = 5.70, SD = 6.44, vs FDI mean score = 4.42; SD = 5.52; respectively; $t = -2.33$, $P < .05$). Girls and boys with chronic pain reported similar levels of functional disability due to their pain ($t = -1.61$, $P = .11$), and child's age was not associated with the level of pain related disability ($r = .04$, $P = .56$).

Specific *t* tests indicated that children with chronic pain problems had significantly lower PedsQL scores (both on physical and psychosocial scales) than children who did not report chronic pain problems at the 0.05 and 0.001 level, respectively (Table 2). Boys and girls with chronic pain problems reported a similar level of quality of life ($t = 0.53$, $P = .59$); and the age of the child with chronic pain problems was not related to quality of life ($r = -.03$, $P = .68$). Parents' reports on their children's quality of life were comparable to the information provided by the children. Parents rated the quality of life of their children as high (mean = 8.34, SD = 1.92; range = 0–10), but those whose children had chronic pain problems acknowledged lower levels of quality of life for their children, as compared with parents whose children were not experiencing chronic pain (mean = 8.03, SD = 2.04 vs mean = 8.59, SD = 1.74; $t = 2.78$, $P < .01$). Similarly, and in agreement with that reported by participating schoolchildren, the quality of life of children with chronic pain reported by parents was not related to children's age or sex ($r = .15$, $P = .08$; $t = -0.31$, $P = .75$).

Chi-square tests demonstrated that the likelihood to report pain-related visits to the doctor and consumption of medication was significantly higher for children with chronic pain problems than for children without those problems ($\chi^2_{(2)} = 28.74$; $P < .001$, and $\chi^2_{(2)} = 12.07$; $P < .01$, respectively); 53.06% of children with chronic pain problems consulted with a doctor due to their pain complaints, 29.73% of children with no chronic pain problems did so too; 54.60% of children with chronic pain problems had consumed pain medication within the preceding 3 months of the interview, 39.30%, of children with no chronic problems had done it too.

Severity of Pain

The severity of pain syndromes in this population were graded as follows: Grade 0: 63.2% (n = 350); grade I: 20% (n = 111), grade II: 11.7% (n = 65); grade III: 4% (n = 22); and grade IV: 1.1% (n = 6) (Fig 2). Table 3 presents some pain characteristics for each level of severity.

By definition, children at grade I and at grade II differed in terms of pain intensity level (low vs high pain intensity) but were equal in terms of (low) levels of pain related disability (ie, FDI scores <10). However, although children at both grades scored in the lower range of FDI (ie, FDI scores <10), we found statistically significant differences between children in those 2 grades, namely,

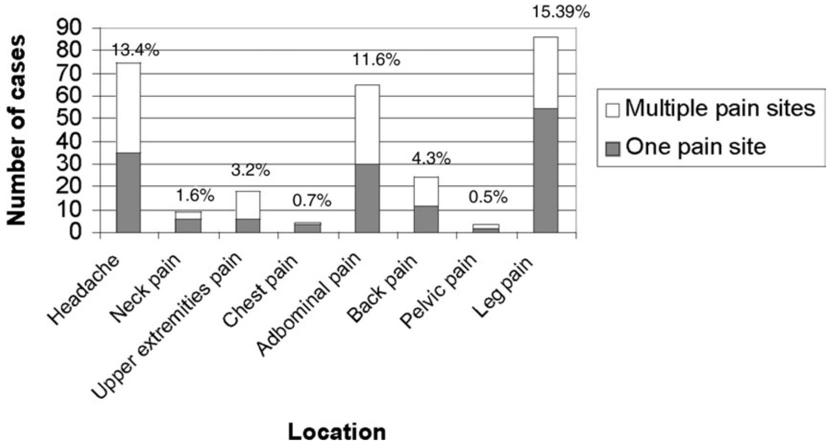

Figure 1. Number of children and adolescents with chronic pain problems with 1 or multiple pain sites and percentage of the total sample with chronic pain problems according to the location of the problem.

children at grade I reported lower levels of disability than children at grade II (mean = 3.13, SD = 2.81 and mean = 4.69, SD = 3.24, respectively; $t = -3.37$, $P < .001$).

Children at grade III and children at grade IV, again by definition, differed in the level of pain related disability (ie, grade III: Moderately disabled vs grade IV: Severely disabled) regardless of their pain intensity. As far as pain intensity, children at both grades tended to report high pain intensity (ie, intensity index >5/10) (Table 3), but that was not true for all the cases. Whereas at grade IV, 83.3% of children had high pain intensity, at grade III it was true for 59% of children.

The severity of chronic pain syndromes was not graded in terms of frequency of pain episodes. However, it is noteworthy that the frequency of pain episodes showed a tendency to increase with higher pain grades (Table 3). For example, on average, more than 1 weekly pain episode was reported by 29.7% of children at grade I, 43.1% at grade II, 54.5% at grade III, and 83.3% at grade IV. However, these differences were not statistically significant ($\chi^2_{(9)} = 14.48$; $P = .11$). The number of cases of schoolchildren distributed in grades of severity according to its location is depicted in Fig 3; percentage of cases in each grade for the most common pain location is depicted in Fig 4. Pain location was related with the severity of chronic pain only for cases of chronic pain in the head and in the lower limbs ($\chi^2_{(3)} = 8.64$, and 9.57, $P < .05$, respectively). Children with chronic headache were more likely to experience more severe chronic pain syndromes (ie, 9.9% of children at grade I, 12% at grade II, 36% at grade III, and 33% at grade IV), whereas children with chronic lower limb pain were more likely to have less severe chronic pain syndromes (ie, 27% of children at grade I, 34% at grade II, 4.5% at grade III, and 0% at grade IV). For all other pain problems, the location was not found to be associated with pain severity grade.

Pain severity grade was associated with age ($F = 3.15$; $P < .01$) as well as with sex ($\chi^2_{(4)} = 24.93$; $P < .001$). Severe pain syndromes were more common among females (Fig 5); specifically, children with pain syndrome grades I and III were more likely to be females than males ($\chi^2_{(1)} = 20.50$; $P < .001$ and $\chi^2_{(1)} = 7.76$; $P < .05$, respectively). No differences were found for the other grades. As far as the child's age group is concerned (Fig 6), younger children were more likely to report less severe pain syndromes. Specifically, children at grades 0 and I were younger than children at the other grades ($t = 5.36$ and -4.98, $P < .001$, respectively). The t tests for independent samples revealed no differences in age for children at higher grades.

Graded pain severity was related, on the one hand, to child's quality of life ($F = 7.61$, $P < .001$), the level of quality of life (both physical and psychosocial functioning) showed a tendency to decrease with pain grade (Table 3). No differences were observed between quality of life of children with no chronic pain and children in grade I, but the mean scores between these children and children with higher grade were statistically different ($P < .05$). No differences were found among higher grades. On the other hand, graded chronic pain severity

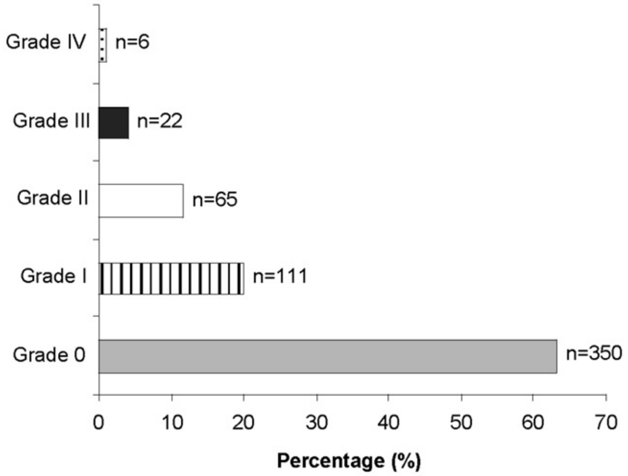

Figure 2. Number of schoolchildren and number of cases in each chronic pain severity grade.

Table 3. Pain Characteristics by Graded Severity

Characteristics	Grade I	Grade II	Grade III	Grade IV
Pain frequency (N, %)				
More than once a week	33 (29.7)	28 (43.1)	12 (54.5)	5 (83.3)
Once a week	29 (26.1)	12 (18.5)	3 (13.6)	1 (16.7)
Once or twice a month	49 (44.1)	24 (36.9)	7 (31.8)	0 (0)
Pain intensity (mean, SD)	3.73 (1.31)	6.41 (1.39)	5.83 (1.99)	6.97 (1.63)
Functional disability (mean, SD)	3.12 (2.81)	4.69 (3.24)	14.40 (2.26)	31.83 (6.61)

was also related school absence in the month before the interview took place ($F = 7.31$, $P < .001$): the mean number of days absent from school was 0.77 for children with no chronic pain, 0.77 for grade I, 0.83 for grade II, 1.17 for grade III, and 5.40 for grade IV. Posthoc analysis for ANOVA analysis revealed, however, that the only significant differences were between children at grade 0 and children at grade IV ($P < .001$). Finally, graded chronic pain severity was also related to visits to specialists and medication consumption; the greater the grade of pain severity the higher the likelihood that children visited a health care professional or used medication due to their pain problems ($\chi^2_{(8)} = 40.93$, $P < .001$; $\chi^2_{(8)} = 25.56$, $P < .01$, respectively). Whereas 39.3% of children with no chronic pain problems had consumed pain medication during the previous 3 months to the interview for an occasional pain problem and 29.7% had visited a doctor, more than half of children in grade II onward had consumed pain medication and visited a doctor (Table 2).

For each pain severity grade, the effect of children's sex and age was also examined. Regarding children's sex, females in grade I and II were more likely to consume pain medication ($\chi^2_{(2)} = 9.45$, $P < .01$; $\chi^2_{(2)} = 6.45$, $P < .05$); however, no differences were found between boys and girls in terms of their visits to health care professionals. Regarding children's age, only in grade II children who had consumed pain medication were significantly older than children who had not ($t = -2.41$, $P < .05$). Pain-related visits to health care professionals were not related to children's age in any grade.

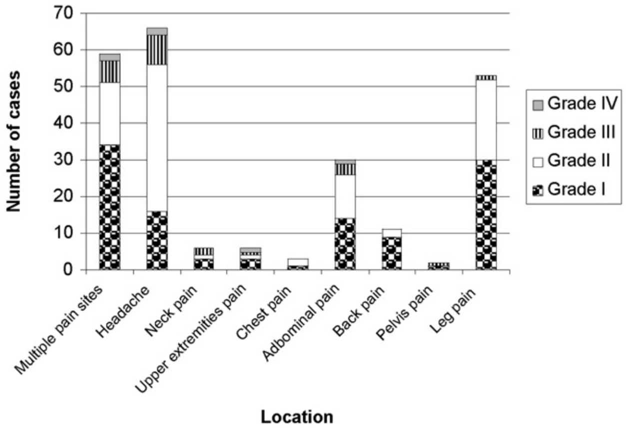

Figure 3. Number of schoolchildren in graded chronic pain severity for location.

Discussion

This study corroborates that chronic pain is an important problem among Catalan schoolchildren, similar to what has been claimed in previous studies.[2,3,26,38,44] The prevalence of reported chronic pain in this study was higher compared with previous major works, such as Perquin et al,[38] a study with similar characteristics to this one. Such a discrepancy might be explained by differences in data collection and/or differences in participation rate. On one hand, whereas Perquin and colleagues only collected pain-related information (eg, pain duration) about the most troublesome pain problem to study the prevalence of chronic pain, we collected the same information for any pain experience within the previous 3 months. The results of our study show that a very intense occasional (acute) pain can be considered as being more interfering with the daily living of the child than a chronic pain problem. Therefore, Perquin and her colleagues could have underestimated the prevalence of chronic pain by just collecting information about the most troublesome problem. On the other hand, the participation rate in our study was lower than in Perquin et al's work (62.2% vs 82%). Due to the special characteristics of our collecting data procedure (ie, personal interviews that were very time consuming), parents who agreed to participate might have been those that were most concerned about this problem (for example, they might have been worried by their child's pain problems), this might have somewhat contributed to a potential overestimation of chronic pain. However, this hypothesis can not be confirmed because no data is available for nonparticipants. Also, such a discrepancy in the preva-

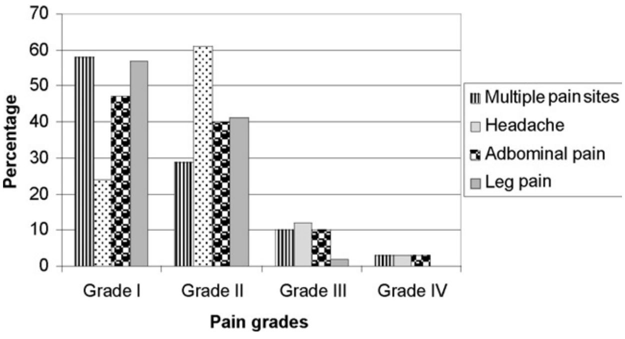

Figure 4. The percent distribution of graded chronic pain severity among patients with headache, abdominal pain, lower extremity pain, and patients with multiple pain sites.

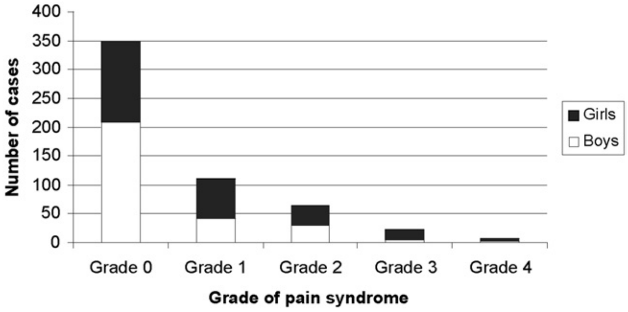

Figure 5. Number of cases distribution of graded chronic pain severity by gender.

lence of chronic pain could be explained by sociocultural differences[7,51,58,59]; Mediterranean people may be more likely to be concerned about and express physical complaints than people from other cultural environments.[1,60] Cross-cultural investigations of pediatric chronic pain are needed to test this hypothesis.[19,41]

Lower limb pain, headache, and abdominal pain were the most frequently reported chronic pain problems, as it is the case in previous reports on the epidemiology of chronic pediatric pain[38,45]; the co-occurrence of chronic localized pains at multiple anatomic sites was also commonly reported, mainly among girls in our study (see for similar results the work conducted by Laurell et al[26] and Petersen et al[39]).

Our data also corroborated the sex and age differences in the prevalence of chronic pain reported in several other available studies.[28,31,38,52] Both boys and girls report to be more at risk of having chronic pain as they become older. At the same time, girls report to have much more often chronic pain than boys do. Despite this general finding related to the child's sex, it might also be true that some types of chronic pain conditions have different sex prevalence patterns. For example, according to some epidemiological studies, our data shows that lower limb chronic pain is more frequent among boys than among girls, and the co-occurrence of multiple sites in pain is more frequent among girls than among boys.[33]

Another remarkable finding in this study is the high proportion of children who consume pain medication when in pain; the likelihood to consume pain medication is greater for children with chronic pain. Future studies should examine both the frequency of pain-related visits to health professionals, and the levels of medical consumption, and their relation to chronic pain severity and related dysfunction.

This study not only showed that chronic pain is a common problem in the general population of children—one that often demands medical attention, it also demonstrated again that chronic pain negatively impacts the everyday functioning of the children. For example, our data showed that children with a chronic pain syndrome have a worse quality of life when compared with those without chronic pain.[22,36,37] Likewise, chronic pain children reported higher functioning impairments, as a result of their pain, than did children that reported to only have occasional pain problems.

This is the first study presenting classification criteria for grading chronic pediatric pain severity status. It shows that although chronic pain is a prevalent complaint in the general population of children, a smaller proportion (around 5% of the children) have moderate or severe chronic pain syndromes.[9,45] Most children are able to cope quite effectively with their chronic pain problems, regardless of their pain intensity. The levels of quality of life of these children remain high in comparison to clinical samples[5]; and the same is true in relation for chronic pain related disability: In general, disability levels appear to be on the lower range if compared with clinical populations.[4,10,40,57] Although most schoolchildren with chronic pain problems cope well with their pain, reporting a low pain interference on their daily activities, under no circumstances these cases with less severe chronic pain problems should be dismissed as irrelevant or insignificant. For instance, children at grade II report to have quite intense chronic pain problems (mean pain intensity = 6.4/10), besides their use of pain medication is 163% of that of grade 0, and their pain-related visits to doctors are 200% of the grade 0 level.

Previous studies have rated the severity of chronic pain on the basis of its intensity and frequency characteristics.[38,45] However, our results showed that these 2 parameters are not enough to determine a given pain status. Children can report intense and frequent pain episodes for more than 3 months, but this pain is sometimes not interfering their daily functioning (ie, grade II children), therefore other parameters, besides intensity and frequency, should be taken into account to describe with precision the severity of chronic pediatric pain, and better understand its impact on children's quality of life (see Hunfeld et al[22] for a related discussion).

The pattern of observed relationships between pain status, pain characteristics, and indicators of health status is somewhat interesting. Children with more severe chronic pain syndromes tend to report worse pain related characteristics, not included in the definition of pain grades (ie, more frequent pain episodes) too. Also, children with more severe chronic pain syndromes provide reports of poorer functioning through indicators beyond the ones included in the definition (ie, worse quality of life, more days absent from school, more like-

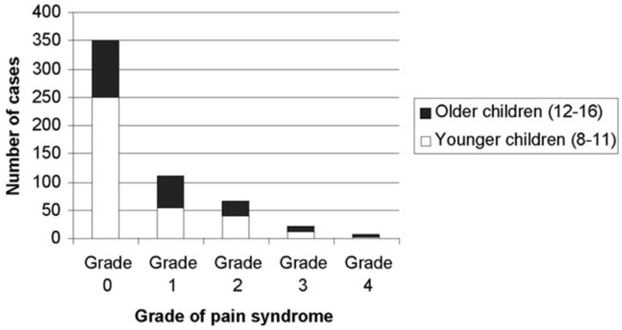

Figure 6. The number of cases distribution of graded chronic pain severity by age.

lihood to consume medication, and consult a health care professional for their pain problems).

As for sex differences in the severity of pain syndromes, girls aged between 8 and 16 years are more likely to have more severe chronic pain syndromes than boys. Other published studies would support this finding that girls have significantly higher pain intensity and frequency[22] or that girls are at higher risk for continuing chronic pain after a 3-year period of time.[28] Such sex differences in prevalence of chronic pain could be the reason why girls consume medication much often than boys in spite of the fact that the likelihood that girls visit a doctor for their pain is higher than boys has not been confirmed in our data.

In this study, the severity of a chronic pain syndrome seems to be related to certain pain locations. Lower limb pain is associated with less severe problems, whereas headaches are associated with more severe ones. This could help explain why, in this study, headaches are the most frequent pain-related reason to visit a doctor, and it is in accordance with Hunfeld et al's study,[21] which reported that patients with headache had lower levels of quality of life and larger school absence due to their pain in comparison to patients with chronic pain at other sites. Alternatively, it seems paradoxical that lower limb chronic pain that is associated with less severe problems is rated as the most bothersome pain. One possible explanation might be that limb pain, in comparison to other pains, particularly interferes with physical functioning, so children with lower limb pains might be more particularly restricted in physical areas, than children with pain at other anatomical sites.

A systematic examination of epidemiological data with this grading system as a template may be helpful to both basic and clinical pain researchers to generate hypotheses in our search for a better understanding of chronic pediatric pain. The relationships between the classification system and several indicators of pain severity (eg, consumption of pain medication, use of healthcare service for pain problems) provide preliminary support to the use of Von Korff's proposal to grade chronic pediatric pain severity on the bases of several different variables (ie, frequency, duration, intensity, and functional disability). Nevertheless, few cases with severe chronic pain syndromes participated in this study; this might be the reason for which some of the analyses supporting the validity of this classification system did not reach statistical significance. Thus, additional studies need to be conducted to test the suitability of our proposal to grade chronic pediatric pain syndromes on the basis of their severity.

Although the participation rate was not as high as in other epidemiological studies, the large sample size, the randomised study design, the reliable and accurate method of data collection (ie, individual interviews by highly skilled and trained professionals), as well as the consistency between our findings with those from previous published reports, guarantee that these results may be fairly generalizable to the population of schoolchildren aged between 8 and 16 years.

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