

Pain Among Children and Adolescents: Restrictions in Daily Living and Triggering Factors

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ABSTRACT. *Objectives.* Pain among children and adolescents has been identified as an important public health problem. Most studies evaluating recurrent or chronic pain conditions among children have been limited to descriptions of pain intensity and duration. The effects of pain states and their impact on daily living have rarely been studied. The objective of this study was to investigate the impact of perceived pain on the daily lives and activities of children and adolescents. In addition, we sought to delineate self-perceived triggers of pain among children and adolescents. In this study, we (1) document the 3-month prevalence of painful conditions among children and adolescents, (2) delineate their features (location, intensity, frequency, and duration), (3) describe their consequences (restrictions and health care utilization), and (4) elucidate factors that contribute to the occurrence of pain episodes among young subjects.

Methods. The study was conducted in 1 elementary school and 2 secondary schools in the district of Ostholstein, Germany. Children and adolescents, as well as their parents/guardians, were contacted through their school administrators. The teachers distributed an information leaflet, explaining the conduct and aim of the study, to the parents a few days before the official enrollment of the youths in the study. Parents of children in grades 1 to 4 of elementary school were asked to complete the pain questionnaire for their children at home, whereas children from grade 5 upward completed the questionnaire on their own during class, under the supervision of their teachers. The response rate was 80.3%. As previously stated, chronic pain was defined as any prolonged pain that lasted a minimum of 3 months or any pain that recurred throughout a minimal period of 3 months. The children and adolescents were surveyed with the Luebeck Pain-Screening Questionnaire, which was specifically designed for an epidemiologic study of the characteristics and consequences of pain among children and adolescents. The questionnaire evaluates the prevalence of pain in the preceding 3 months. The body area, frequency, intensity, and duration of pain are addressed by the questionnaire. In addition, the questionnaire inquires about the private and public consequences of pain among young subjects. Specifically, the question-

naire aims to delineate the self-perceived factors for the development and maintenance of pain and the impact of these conditions on daily life.

Results. Of the 749 children and adolescents, 622 (83%) had experienced pain during the preceding 3 months. A total of 30.8% of the children and adolescents stated that the pain had been present for >6 months. Headache (60.5%), abdominal pain (43.3%), limb pain (33.6%), and back pain (30.2) were the most prevalent pain types among the respondents. Children and adolescents with pain reported that their pain caused the following sequelae: sleep problems (53.6%), inability to pursue hobbies (53.3%), eating problems (51.1%), school absence (48.8%), and inability to meet friends (46.7%). The prevalence of restrictions in daily living attributable to pain increased with age. A total of 50.9% of children and adolescents with pain sought professional help for their conditions, and 51.5% reported the use of pain medications. The prevalence of doctor visits and medication use increased with age. Weather conditions (33%), illness (30.7%), and physical exertion (21.9%) were the most frequent self-perceived triggers for pain noted by the respondents. A total of 30.4% of study participants registered headache as the most bothersome pain, whereas 12.3% cited abdominal pain, 10.7% pain in the extremities, 8.9% back pain, and 3.9% sore throat as being most bothersome. A total of 35.2% of children and adolescents reported pain episodes occurring ≥ 1 time per week or even more often. Health care utilization because of pain differed among children and adolescents according to the location of pain. Children and adolescents with back pain (56.7%), limb pain (55.0%), and abdominal pain (53.3%) visited a doctor more often than did those with headache (32.5%). In contrast, children and adolescents with headache (59.2%) reported taking medication because of pain more often than did those with back pain (16.4%), limb pain (22.5%), and abdominal pain (38.0%). The prevalence of self-reported medication use and doctor visits because of pain increased significantly with age (χ^2 test). The prevalence of self-reported medication use was significantly higher among girls than among boys of the same age, except between the ages of 4 and 9 years (χ^2 test). The prevalence of restrictions in daily activities varied among children and adolescents with different pain locations; 51.1% of children and adolescents with abdominal pain and 43.0% with headache but only 19.4% with back pain reported having been absent from school because of pain. The prevalence of restrictions attributable to pain was significantly higher among girls than among boys of the same age, except between the ages of 4 and 9 years (χ^2 test). The self-reported triggers for pain varied between girls and boys. Girls stated more often than boys that their pain was triggered by weather conditions (39% vs 25%), illness (eg, common cold or injury) (35.9% vs 23.9%), anger/disputes (20.9% vs 11.9%), family

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Accepted for publication Sep 21, 2004.

doi:10.1542/peds.2004-0682

No conflict of interest declared.

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conditions (12.1% vs 5.2%), and sadness (11.9% vs 3.4%). In contrast, boys stated more often than girls that their pain was triggered by physical exertion (28% vs 17.2%). We used a logistic regression model to predict the likelihood of a child paying a visit to the doctor and/or using pain medication. Health care utilization was predicted by increasing age, greater intensity of pain, and longer duration of pain but not by the frequency of pain. We used a logistic regression model to predict restrictions in daily activities. Only the intensity of pain was predictive of the degree of restrictions in daily life attributable to pain; the duration of pain and the frequency of pain episodes had no bearing on the degree to which the daily lives of the children were restricted because of pain.

Conclusions. More than two thirds of the respondents reported restrictions in daily living activities attributable to pain. However, 30 to 40% of children and adolescents with pain reported moderate effects of their pain on school attendance, participation in hobbies, maintenance of social contacts, appetite, and sleep, as well as increased utilization of health services because of their pain. Restrictions in daily activities in general and health care utilization because of pain increased with age. Girls ≥ 10 years of age reported more restrictions in daily living and used more medications for their pain than did boys of the same age. We found gender-specific differences in self-perceived triggers for pain. Pain intensity was the most robust variable for predicting functional impairment in ≥ 1 areas of daily life. Increasing age of the child and increasing intensity and duration of pain had effects in predicting health care utilization (visiting a doctor and/or taking medication), whereas restrictions in daily activities were predicted only by the intensity of pain. Our results underscore the relevance of pediatric pain for public health policy. Additional studies are necessary and may enhance our knowledge about pediatric pain, to enable parents, teachers, and health care professionals to assist young people with pain management, allowing the young people to intervene positively in their conditions before they become recurrent or persistent. *Pediatrics* 2005;115:e152–e162. URL: www.pediatrics.org/cgi/doi/10.1542/peds.2004-0682; *pain, children, adolescents, epidemiology*.

ABBREVIATIONS. CI, confidence interval; VAS, visual analog scale.

Many large-scale epidemiologic studies have documented chronic pain conditions among adults. Pain among children and adolescents has been identified as an important public health problem.^{1,2}

Children and adolescents frequently experience pain.^{2,3} It is estimated that 15% to 25% of all children and adolescents suffer from recurrent or chronic pain conditions.^{2,4} Headache, abdominal pain, and musculoskeletal pain account for most of the recurrent painful states among children and adolescents.⁴

Kristjansdottir⁵ reported a prevalence of 15% to 20% for pain in ≥ 1 location (head, abdomen, and back) among school-aged children. Recurring episodes of pain or chronic pain conditions often have a major impact on the daily lives of children and adolescents.⁶ North American youths who suffered from frequent headaches often missed school.⁷ Children with recurrent headaches have a risk of developing additional physical and mental problems, such as

anxiety and depression, in adulthood.⁸ In addition, recurrent abdominal pain among children and adolescents not only affects physical and psychosocial aspects of daily family life but also may predispose children to experience recurrent pain-related illnesses in adulthood.^{9–11}

Most studies evaluating recurrent or chronic pain conditions among children have been limited to descriptions of pain intensity and pain duration. The resulting effects of pain states and their impact on daily living have been studied only rarely. For example, many studies focused on the validity of headache diaries documenting the frequency and intensity of headaches among young patients. However, measures of functional restrictions resulting from chronic headaches were rarely included in those studies.⁶

The objective of the present study was to investigate the impact of perceived pain on the daily lives and activities of children and adolescents. In addition, we sought to delineate self-perceived triggers of pain among children and adolescents. In this study, we (1) document the 3-month prevalence of painful conditions among children and adolescents, (2) delineate the features of those conditions (location, intensity, frequency, and duration), (3) describe their consequences (restrictions and health care utilization), and (4) elucidate factors that contribute to the occurrence of pain episodes among young subjects.

METHODS

Study Sample

After approval by the ethics committee of the University of Luebeck and the State Department for Education, Research, Science, and Culture (Schleswig-Holstein, Germany), the study was conducted in 1 elementary school and 2 secondary schools in the district of Ostholstein, Germany. Because <3% of the schoolchildren in Germany attend private or special schools (such as schools for children with disabilities), we think that there is no obvious selection bias in our sample.

Children and adolescents, as well as their parents or guardians, were contacted through their school administrators. The teachers distributed an information leaflet, explaining the conduct and aim of the study, to the parents a few days before the official enrollment of the youths in the study. Parents of children in grades 1 to 4 of elementary school were asked to complete the pain questionnaire for their children at home, whereas children from grade 5 upward completed the questionnaire on their own during class, under the supervision of their teachers.

Study Participants

The total number of schoolchildren in the participating schools was 1003. A total of 933 children and adolescents (93.0%) attended school on the day of the survey; 751 schoolchildren completed the questionnaire (80.5%), 70 children and adolescents were absent from school on the day of the study, and 182 did not complete the questionnaire. We performed no substitute sampling of children and adolescents who were absent from school on the day of the study or did not complete the questionnaire. Two children were excluded from the survey because they did not complete the questionnaire properly (Table 1).

Pain Definition and Pain Recall Period

According to McGrath,^{12(p81)} "chronic pain is defined in this study as any prolonged pain that lasts a minimum of 3 months or any pain that recurs throughout a minimum period of 3 months." In accordance with other epidemiologic studies of pain among children and adolescents,^{2,13} we investigated a pain recall period

TABLE 1. Study Participants

Type of School	Total No. of Schoolchildren in Participating Schools	No. of Schoolchildren		No. of Completed Questionnaires	Response Rate, %
		Approached	Responded		
Elementary school	266	258	189	189	73.3
Secondary school I	228	214	130	130	60.7
Secondary school II	509	461	432	430	93.3
Total	1003	933	751	749	80.3

of 3 months. Retrospective reports of pain have been shown to be reliable.¹⁴

Survey Methods

Previous studies showed that sufficient response rates result from recruitment of children and adolescents at school. To avoid selection bias, we chose an unselected sample of schoolchildren.

Depending on the age of the children, parental ratings or self-report measurements were obtained. Parental ratings were used for children in elementary school (6–9 years of age), and self-report measurements were used for pupils in secondary schools (10–18 years of age).

The children and adolescents were surveyed with the Luebeck Pain-Screening Questionnaire, which was specifically designed for an epidemiologic study of the characteristics and consequences of pain among children and adolescents. The questionnaire evaluates the prevalence of pain in the preceding 3 months. The body area, frequency, intensity, and duration of pain are addressed by the questionnaire. In addition, the questionnaire inquires about the private and public consequences of pain among young subjects. Specifically, the questionnaire aims to delineate the self-perceived factors for the development and maintenance of pain and the impact of these conditions on family life. Previous pilot studies showed that children of the age of 9 years were able to respond correctly to the questionnaire.¹⁵

The questionnaire has 3 versions, depending on the age of the enrolled subject. Version 1 was distributed to the parents of children in grades 1 to 4, version 2 to study participants enrolled in grades 5 to 9, and version 3 to adolescents enrolled in grade 10. The questionnaire was easy to understand and could be completed within 10 minutes, without additional information or aids.

If the answer to the first question of the questionnaire (did your child/did you have pain within the past 3 months?) was no, then no other question needed to be answered. Children who reported pain within the preceding 3 months were asked to describe the body area from which the pain arose. Choices given were head, back, abdomen, arm, leg, ear, throat, chest, pelvis, tooth, or other. For pain that was described as the main discomfort, the participants were asked to specify the duration, frequency, and intensity of the pain with answer categories. For the duration of pain, the categories were only once, <1 month, 1 to 3 months, >3 months, >6 months, or >12 months. For the frequency of pain, the answer options were <1 time per month, 1 time per month, 2 or 3 times per month, 1 time per week, 2 or 3 times per week, or every day. The intensity of pain was assessed with a visual analog scale (VAS) of 1 to 10, combined with verbal end points (hardly noticeable pain versus strongest conceivable pain). In addition, a face-smile (“smiley”) scale depicted 6 faces between laughter and crying. The type and extent of the personal impairment attributable to pain were assessed in the areas of sleep, eating, missed school days, hobbies, social contacts, and health care utilization (doctor’s visits and pain medication); the participants were asked to rate the impact of the pain in these areas as never, sometimes, often, or always. Self-perceived triggers of pain and explanations for the first occurrence of the pain were evaluated with the help of a list of possible causes (change of weather, lack of sleep, annoyance/conflicts, school tests, cold, common cold, school situation, sports/physical efforts, family situation, light, noise, computer use, television use, consumption of sweets, nutrition, sadness, excitement, nonspecific factor, or other), as well as open-ended statements. In addition, the participants were asked whether they knew the cause of their pain and/or whether they had a medical diagnosis for their pain. Furthermore, the children and adolescents were asked whether a family member experienced recurrent or chronic pain.

The prevalence of pain was calculated according to age and gender. Computation of standardized rates and school type-specific prevalence rates was not conducted. Data analyses provided absolute and relative frequencies of pain episodes in a descriptive manner. The influence of age, pain intensity, duration of pain, and pain frequency on the extent of impairments was determined with a logistic regression model.

RESULTS

Return Rate and Response Rate

A total of 933 questionnaires were distributed, and 751 questionnaires (80.5%) were returned. Of the returned and completed questionnaires, a total of 749 (99.7%) were evaluated. Two questionnaires did not specify the gender of the study participant and therefore were excluded from the data analysis. The response rate was 80.3% (Table 1).

Sample Characteristics

Table 2 presents the social demographic features of the study sample. The largest group of study participants (38.3%) was between 13 and 15 years of age, and 33.6% of the participants in our study sample were 10 to 12 years of age. The gender distribution in our study was 47.4% male subjects and 52.6% female subjects. German was the primary language at home for 89.9% of all enrolled children and adolescents, whereas 10.1% of the enrolled participants indicated that they also spoke other languages at home.

Prevalence of Pain Within 3 Months

A total of 622 of 749 study participants (83%; 95% confidence interval [CI]: 80.4–85.7%) declared, either through their parents/guardians or by themselves, that they had experienced pain within the preceding 3 months.

Body Areas With Pain

Figure 1 indicates the most common areas of pain in our study population. The head, abdomen, throat, extremities, and back were cited most commonly as

TABLE 2. Sociodemographic Data

	No.	%
Gender (<i>n</i> = 749)		
Male	355	47.4
Female	394	52.6
Age group (<i>n</i> = 749)		
4–9 y	130	17.4
10–12 y	252	33.6
13–15 y	287	38.3
16–18 y	80	10.7
Language (<i>n</i> = 736)		
Only German	662	89.9
And other	74	10.1

locations of perceived pain. The 3-month prevalence rates of symptoms were 60.5% (95% CI: 57.0–64.0%) for headaches, 43.3% (95% CI: 39.7–46.8%) for abdominal pain, 33.6% (95% CI: 30.3–37%) for pain in the extremities, 30.2% (95% CI: 26.9–33.5%) for back pain, and 35% (95% CI: 31.6–38.4%) for sore throat. Eighty-five percent of children and adolescents with pain within the preceding 3 months reported pain in >1 location, and 15% complained of pain in only 1 body region. The 3-month prevalence of pain in >1 location was 70.6%.

Type of Pain

Of a total of 622 children and adolescents with pain within the preceding 3 months, 604 (97.1%) answered the question, “which type of pain is in your opinion the most bothersome to you?” A total of 30.4% of study participants registered headache as the most bothersome pain, whereas 12.3% cited abdominal pain, 10.7% pain in the extremities, 8.9% back pain, and 3.9% sore throat as being most bothersome (Fig 1).

Pain Intensity

The mean pain intensity for children and adolescents with pain was 5.7 on the VAS (SD: 1.9); 17.5% of those suffering pain rated their pain as 1 to 3 on the VAS, 56.9% rated their pain as 4 to 6 on the VAS, and 25.6% scored their pain as 7 to 10 on the VAS.

Frequency of Pain Episodes

Figure 2 depicts the 3-month prevalence of the frequency of pain episodes. A total of 25.6% of the study participants stated that their pain occurred <1 time or 1 time per month, 19.2% declared 2 or 3 pain episodes per month, and 35.2% of children and ad-

olescents reported pain episodes occurring ≥ 1 time per week or even more often (Fig 2).

Duration of Pain Episodes

Figure 3 depicts the 3-month prevalence of the duration of pain. For 14.4% of the children and adolescents, the symptoms occurred only once; 11.5% of participants stated that their painful episodes had occurred <1 month earlier, 13% reported that their pain had occurred within 1 to 3 months, 9.5% stated that they had experienced pain off and on for >3 months, 8.7% stated that they had experienced pain for >6 months, and 22.2% remembered episodes of pain persisting for >12 months (Fig 3).

Health Care Utilization Attributable to Pain

Of the 622 participants who had experienced pain, 564 answered the question of whether they had sought medical care for their pain. A total of 50.9% ($n = 287$) reported that they had seen a doctor for their pain; 37.2% ($n = 210$) stated that they had seen their doctor sometimes, and 13.7% ($n = 77$) said often or always (Fig 4).

Of the 622 children with pain, 573 answered the question of whether they had taken any medications for their pain. A total of 51.5% ($n = 295$) reported that they had taken medications for their pain; 39.1% ($n = 224$) stated that they sometimes used medications, and 12.4% ($n = 71$) reported that they used medications often or always (Fig 4).

Health care utilization attributable to pain differed among children and adolescents according to the location of pain. Table 3 shows the prevalence of self-reported health care utilization and restrictions attributable to pain for different pain locations. Children and adolescents with back pain (56.7%), limb

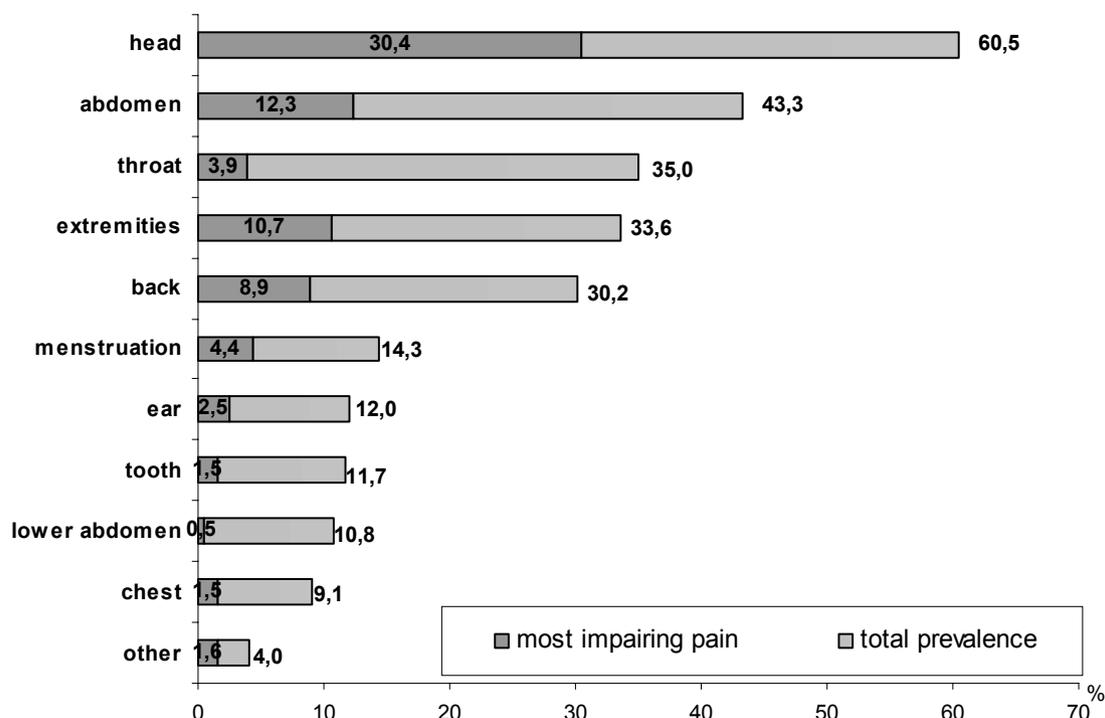


Fig 1. Three-month prevalence of pain according to body area.

Fig 2. Pain frequency.

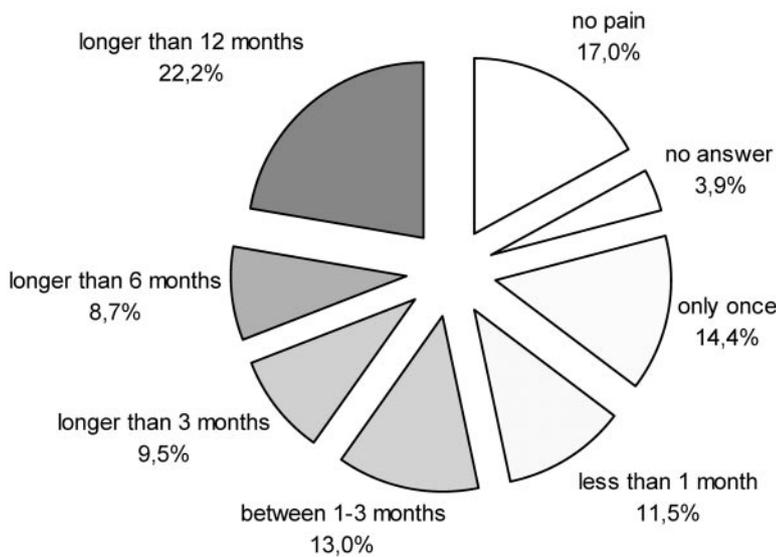
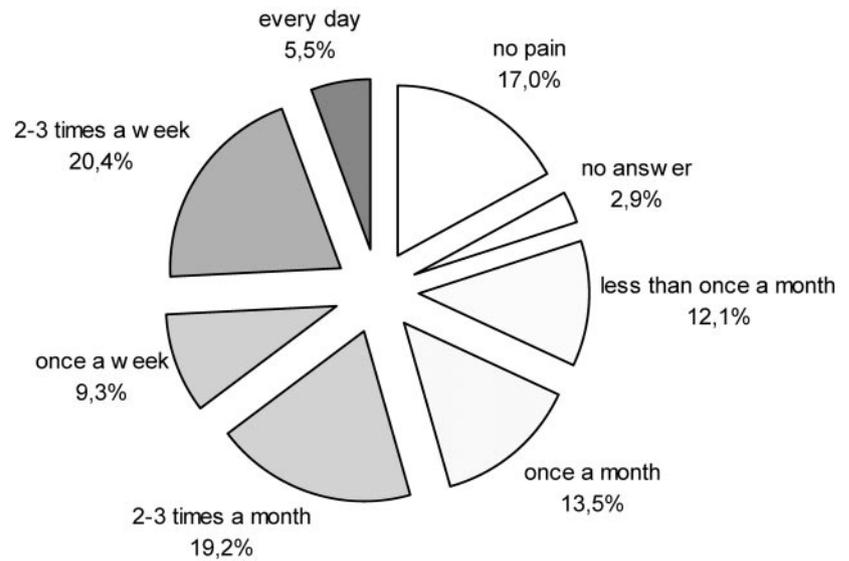


Fig 3. Pain duration.

pain (55.0%), and abdominal pain (53.3%) visited a doctor more often than did those with headache (32.5%) (Table 3). In contrast, children and adolescents with headache (59.2%) more often stated that they took medications because of pain than did those with back pain (16.4%), limb pain (22.5%), and abdominal pain (38.0%).

The prevalence of self-reported medication use and doctor visits because of pain significantly increased with age (χ^2 test) (Table 4). The prevalence of self-reported medication use was significantly higher among girls than among boys of the same age, except for those 4 to 9 years of age (χ^2 test) (Table 4).

Restrictions in Daily Living Attributable to Pain

A total of 68.2% of all respondents reported restrictions in daily living activities attributable to pain. The prevalence rates of restrictions in daily living activities attributable to pain, according to age and gender, are shown in Table 4. Figure 5 depicts the restrictions in daily activities attributable to pain among children and adolescents with pain in the preceding 3 months; 53.6% of children and adoles-

cents reported sleep disturbances attributable to pain (35.1% sometimes and 18.5% often or always), and 53.3% reported that they had been unable to pursue their hobbies because of the pain (37.5% sometimes and 15.8% often or always). Appetite problems attributable to the pain were reported by a total of 51.1% of the children and adolescents with pain in the preceding 3 months (37.3% sometimes and 13.8% often or always). Absence from school was reported by 48.8% of the study participants (35.8% sometimes and 13% often or always), and 46.7% of the study participants with pain in the preceding 3 months said that they had not met their friends because of their pain (32.9% sometimes and 13.8% often or always).

The prevalence of restrictions in daily activities varied among children and adolescents with pain in different locations (Table 4). A total of 51.1% of children and adolescents with abdominal pain and 43.0% with headache but only 19.4% with back pain reported having been absent from school because of pain (Table 4). Children and adolescents with headache (45.6%) and abdominal pain (48.9%) more often

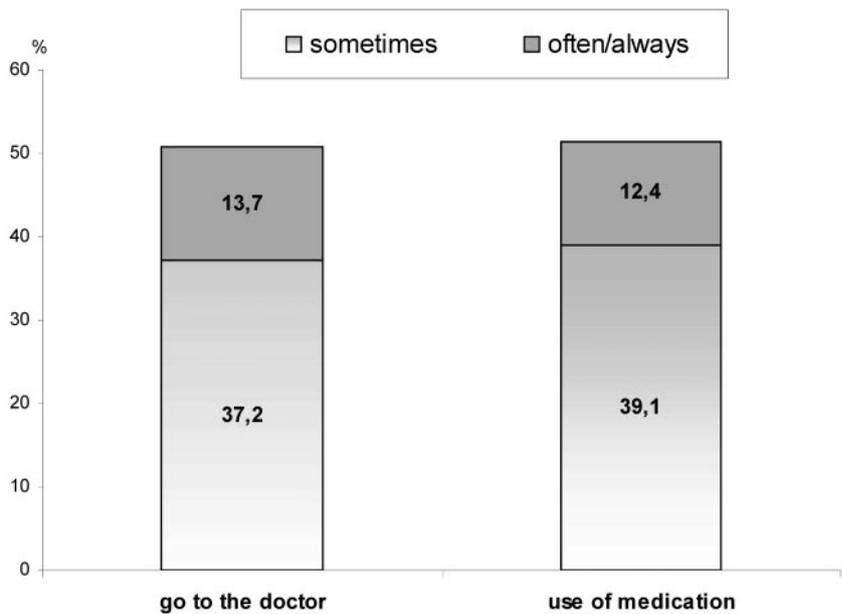


Fig 4. Health care utilization because of pain among children and adolescents with pain in the preceding 3 months.

TABLE 3. Prevalence of Self-Reported Health Care Utilization and Restrictions Resulting From Pain Among Children and Adolescents, According to the Location of Pain

	No. (%)								
	Total	Doctor Visit	Medication Use	Restrictions					
				Total	Absence From School	Not Meeting Friends	Loss of Appetite	Sleep Disturbances	Unable to Pursue Hobbies
Headache	228	74 (32.5)	135 (59.2)	194 (85.1)	98 (43.0)	104 (45.6)	113 (49.6)	118 (51.8)	103 (45.2)
Back pain	67	38 (56.7)	11 (16.4)	49 (73.1)	13 (19.4)	14 (20.9)	13 (19.4)	33 (49.3)	28 (41.8)
Limb pain	80	44 (55.0)	18 (22.5)	62 (77.5)	28 (35.0)	22 (27.5)	15 (18.8)	29 (36.3)	44 (55.0)
Abdominal pain	92	49 (53.3)	35 (38.0)	75 (81.5)	47 (51.1)	45 (48.9)	56 (60.9)	47 (51.1)	45 (48.9)
<i>P</i>		.000	.000	NS	.000	.000	.000	NS	NS

NS indicates not significant.

TABLE 4. Prevalence of Health Care Utilization and Restrictions Resulting From Pain Among Schoolchildren, According to Age and Gender

Age and Gender	No. (%)								
	Total	Doctor Visit	Medication Use	Restrictions					
				Total	Absence From School	Not Meeting Friends	Loss of Appetite	Sleep Disturbances	Unable to Pursue Hobbies
4–9 y	130	46 (35.4)	39 (30.0)	69 (53.1)	36 (27.7)	32 (24.6)	47 (36.2)	42 (32.3)	34 (26.2)
Boys	66	20 (30.3)	17 (25.8)	35 (53.0)	18 (27.3)	15 (22.7)	24 (36.4)	18 (27.3)	17 (25.8)
Girls	64	26 (40.6)	22 (34.4)	34 (53.1)	18 (28.1)	17 (26.6)	23 (35.9)	24 (37.5)	17 (26.6)
10–12 y	252	81 (32.1)	92 (36.5)	166 (65.9)	88 (34.9)	92 (36.5)	102 (40.5)	97 (38.5)	90 (35.7)
Boys	120	33 (27.5)	34 (28.3)	69 (57.5)	39 (32.5)	37 (30.8)	40 (33.3)	39 (32.5)	39 (43.3)
Girls	132	48 (36.4)	58 (43.9)*	97 (73.5)*	49 (37.1)	55 (41.7)	62 (47.0)*	58 (43.9)	51 (38.6)
13–15 y	287	121 (42.2)	119 (41.5)	211 (73.5)	106 (39.9)	97 (33.8)	106 (36.9)	126 (43.9)	131 (45.6)
Boys	134	57 (42.5)	44 (32.8)	87 (64.9)	41 (30.6)	37 (27.6)	37 (27.6)	44 (32.8)	57 (42.5)
Girls	153	64 (41.8)	75 (49.0)*	124 (81.0)*	65 (42.5)	60 (39.2)*	69 (45.1)*	82 (53.6)*	74 (48.4)
16–18 y	80	39 (48.8)	45 (56.3)	65 (81.3)	37 (46.3)	33 (41.3)	26 (32.5)	42 (52.5)	38 (47.5)
Boys	35	18 (51.4)	12 (34.3)	23 (65.7)	15 (42.9)	12 (34.3)	6 (17.1)	14 (40.0)	14 (40.0)
Girls	45	21 (46.7)	33 (73.3)*	42 (93.3)*	22 (48.9)	21 (46.7)	20 (44.4)*	28 (62.2)	24 (53.3)
<i>P</i> (age)		.018	.001	.000	NS	NS	NS	.018	.000

NS indicates not significant.

* Significant differences between boys and girls ($P < .05$).

than those with back pain (20.9%) or limb pain (27.5%) stated that they were not able to meet their friends because of pain (Table 4). Children and adolescents with headache (49.6%) and abdominal pain (60.9%) more often than those with back pain (19.4%) or limb pain (18.8%) stated that they had lost their appetite because of their pain (Table 4).

The prevalence of self-reported restrictions resulting from pain increased with age. A total of 73.5% of the 13- to 15-year-old participants and 81.3% of the 16- to 18-year-old participants reported restrictions in daily activities attributable to pain. Sleep disturbances and the inability to pursue hobbies because of pain increased with age (Table 4). The prevalence of

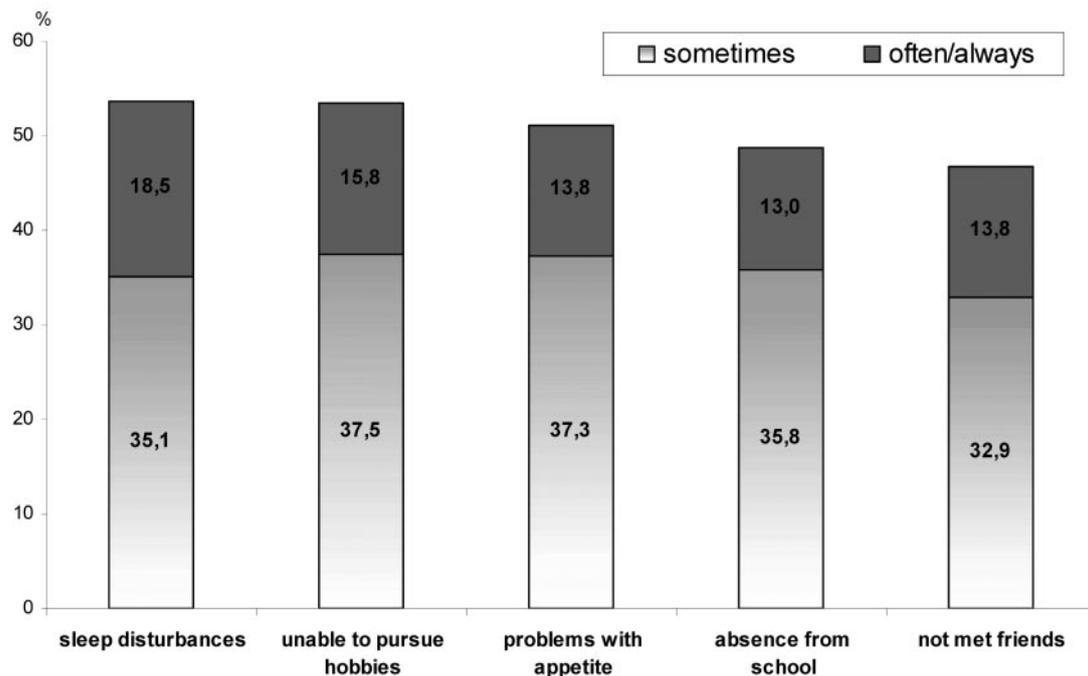


Fig 5. Restrictions in daily activities resulting from pain among children and adolescents with pain in the preceding 3 months.

restrictions attributable to pain was significantly higher among girls than among boys of the same age, except for the ages of 4 to 9 years (χ^2 test) (Table 4).

Triggers of Pain Episodes

Of 622 children and adolescents with pain in the preceding 3 months, 603 answered the question, "what do you think caused this pain?" Thirty-three percent of respondents thought that weather conditions (specifically cold weather) were responsible for

their discomfort, 30.7% cited illness (eg, common cold or injury), 21.9% cited sports or physical activities, 16.2% reported lack of sleep, 12.8% cited television or computer use, and 10% reported nutrition or consumption of sweets (Fig 6). Anger/disputes (17.6%), agitation (12.6%), school conditions (11.1%), examinations (10%), family conditions (9.5%), and sadness/loneliness (8.5%) were cited as triggers for pain by some of the responding children and adoles-

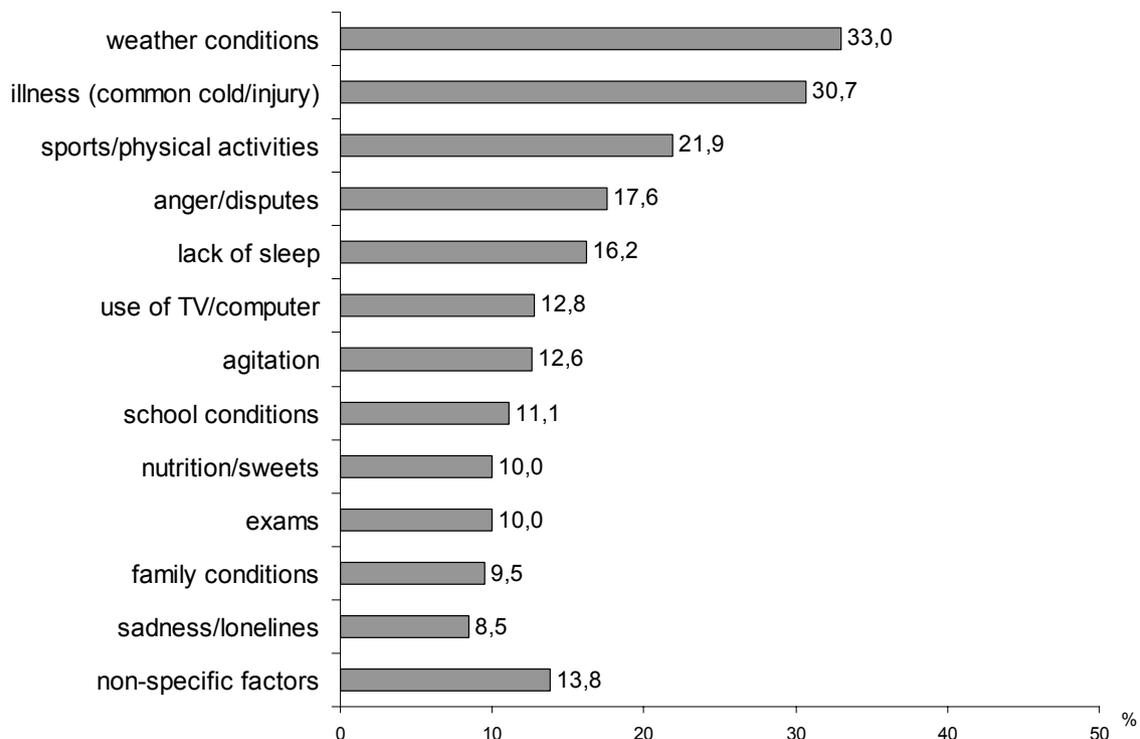


Fig 6. Self-perceived subjective triggers of pain among children and adolescents with pain.

cents, and 13.8% of children stated that their pain was triggered by nonspecific factors (Fig 6).

The self-reported triggers for pain varied between girls and boys. Girls stated more often than boys that their pain was triggered by weather conditions (39% vs 25%), illness (eg, common cold or injury) (35.9% vs 23.9%), anger/disputes (20.9% vs 11.9%), family conditions (12.1% vs 5.2%), or sadness (11.9% vs 3.4%). In contrast, boys stated more often than girls that their pain was triggered by physical exertion (28% vs 17.2%).

Context of First Pain Episode

Of 622 children and adolescents with pain, 600 answered the question, "what was the context in which you felt your pain for the first time?" Figure 7 presents their answers. Most children and adolescents (53.7%) had no recollection of an incident or the context in which they felt their pain for the first time. The remaining participants stated that their pain first appeared during an illness (14%), after an injury or an accident (10.3%), after physical strain attributable to school, computer use, or poor diet (8.2%), after physical exercise (5.7%), or after a death in the family (3.5%) (Fig 7).

Cause and/or Medical Diagnosis of Pain

A total of 21.1% of children and adolescents with pain stated that they knew a cause or medical diagnosis for their pain, 36.9% denied a cause for their pain, and 42% said that they did not know the cause of their pain. Causes and medical diagnoses reported included common colds, infections, spine or musculoskeletal diseases, menstruation, accidents, and injuries.

Prediction of Health Care Utilization

We used a logistic regression model to predict the likelihood of a child paying a visit to the doctor and/or using pain medication. We labeled this variable as health care utilization. We included age, duration of pain, and frequency of pain in the analysis. Children without pain and those with missing data were excluded from the model, leaving 559 cases for analysis. Health care utilization was predicted by increasing age, greater intensity of pain, and longer duration of pain but not by the frequency of pain.

Prediction of Degree of Restrictions in Daily Life

We used a logistic regression model to predict restrictions in daily activities. We dichotomized these restrictions as no restrictions at all or any restrictions in attending school, visiting friends, eating meals, sleeping, or performing recreational activities. Only the intensity of pain was predictive of the degree of restrictions in daily activities resulting from pain. The duration of pain and the frequency of pain episodes had no bearing on the degree to which the daily lives of the children were restricted because of pain (Table 5).

DISCUSSION

This study examined the frequency, characteristics, and consequences of pain in an unselected sample of children and adolescents. The 3-month prevalence of pain in our study was 83%. The results of this study regarding the prevalence, duration, intensity, and location of pain are consistent with those from earlier studies by our group^{3,16} and the study by Perquin et al.²

One aim of this study was to document the impact of pain among children and adolescents, with respect

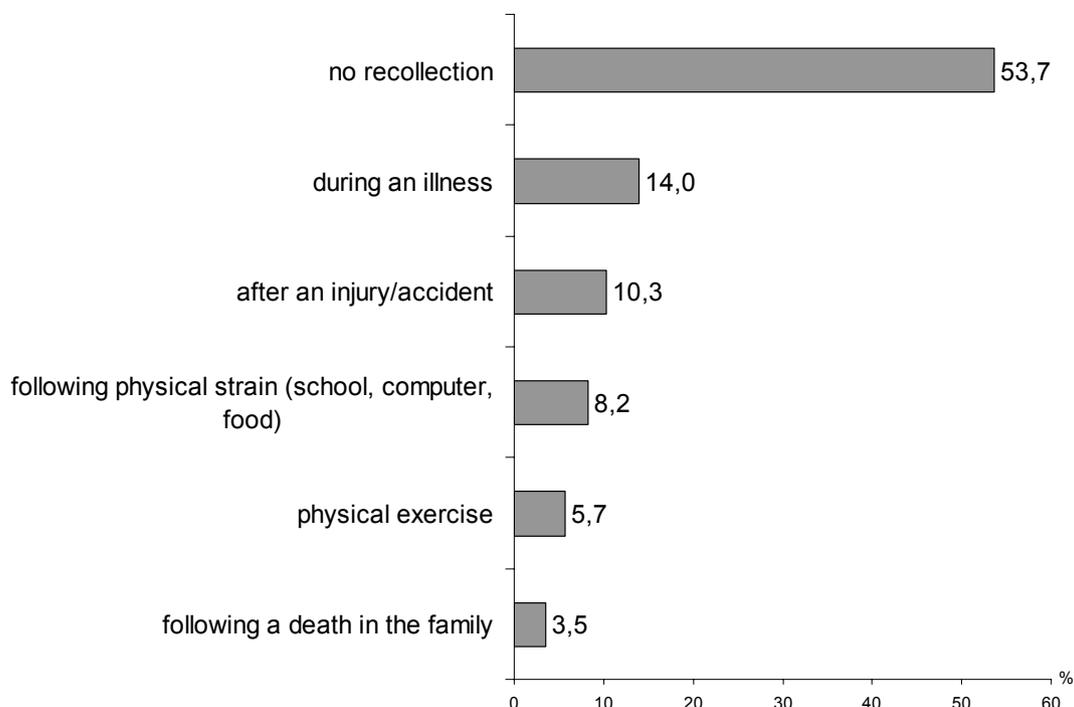


Fig 7. Self-perceived timing of the first pain experience among children and adolescents with pain.

TABLE 5. Logistic Regression Models to Predict Health Care Use and Restrictions Resulting From Pain

Variable	Coefficient B	SE	Wald Statistic	Significance	OR	95% CI
Dependent variable: health care use resulting from pain						
Constant	-2.178	0.545	15.957	0.000	0.11	
Age	0.078	0.036	4.618	0.032	1.08	1.01-1.16
Pain intensity	0.265	0.052	25.653	0.000	1.30	1.18-1.45
Pain duration	0.136	0.051	7.121	0.008	1.15	1.04-1.27
Pain frequency	-0.037	0.062	0.351	0.554	0.96	0.85-1.09
Model χ^2 (df)	48.843 (4)					
Block χ^2 (df)	48.843 (4)					
Correct predictions, %	67.1					
Cox and Snell R^2	0.081					
Nagelkerkes R^2	0.112					
Dependent variable: restrictions resulting from pain						
Constant	-2.201	0.573	14.743	0.000	0.11	
Age	0.026	0.038	0.486	0.486	1.03	0.95-1.11
Pain intensity	0.364	0.057	40.336	0.000	1.44	1.29-1.61
Pain duration	0.078	0.053	2.145	0.143	1.08	0.97-1.20
Pain frequency	-0.054	0.064	0.718	0.397	0.95	0.84-1.07
Model χ^2 (df)	55.309 (4)					
Block χ^2 (df)	55.309 (4)					
Correct predictions, %	65.0					
Cox and Snell R^2	0.104					
Nagelkerkes R^2	0.139					

The Wald statistics are distributed χ^2 with 1 degree of freedom. OR indicates odds ratio.

to health care utilization and restriction of daily activities. More than two thirds of the respondents reported restrictions in daily activities resulting from pain. However, 30 to 40% of children and adolescents with pain reported moderate effects of their pain on school attendance, participation in hobbies, maintenance of social contacts, appetite, and sleep, as well as increased utilization of health services because of their pain.

Restrictions at school, absenteeism, and/or problems with school activities have been used most often as variables in studies of children with chronic and/or recurrent pain. Frequent absence from school was identified among children with musculoskeletal pain,¹³ juvenile rheumatoid arthritis,¹⁷ migraine,⁷ and abdominal pain.¹⁸ Compared with other chronic pediatric illnesses, recurrent or chronic pain seems to be an equivalent or even greater factor contributing to absenteeism.⁶ In our study, children and adolescents with abdominal pain and headache more often reported school absences because of pain, compared with children and adolescents with back pain. Newacheck and Taylor¹⁹ reported the highest rates of missed school days (on average, 3 days per school year) among children suffering from migraine or arthritis.

A total of 41% of the respondents reported sleep disturbances attributable to pain. Self-reported sleep disturbances attributable to pain increased with age. Sleep disturbances among children affect many areas of their lives, including school attendance and performance, emotional state, and relationships with family members and friends.²⁰ Sleep disorders with frequent nocturnal arousals or daytime somnolence are common among children suffering from either chronic headaches/migraines²¹ or juvenile rheumatoid arthritis.²²

Restrictions on maintaining social contacts and ac-

tivities with same-age friends are other important signs of chronic and recurrent pain conditions.⁶ Children and adolescents with headache and abdominal pain reported significantly more often than those with back and/or limb pain not being able to socialize with their friends. The self-reported inability to pursue hobbies because of pain increased with age.

In our study, self-reported health care utilization because of pain varied according to the pain location. Walker et al¹⁸ demonstrated greater health care utilization by children with abdominal pain, compared with healthy children. In our study, children and adolescents with abdominal, limb, and/or back pain more often reported visiting a doctor than did those with headache. In contrast, children and adolescents with headache most often reported taking medications for their pain. In accordance with these results, Newacheck and Taylor¹⁹ reported the use of medications for 50% of children with persistent or recurrent headaches or migraines.

Restrictions in daily activities in general and health care utilization because of pain increased with age. This result is in accordance with other studies. In a German study investigating adolescents' knowledge about and use of legal drugs, 57% of the respondents reported having taken 1 to 6 different drugs in the 2 weeks preceding the study.²³ That study also reported the chronic consumption of nonopioid analgesics by German adolescents. In a Swedish study, a large proportion (9%) of all adolescents reported taking painkillers at least 1 to 3 times per week.²⁴ In our study, girls ≥ 10 years of age reported more restrictions in daily living and used more medications for their pain than did boys of the same age group. In accordance with our results, Dengler and Roberts²⁵ reported that 40% of English adolescent girls in their study had used a nonprescription painkiller in the previous week.

Our study examined triggers of pain through self-assessment and self-perception among young people afflicted with pain. The results depict the subjective views of children and adolescents and indicate the complex processing of psychosocial circumstances that trigger pain symptoms.

The most frequent triggers for pain, perceived by one third of the participants in our study, were external factors, such as changes in weather conditions, common colds, injuries, and exertion resulting from sports and other physical activities. Nutrition has been shown to be associated with headaches in the pediatric population.^{26–28} Length of exposure to media such as television and computers, lack of sleep, and daytime sleepiness have all been shown to be associated with back pain among adolescents.^{29,30} In accordance with those studies, 12.8% of our enrollees reported that their pain was triggered by television or computer use and lack of sleep (16.2%). Similar proportions of children and adolescents perceived psychologic factors as triggers of pain; such factors included personal anger states, arguments, agitation, stress at school, schoolwork, family situations, and overall sadness.

In our study, we found gender-specific differences in self-perceived triggers for pain. Boys more often than girls stated that their pain was triggered by physical exertion. Girls more often than boys stated that their pain was triggered by weather conditions, common colds, or internal factors such as anger, disputes, family conditions, or sadness.

Previous studies confirmed the roles of school or everyday stress, examinations, and the overall school experience in the prevalence of pediatric headache.^{31,32} Psychosocial aspects (eg, positive friendships and supportive relationships with parents or other adults) were indicated to influence the prevalence and severity of back pain among adolescents.²⁹

The results of this survey concerning self-perceived triggers for pain among children and adolescents indicate the potential importance of psychosocial factors in the development and persistence of pediatric pain problems. Nevertheless, the majority of children and adolescents who had experienced pain were unable to relate the first appearance of their pain to a critical life event.

A minority of subjects (approximately one fifth of our study sample) were able to name a cause or medical diagnosis for their pain conditions. This finding may indicate that children and adolescents process the perceived pain in a nonmedicalized manner and do not seek a professional diagnosis for their conditions. In addition, only a few pain states among children can actually be related to physical causes. For example, Korinthenberg³³ found a physical correlate for headaches for only 5 to 10% of young patients.

In our study, pain intensity was the most robust variable for predicting functional impairment in ≥ 1 areas of daily life. With a logistic regression model, the variables of frequency and pain duration did not significantly predict the degree of restriction resulting from the perceived pain.

Increasing age of the child and increasing intensity

and duration of pain had effects in predicting health care utilization (visiting a doctor and/or taking medication), whereas restrictions in daily activities were predicted only by the intensity of pain.

Several limitations of this study must be taken into account. First, we measured subjective pain complaints among children and adolescents and the effects on their lives without validating their reports with independent objective observations. Second, the respondents reported their pain complaints retrospectively, for a 3-month period. Therefore, we cannot exclude the possibility of overestimation or underestimation of the pain complaints. Third, no substitute sampling of children and adolescents who were absent from school on the day of the study was performed. There is a potential underestimation of pain complaints for children and adolescents who were absent from school because of pain. Fourth, we cannot exclude the possibility that the unselected regional sample of schoolchildren in our study is not representative of the entire population of schoolchildren.

Our results underscore the relevance of pediatric pain for public health policy. Additional studies are necessary and may enhance our knowledge about pediatric pain, to enable parents, teachers, and health care professionals to assist young people with pain management, allowing the young people to intervene positively in their conditions before they become recurrent or persistent.

ACKNOWLEDGMENTS

We thank the school principals, teachers, parents, and students for their help and enthusiasm in participating in this study. Special thanks go to Angret Daher for her help in executing this project and secretarial assistance.

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Pediatrics 2005;115:e152

DOI: 10.1542/peds.2004-0682

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