

Somatic symptom disorder was common in children and adolescents attending an emergency department complaining of pain

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ABSTRACT

Aim: The aim of this study was to quantify the prevalence of somatic pain in a paediatric emergency department (ED).

Methods: We conducted a prospective observational study using patients admitted to the ED of an Italian children's hospital between December 2014 and February 2015. We enrolled children aged 7–17 who turned up at the ED complaining of pain. Patients and parents were asked to fill in a questionnaire to allow the analysis of the patients' medical history and provide contact details for follow-up. We divided the enrolled patients into four groups: post-traumatic pain, organic pain, functional pain and somatic pain. The questionnaire was used to define pain characteristics and to generate an impairment score.

Results: Of the 713 patients who met inclusion criteria, 306 (42.9%) were enrolled in the study. Of these, 135 (44.0%) suffered from post-traumatic pain, 104 (34.0%) from organic pain, 41 (13.4%) from functional pain and 26 (8.6%) from somatic pain. Somatic pain patients had endured pain longer, had missed more school days and had suffered severe functional impairment.

Conclusion: This study highlighted that somatic pain was a significant contributor to paediatric emergency room visits and should be suspected and diagnosed in children reporting pain.

INTRODUCTION

Pain is one of the most frequent health complaints made by children and adolescents in Western countries (1,2), and it is considered a public health issue in the paediatric population (3). A substantial percentage of schoolchildren are affected by recurrent and chronic pain. Pain decreases their quality of life considerably because it reduces their opportunities for socialisation and learning when they miss school, hampers their ability to pursue leisure activities, as they cannot practice sports, disrupts their sleep and generally complicates family life (4). Headache and abdominal pain are the most frequent complaints and together they account for a sizeable proportion of paediatric outpatient visits (5).

Chronic or recurrent pain is often exacerbated and maintained by different physiological and psychological features (6,7). While functional disorders frequently cause pain (8,9), assigning complaints to a well-defined functional pain disorder diagnostic category is not always straightforward (10–12).

Medical terminology is evolving so that it describes and catalogues somatic pain disorders better. The literature uses different terms to label these phenomena, such as unexplained medical symptoms, somatisation, functional somatic symptoms or somatoform disorders, but all these definitions have been judged unsatisfactory (13–15).

As far as somatoform disorders are concerned, the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) has removed the distinction between medically explained and unexplained symptoms, on the

Key notes

- This study quantified the prevalence of somatic pain in 306 children aged 7–17 attending the emergency department of an Italian children's hospital between December 2014 and February 2015.
- We found that 44.0% had post-traumatic pain, 104 (34.0%) had organic pain, 13.4% had functional pain and 8.6% had somatic pain.
- Somatic pain was a significant contributor to paediatric emergency room visits and should be suspected and diagnosed in children reporting pain.

Abbreviation

ED, Emergency department.

basis that the organic versus psychological dichotomy is both confusing and inaccurate (14). The DSM-5 labels these conditions as somatic symptoms disorders. A somatic symptom disorder is diagnosed when a patient reports that physical symptoms are associated with distress, disruption in his or her day-to-day functioning or disproportionate thoughts, feelings and behaviours regarding those symptoms (16).

Due to the differences in the medical classifications of somatic symptoms, the prevalence in children and adolescents ranges from 8% to 12.5%, with pain being the most common symptom (17,18).

To the best of our knowledge, no study to date has investigated the prevalence of functional pain and somatic pain in the paediatric emergency department (ED) population.

The aim of this study was to quantify the prevalence of functional pain and somatic pain in this population and to identify the anamnestic and clinical clues associated with these conditions.

PATIENTS AND METHODS

Study design

We conducted a prospective observational study using patients admitted to the ED of an Italian university teaching children's hospital, the Institute for Maternal and Child Health IRCCS Burlo Garofolo in Trieste, from December

2014 to February 2015. The study was approved by the Independent Bioethics Committee, and all the children's parents provided written, informed consent at enrolment. The eligible subjects were children aged seven years to 17 years who turned up at the ED complaining of pain, regardless of the reported cause, characteristics, duration and presence of associated symptoms.

The exclusion criteria were that the children were suffering from a critical clinical condition requiring an emergency medical evaluation, the presence of intellectual disability or the inability to read or write in Italian.

We offered enrolment at triage. Participation consisted of completing a questionnaire about the nature of pain and its impact on the child's life, as well as their families', permitting the analysis of the child's medical records and providing contact details for a follow-up phone interview. Eligible subjects were enrolled as long as they answered all the questions and supplied contact details for the follow-up call.

All the ED medical staff took part in prestudy meetings where the clinical diagnostic criteria were discussed and agreed upon. The ED diagnosis was formulated according to the clinical judgement of the physician handling the case and the available clinical definitions and criteria (11,12,16).

The ED doctors were blinded to the questionnaire answers during and after the medical examination and played no part in the data analysis.

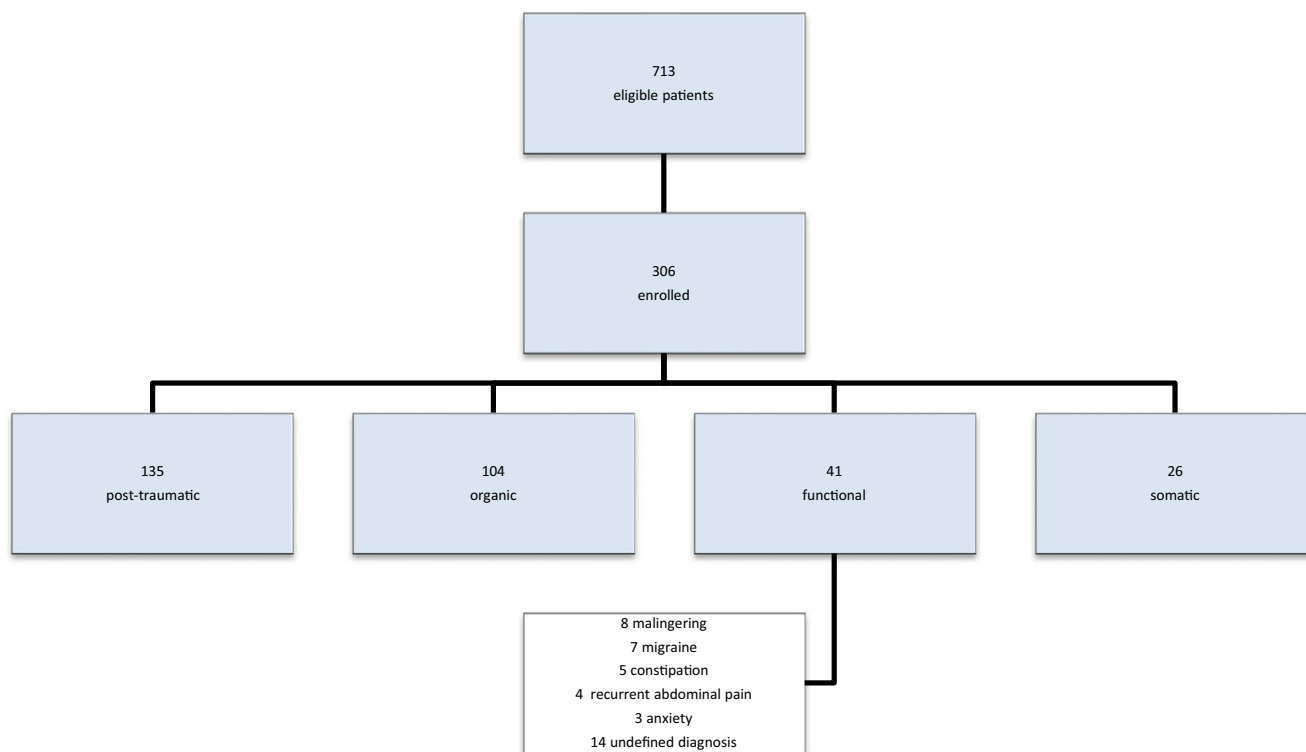


Figure 1 Study population and distribution in the study diagnostic groups.

Attribution of the study groups

A team composed of an ED paediatrician and a neuropsychiatrist reviewed the medical records of each enrolled child. Neither study team member was involved in the patients' medical evaluation.

We collected the age and gender of the patient, the number of ED visits in the last year, the number of occasions when medical advice had been given on the presenting symptoms and the child's medical history. The data also include the outcome of the physical examination and diagnostic tests performed during the ED evaluation, the ED visit

outcome – namely discharge, short-stay observation or admission – and the length of the medical history record.

Based on the ED clinical diagnosis, patients were initially split into four groups. The post-traumatic pain group comprised patients whose pain was related to a recent traumatic trigger and whose clinical examination was consistent with the patient's history. The organic pain group comprised patients whose medical history, clinical examination, test results, specialist evaluations or response to pharmacological therapies were consistent with an organic aetiology of the pain. The functional pain group

Table 1 Study population main characteristics (n = 306)

| | Post-traumatic | Organic | Functional (others) | Somatic | Total | p |
|--|----------------|------------|---------------------|------------|-------------|--------|
| Number (%) | 135 (44.0) | 104 (34.0) | 41 (13.4) | 26 (8.6) | 306 (100.0) | – |
| Sex, F (F%) | 56 (41.5) | 36 (34.6) | 19 (46.3) | 16 (61.5) | 127 (41.5) | 0.84 |
| Age, median (IQR) | 12 (10–14) | 11 (9–14) | 11 (10–13) | 12 (11–14) | 12 (10–14) | 0.105 |
| Site of pain (%) | | | | | | |
| Limbs | 118 (87.4) | 15 (14.4) | 2 (4.9) | 3 (11.5) | 138 (45.1) | <0.001 |
| Abdomen | 3 (2.2) | 23 (41.3) | 21 (51.2) | 11 (42.3) | 78 (25.5) | |
| Head | 11 (8.1) | 24 (23.0) | 16 (39.0) | 9 (34.6) | 60 (19.6) | |
| Others | 3 (2.3) | 22 (21.3) | 2 (4.9) | 3 (11.6) | 30 (9.8) | |
| Pain duration (%) | | | | | | |
| <1 week | 124 (92.1) | 69 (66.0) | 21 (51.1) | 1 (3.9) | 215 (69.8) | <0.001 |
| 1 week–1 month | 9 (6.3) | 26 (25.2) | 9 (22.0) | 10 (38.4) | 54 (17.8) | |
| 1–6 months | 1 (0.8) | 9 (8.8) | 2 (4.9) | 10 (38.4) | 22 (7.4) | |
| >6 months | 1 (0.8) | 0 (0.0) | 9 (22.0) | 5 (19.3) | 15 (5.0) | |
| Emergency department visits in the previous year (%) | | | | | | |
| 0 | 63 (47.1) | 45 (42.9) | 16 (39.0) | 15 (57.7) | 139 (45.5) | 0.26 |
| 1 | 39 (28.8) | 35 (34.0) | 11 (26.8) | 3 (11.5) | 88 (28.7) | |
| >1 | 33 (24.1) | 24 (23.1) | 14 (34.2) | 8 (30.8) | 79 (25.8) | |
| School absenteeism (%) | | | | | | |
| None | 94 (69.3) | 53 (50.5) | 12 (30.0) | 0 (0.0) | 159 (51.9) | <0.001 |
| <1 week | 37 (27.6) | 42 (40.6) | 20 (47.5) | 8 (30.8) | 107 (35.0) | |
| 1 week–1 month | 3 (2.3) | 9 (8.9) | 9 (22.5) | 11 (42.3) | 32 (10.4) | |
| >1 month | 1 (0.8) | 0 (0.0) | 0 (0.0) | 7 (26.9) | 8 (2.7) | |
| Number of times medical advice was provided for the same symptom (%) | | | | | | |
| None | 81 (62.8) | 48 (47.5) | 13 (31.7) | 1 (3.8) | 143 (48.1) | <0.001 |
| ≤3 | 22 (17.0) | 35 (34.6) | 17 (41.5) | 9 (34.6) | 83 (27.9) | |
| >3 | 26 (20.2) | 18 (7.8) | 11 (26.8) | 16 (61.5) | 71 (24) | |

Table 2 Patients' course after emergency department (ED) referral

| | Post-traumatic | Organic | Functional (others) | Somatic | Total | p |
|--|----------------|------------|---------------------|-----------|------------|--------|
| ED diagnostic tests (%) | | | | | | |
| 0 | 23 (17.0) | 65 (62.5) | 16 (39.0) | 7 (26.9) | 111 (36.3) | <0.001 |
| 1 | 8 (5.9) | 32 (30.8) | 15 (36.6) | 7 (26.9) | 62 (20.2) | |
| 2 | 101 (74.8) | 6 (5.8) | 5 (12.2) | 5 (19.5) | 117 (38.3) | |
| >2 | 3 (2.2) | 1 (0.9) | 5 (12.2) | 7 (26.9) | 16 (5.2) | |
| Outcome (%) | | | | | | |
| Discharge | 133 (98.5) | 100 (96.1) | 34 (82.9) | 22 (84.6) | 289 (94.4) | <0.001 |
| Short-stay observation | 2 (1.5) | 0 (0.0) | 5 (12.2) | 3 (11.5) | 10 (3.3) | |
| Admission | 0 (0.0) | 4 (3.9) | 2 (4.9) | 1 (3.9) | 7 (2.3) | |
| Lines on medical history in the medical record: median (IQR) | 1 (1–2) | 3 (2–4) | 5 (3–7) | 7 (5–9) | 2 (1–4) | <0.001 |

comprised patients who fulfilled specific criteria for a defined functional syndrome or psychiatric disease (11,12,16) or whose medical history, clinical examination, test results and response to pharmacological therapies were not consistent with either organic or post-traumatic pain. Finally, the somatic pain group comprised patients who met the DSM-5 definition of somatic symptoms disorder (16).

In order to assess the robustness of the ED clinical diagnosis, we contacted the patients' parents by phone three to six months after the ED evaluation. They were asked whether the aetiology of pain had been confirmed in the time since the ED visit by either the clinical evolution of symptoms or by subsequent tests or medical evaluations.

After a review of all the evidence – the ED clinical diagnosis and interview results – the children were definitively allocated to one of the four groups above.

Questionnaire structure and evaluation

Having finalised the allocation of patients to the study groups, we analysed the survey data to better understand pain and its impact on the day-to-day life of children. The questionnaire employed in the survey was a nonvalidated instrument developed by a paediatric neurologist and psychiatrist consultant. The 40 questions were based on the current literature and the developers' professional experience. The questions concerned the main features of pain, the presence of any other symptoms, the quality of the patients' academic and social functioning, the patients' impressions about their pain and health status, their mood and the impact of pain on the day-to-day life of both the patients and their families.

Patients were asked to answer 23 questions, and the parents answered the remaining 17 questions (Appendix 1).

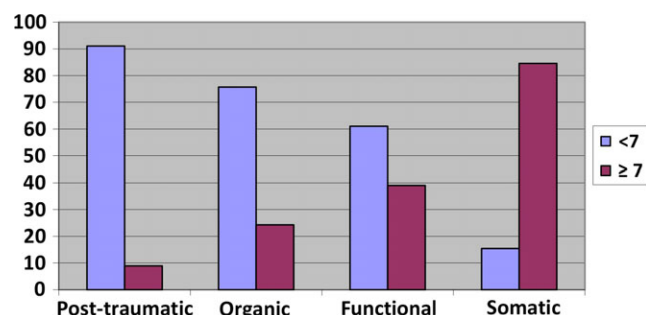


Figure 2 Impairment score: percentage of patients for each diagnostic group.

Children younger than 12 years received help from their parents when they completed their share of the survey.

The survey contained 10 questions designed to assess the impact of pain on quality of life. We used the answers to these questions to create an impairment score for each patient. Children were considered to be severely impaired if they scored above the 75th centile of the study population (Appendix 2).

Outcomes

The primary outcome of the study was to quantify the prevalence of somatic and functional pain in a paediatric ED. The secondary outcome was to identify medical history and clinical markers associated with somatic and functional pain.

Statistical analysis

Our sample contained both continuous and categorical variables. We present medians and interquartile ranges (IQR) to summarise continuous variables and counts and frequencies to summarise categorical ones. We used the Mann–Whitney *U*-test to compare groups, adjusting the calculated *p* values with the Bonferroni correction to account for multiple testing. We used the Kruskal–Wallis test to evaluate impairment differences across pain categories and Fisher's exact test to assess differences between categorical variables. All calculations were performed using Stata 12 (StataCorp, Lakeway, TX, USA) and a *p* value of <0.05 was considered significant.

RESULTS

Of the patients triaged at our paediatric ED between December 2014 and February 2015, 713 met the inclusion criteria, but 268 (37.5%) refused to participate. A further 139 (19.5%) were excluded: 56 because of the need for urgent medical evaluation, 24 because of language issues, five because of intellectual disability, 48 because they returned an incomplete questionnaire and six because they did not provide contact details for the follow-up call. As a result, 306 patients (42.9%) were definitively enrolled in the study. The baseline characteristics of the excluded and enrolled subjects were comparable. Confirmation of the follow-up diagnosis was obtained for all the patients, at a mean of 4.2 months and range of three to six months. At the end of the study, 135 (44.0%) patients were allocated to the post-traumatic pain group, 104 (34.0%) to the organic pain group, 41 (13.4%) to the functional pain group and 26 (8.6%) to the somatic pain group (Fig. 1).

| | Post-traumatic | Organic | Functional (others) | Somatic | Total |
|----------------------------|----------------|-----------|---------------------|-----------|-----------|
| Impairment score mean (SD) | 3.7 (1.9) | 4.6 (2.1) | 5.5 (2.4) | 8.1 (1.3) | 4.6 (2.4) |
| Impairment score ≥ 7 (%) | 12 (8.9) | 25 (24.3) | 16 (39.0) | 22 (84.6) | 75 (24.5) |

The main characteristics of each group at enrolment are reported in Table 1.

We found statistically significant differences according to the site of the pain between the groups ($p < 0.001$) and between the functional and organic groups (Bonferroni adjusted $p = 0.014$) and the functional and traumatic groups (Bonferroni adjusted $p < 0.001$). Pain was more likely to be localised in the head and abdomen in those in the functional group and in the limbs for those in the traumatic group.

Children in the functional group experienced pain for longer ($p < 0.001$) and missed more school days ($p < 0.001$) than children in other groups. They had also sought previous medical attention for their symptoms more often than the other groups ($p < 0.001$).

The patients' course after the ED referral is described in Table 2.

The medical history record, as measured by the number of written lines, was longer for patients in the functional group (median five lines, IQR 3–7) and somatic group (median seven lines, IQR 5–9) than for those in the other groups ($p < 0.001$).

Functional and somatic patients underwent a short-stay observation more frequently than other patients ($p < 0.001$). Somatic patients were more likely to be prescribed diagnostic tests than functional ($p < 0.001$) and organic ($p < 0.001$) patients.

The results of the impairment scores can be seen in Figure 2 and Table 3.

Of the somatic patients, 84.6% experienced severe impairment, meaning an impairment score above the 75th percentile of the sample (≥ 7), and the difference with the other groups was statistically significant ($p < 0.001$).

DISCUSSION

In our sample, 8.6% of the children suffered from somatic pain, while functional pain had a prevalence of 13.4%.

Although several studies have already quantified the prevalence of these conditions in paediatric primary care (5,18,19), to the best of our knowledge this is the first study to investigate functional pain and somatic pain in an ED setting.

In spite of changes in the definitions of somatic and functional pain, the literature is consistent in finding that somatic pain and functional pain are caused by a mix of biological, psychological and interpersonal factors (13). It has also been reported that both types of pain can significantly affect the quality of life of paediatric patients, as much as they do in the adult population (20).

Several factors have been reported to increase the likelihood of experiencing – and actually triggering – somatic symptoms in children and adolescents, including pressures from schools and families and dysfunctional family dynamics (17). It is also well known that anxiety and depression are associated with the onset of functional and somatic syndromes (21,22). At the same time, the suspicion of functional pain should also evoke a psychiatric

morbidity. For example, during our study, three patients complaining of pain had just been diagnosed with an anxiety disorder.

Poor interaction with peers might influence the development of somatic symptoms. Conversely, children who are already suffering from somatic pain may be negatively affected by the response of peers to their condition (21,23) and be more likely to skip school and to experience social isolation.

The same two-way mechanism is at work in the case of dysfunctional family dynamics. Children living in dysfunctional homes have been reported to be more likely to develop functional pain and this may become how they express their distress (24). On the other hand, the difficulty of dealing with a child in functional or somatic pain may significantly affect the quality of life of the entire family, for example by restricting the range of feasible family activities or by affecting the parents' ability to work. Not surprisingly, the impact of ill health on the quality of life of children is greater for those with a functional rather than an organic disease (25).

In different populations of children hospitalised for somatoform disorders, female sex and adolescence were identified as risk factors (15,26). This was indeed the case in our sample, although the results were not statistically significant.

Functional pain can be extremely disabling. In addition, its explanation is often difficult, so that affected children and adolescents typically end up having to undergo extensive medical investigations to reassure both parents and doctors, which further decreases their quality of life.

As this study confirmed, social and scholastic impairments were strongly associated with functional and somatic pain disorders (5).

We showed that some clinical and medical history elements were positively associated with a ED diagnosis of functional pain and somatic pain. Clinicians should check for these markers at evaluation, as doing so may prevent unnecessary tests and examinations from being prescribed, speeding up diagnosis and treatment. Specifically, we found the following markers to be significantly correlated with functional pain and somatic pain: the child had experienced pain in either the head or the abdomen, had been experiencing pain for a long time, had been missing school and his or her quality of life had decreased because of pain. They also had a longer medical history record, as measured by the number of written lines. Therefore, clinicians identifying these markers in a patient should consider a diagnosis of functional pain and somatic pain, even in the ED setting, where the tendency is to focus on urgent problems and to delay investigating nonurgent issues.

Our study had some limitations. Even if the excluded and enrolled patients were comparable at baseline, in terms of age, gender and the location of pain, fewer than 50% – 306 of 713 – of the eligible patients agreed to take part in the study and were definitively enrolled. In addition, our findings only applied to nonurgent ED cases, which make

up a large share of ED visits, so we cannot generalise our findings to all ED visits. Furthermore, by choosing a sample period associated with high academic demands in Italy, due to mid-term school examinations, we might have overestimated the prevalence of functional pain and somatic pain, according to the evidence that school pressure is related to somatic pain symptoms in school-age children (27). This literature evidence also motivated the choice of restricting the sample to children aged 7 and older; once again, this may have come at the cost of not being able to generalise our findings. Another issue to consider is that our questionnaire was not a validated instrument. Having said that, it is important to stress that the questionnaire was not used as a diagnostic tool, but rather as a data collection tool. Moreover, our questionnaire displayed a considerable overlap with validated questionnaires such as the Pediatric Quality of Life Inventory 4.0 (28), even if in our questionnaire provided a greater focus on the impact of pain on the quality of life.

Comparisons with other studies may be limited by our decision to consider constipation and migraine as symptoms of functional pain. We chose to do so because these symptoms do not have a clear organic aetiology and are often included in categories such as primary headache (12) and childhood functional gastrointestinal disorders (11). They also share some of the same therapeutic approaches as functional pain.

The main strength of this study was that the diagnosis of functional pain and somatic pain was based on clinical data, in contrast to many surveys on this topic (17) that used a questionnaire as the only diagnostic tool, even if this kind of exclusive evaluation is considered incomplete (29). Another strength was that, in order to confirm the final diagnosis, an appropriate follow-up period was considered.

CONCLUSION

This study showed that a considerable proportion of nonurgent paediatric ED visits were attributed to functional pain and somatic pain. We identified medical history and clinical markers that may help ED doctors to detect the aetiology of their physical complaints. Further studies with a larger population size are needed to confirm these findings.

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CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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APPENDIX 1: QUESTIONNAIRE

Patient section

1. How long have you been experiencing this pain?
 - <1 week
 - 1 week–1 month
 - 1 month–6 months
 - >6 months
2. Has the site of the pain changed since the beginning?
 - Yes
 - No
3. Does the pain worsen during any specific moment of the day?
 - Morning
 - Afternoon
 - Evening-night
4. Is pain associated with any other symptom?
 - Yes (if yes, specify)
 - No
5. Do you feel more tired than usual?
 - Yes
 - No
6. How many schooldays have you been missing?
 - 0
 - <1 week
 - 1 week–1 month
 - >1 month

7. Are your school marks good?
 - Yes
 - No
 8. Do you get along with your classmates?
 - Yes
 - No
 9. Do you have many friends?
 - Yes
 - No
 10. Have you ever been bullied by your schoolmates?
 - Yes
 - No
 11. Are you happy with your teachers?
 - Yes
 - No
 12. Is there any teacher who doesn't understand you?
 - Yes
 - No
 13. Have you ever failed a school grade?
 - Yes
 - No
 14. Is there anything that worries you at school?
 - Yes
 - No
 15. Are you happy to start a new day in the morning, even if it is a school day?
 - Yes
 - No
 16. Does the pain prevent you from sports or other pleasant activities?
 - Yes
 - No
 17. Does the pain prevent you from going out with your friends?
 - Yes
 - No
 18. Does the pain prevent you from using mobile phone or playing with videogames?
 - Yes
 - No
 19. Are you extremely worried about the pain you are currently experiencing?
 - Yes
 - No
 20. Do you fall asleep immediately after going to bed?
 - Yes
 - No
 21. Do you have nightmares very frequently?
 - Yes
 - No
 22. Have you been crying very often lately?
 - Yes
 - No
 23. Have you spent much time or energy in worrying about this pain?
 - Yes
 - No
- ### Parents' section
24. How many times have you sought medical attention because of your child's pain?
 - 0
 - 0–3
 - >3
 25. Did your child undergo any radiological, blood or specialist's examination because of the pain?
 - Yes (if yes, specify)
 - No

26. Has your child been using painkillers? Have they been working?
 Yes, and they have been working
 Yes, but they haven't been working
 No
27. Do you feel that this pain might be harmful to your child's health?
 Yes
 No
28. Do you feel that your child is worried about this pain?
 Yes
 No
29. Do the friends of your child hang out at your home?
 Yes
 No
30. Have you ever noticed if your child prefers to stay by himself?
 Yes
 No
31. Is your child worried about school marks?
 Yes
 No
32. Is your child worried about school marks, even though his marks are good?
 Yes
 No
33. How do you quantify the attention your child pays to school?
 Poor
 Normal
 Excessive
34. Are you sure that your child's pain depends on a disease?
 Yes
 No
35. Do you believe that your child is expressing a problem that he is not able to express in other ways if not with the pain he is experiencing?
 Yes
 No
36. Has your child given up any pleasant activity because of the pain he is experiencing?
 Yes
 No
37. Has your child experienced any disappointment or grief recently?
 Yes
 No
38. Are you divorced?
 Yes
 No
39. Have you spent much time or energy in worrying about your child's pain?
 Yes
 No
40. Has your child ever needed a psychologist or a neuropsychiatrist?
 Yes
 No

APPENDIX 2: IMPAIRMENT SCORE

- QA Do you feel more tired than usual?
 Yes
 No
- QB How many days of school have you been missing?
 <1 week
 >1 week
- QC Does the pain prevent you from doing sport or other pleasant activities?
 Yes
 No
- QD Does the pain prevent you from going out with your friends?
 Yes
 No
- QE Are you worried because of this pain?
 Yes
 No
- QF Have you spent much time or energy in worrying about this pain?
 Yes
 No
- QG Do you feel that your child is worried about this pain?
 Yes
 No
- QH Do the friends of your child hang out at your home?
 Yes
 No
- QI Has your child lately given up his usual activities?
 Yes
 No
- QL Have you spent much time or energy in worrying about your child's pain?
 Yes
 No