

Children's pain perspectives

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Abstract

Background Previous studies on children's pain perspectives remain limited to English-speaking populations.

Methods An exploratory cross-sectional descriptive design was used to investigate the developmental progression of children's pain perspectives, including their pain experience, its definition and attributes, causality and coping. The Children's Pain Perspectives Inventory was applied to 180 healthy Spanish children. A coding system was developed following the content analysis method. Three age groups were compared: 4–6 years, corresponding to the Piagetian pre-operational stage of cognitive development; 7–11 years, corresponding to stage of concrete operations; and 12–14 years, corresponding to the period of early formal operations.

Results In children between 4 and 6, the predominant narratives related to physical injuries, the notion of causality and the definition of pain. In children between 7 and 11, the predominant narratives were those in which pain was described as a sensation in one part of the body. The view of pain as having an emotional basis significantly increased with age and was more frequent in adolescents. In contrast, children between 4–6 and 7–11 indicated that pain occurs spontaneously. The denial of any positive aspects of pain significantly decreased with age; some children between 7 and 11 referred to the 'possibility of relief', while the view that pain is a 'learning experience' was significantly more frequent among adolescents aged between 12 and 14 years. The use of cognitive strategies to control pain significantly increased with age. Between 12 and 14 years of age, adolescents communicate pain by non-verbal behaviour and reported that they do not express demands for relief.

Conclusions There was a progression from concrete to more complex notions of pain as age increased. These results may be of use to health professionals and parents to understand how children at various developmental stages express and cope with pain and to develop tools that effectively assess and manage pain in children.

Keywords

cognitive development, pain causality, pain perspectives, pain vocabulary, school-aged children, young children

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Introduction

Although pain is a frequent experience in the life of children (Barajas 2003; Huguet & Miró 2008), research on children's understanding of pain is very scarce compared with the number

of studies on the pain experience among adults (Kortelnuoma & Nikkonen 2006).

Several studies (Gaffney & Dunne 1986; Harbeck & Peterson 1992; Crow 1997) have found that children's understanding of pain and their ability to describe it follows a developmental

pattern consonant with the stages of cognitive development described by Piaget (1975), whereas others have not (Ross & Ross 1984; Franck *et al.* 2008). In contrast, studies with hospitalized and ill children have highlighted the importance of personal experience in pain understanding (Savdra *et al.* 1988; Neul *et al.* 2003; Kortessluoma & Nikkonen 2006). In addition, pain coping strategies in children before surgery (Reissland 1983) and in children suffering chronic pain (Lynch *et al.* 2007) seem to become increasingly complex and flexible with advancing age; older children are more likely to use cognitive coping strategies, including positive self-statements and cognitive distraction.

To effectively communicate with children, parents and health professionals need to know how children understand and express pain. Because of its subjective nature, it is difficult to assess pain using physical examination methods alone, and therefore the patients' self-reports are essential. Spanish is the third most-spoken language in the world and, as far as we know, developmental studies on children's pain perspectives remain limited to the English-speaking population. Thus, the purpose of this study was to investigate the developmental progression of children's pain perspectives, including their pain experience, its definition and attributes, causality and coping in the Spanish-speaking population. This is the first developmental study on this topic in a healthy Spanish-speaking population.

Methods

Participants

The participants consisted of 180 children and adolescents aged from 4 to 14 years attending three schools in a city with intakes mainly from the middle class. Fifty-five per cent were female and 45% were male.

Participants were excluded if one of the following conditions was present: (i) chronic illness associated with pain; (ii) hospitalization in the last 6 months due to severe illness or accident; and (iii) cognitively impaired, as reported by teachers. Three children were excluded as a result of chronic illnesses, which were associated with frequent pain.

Measures

The Children's Pain Perspectives Inventory (Crow 1997) is an instrument designed to assess children's perspective on pain. It is a 16-item semi-structured interview schedule that includes questions related to pain: painful personal experiences, causality

of pain, definition and description of pain and pain behaviour. Tables 1–4 show the items in English and Spanish.

The Children's Pain Perspectives Inventory was developed for the English-speaking population and had not been translated into Spanish. Conventional back-translation procedures were used to translate the inventory for this study.

Procedures

First, permission was obtained from the education authorities in the three participating schools before data collection. Parents of children in the relevant age groups were sent a letter via the school board asking for permission for their children to participate in the study and providing information on the study aims. They were also advised that all data would remain confidential and anonymous. Written parental permission was given for all participants. Parents in the relevant age groups were asked to give permission for their children to participate in the study and were informed of the study aims. They were also advised that all data would remain confidential and anonymous. Written parental permission was given for all participants.

To test whether the translated items were understandable, the instrument underwent a pilot test with 10 children whose ages were within the ranges established for the whole sample. These interviews lasted 15 min on average and the children found it easy to understand and answer the questions. These data were not included in the analyses.

Children whose parents had signed the informed consent form were asked to participate and none of them refused. They were told that there were no right or wrong answers, and that it was all right if they did not want to answer some of the questions. The answers were written down word-for-word. The participants were individually interviewed by the same experienced child psychologist.

To analyse the answers, a coding system was developed following the content analysis method (Krippendorff 1980; Weber 1995; Graneheim & Lundman 2004). Thus, the categories used emerged from, rather than being imposed upon, the data. In a sample of 18 protocols (10% of the total), two independent experts looked for common themes that were organized into categories. One of them was an expert in developmental psychology and the other, an expert in psychological aspects of pain. Distinct categories were developed for each item by the experts. The final system of categories, developed by consensus between the experts, can be seen in Tables 1–4. Finally, two independent raters, who were blind to the age and gender of the children, coded the answers according to the coding system.

Table 1. Items related to previous painful personal experiences

Categories	Examples of responses	%G1	%G2	%G3	Kappa	χ^2	P
Item 1: Have you ever had pain? Do you know what pain is? <i>¿Alguna vez has tenido dolor? ¿Sabes lo que es el dolor?</i>							
1.1. Physical injury <i>Daño físico</i>	It hurts <i>El dolor es la pupa</i>	23.3	23.3	21.7	0.89	0.06	0.969
1.2. A thing <i>Algo o una cosa</i>	Something that hurts <i>Es algo que te hace daño</i>	1.7	20	13.3	0.83	10.03	0.007
1.3. Body sensation <i>Sensación interna</i>	Tummy upsets <i>Que te moleste la barriga</i>	11.7	55	31.7	0.84	25.62	0.000*
1.4. Psychological state <i>Estado psicológico</i>	A sad feeling <i>Un sentimiento triste</i>	0	15	31.7	0.86	22.92	0.000*
1.5. Yes–no answers <i>Respuestas sí-no</i>	–	63.3	11.7	40	0.94	33.98	0.000*
1.6. Others <i>Otros</i>	–	3.3	3.3	3.3	0.91	0	1.000
Item 2: Tell me about all the different times that you can remember having pain <i>Háblame de las veces que has tenido dolor</i>							
2.1. Physical injury <i>Daño físico</i>	I bled <i>Me hice sangre</i>	55	50	61.7	0.96	1.67	0.435
2.2. Body sensation <i>Sensación corporal</i>	Yesterday, I had tummy ache <i>Ayer me dolió la barriga</i>	45	50	26.7	0.91	7.51	0.023
2.3. Psychological state <i>Estado psicológico</i>	I got angry with my brother <i>Me enfadé con mi hermano</i>	1.7	5	46.7	0.92	51.61	0.000*
2.4. Others <i>Otros</i>	–	5	1.7	3.3	0.91	1.03	0.596
Item 4: What was the worst pain you ever had? <i>¿Puedes recordar el peor dolor que has tenido? ¿Cómo fue?</i>							
4.1. Physical injury <i>Daño físico</i>	When I broke my leg <i>Cuando me partí la pierna</i>	45	70	33.3	0.88	16.85	0.000*
4.2. Body sensation <i>Sensación corporal</i>	I had very bad tummy ache <i>Me dolió mucho la barriga</i>	48.3	26.7	25	0.87	9.15	0.010
4.3. Psychological state <i>Estado psicológico</i>	When my parents got divorced <i>Cuando se divorciaron mis padres</i>	0	5	41.7	0.94	47.28	0.000*
4.4. Others <i>Otros</i>	–	6.7	3.3	11.7	0.96	3.15	0.207

G1 = Group 1, G2 = Group 2, G3 = Group 3.

* $P \leq 0.001$.

Data analysis

The analysis was performed using the spss 15.0 software package. The interrater reliability for each category was calculated using the Kappa coefficient (Cohen 1960). When the reliability index was less than 0.70 for a category, the raters analysed and discussed the disagreements and, when necessary, the definition of the category was specified. Two independent raters again analysed all the answers to the items in which disagreements were detected. Interrater reliability was calculated again and the Kappa coefficients were now all higher than 0.70; in fact, 90% of the coefficients were higher than 0.80. Tables 1–4 show

the reliability coefficients for each category of the final coding system.

For the purpose of the statistical analysis, the subjects were separated into three age groups of 60 subjects each corresponding to the Piagetian stages of cognitive development: Group 1 (G1), 4–6 years, pre-operational stage; Group 2 (G2), 7–11 years, corresponding to the concrete operations stage; and Group 3 (G3), 12–14 years, corresponding to the early formal operations stage (Meadows 2006). As indicated by Cohen (1988), the size of the groups ensured that the analysis had high power (0.80) to detect medium-size effects (0.40) at a 0.05 significance level with 2 degrees of freedom. Chi-squared

Table 2. Items related to the causality of pain

Categories	Examples of responses	%G1	%G2	%G3	Kappa	χ^2	P
Item 5: What causes pain?							
<i>¿Qué causa el dolor?</i>							
5.1. Physical injury <i>Daño físico</i>	Falling down <i>Caerse</i>	48.3	61.7	38.3	0.92	6.58	0.037
5.2. Internal organs <i>Órganos internos</i>	The belly <i>La barriga</i>	11.7	1.7	0	0.94	11.25	0.004
5.3. Illness <i>Enfermedad</i>	Being ill <i>Estar enfermo</i>	15	15	13.3	0.96	0.09	0.956
5.4. Psychological states <i>Estados psicológicos</i>	Being angry <i>Cuando nos enfadamos</i>	3.3	15	20	0.86	7.87	0.019
5.5. Own responsibility <i>Responsabilidad personal</i>	Eating sweets <i>Comer chuches</i>	18.3	21.7	3.3	0.96	9.26	0.010
5.6. Personal loss <i>Pérdida personal</i>	A failure <i>Un suspenso</i>	0	10	15	0.96	9.16	0.010
5.7. Taking the cause for the consequence <i>Tomar la causa por consecuencia</i>	Pain causes suffering <i>El dolor causa sufrimiento</i>	3.3	0	41.7	0.91	50.46	0.000*
5.8. Do not know <i>No sabe</i>	–	8.3	5	0	1.00	4.97	0.083
5.9. Others <i>Otros</i>	–	18.3	8.3	10	0.95	3.21	0.201
Item 6: How do you get pain?							
<i>¿Cómo te da dolor a ti?</i>							
6.1. Physical injury <i>Daño físico</i>	I hit my head <i>Me di un golpe en la cabeza</i>	23.3	20	35	0.87	3.86	0.145
6.2. Psychological states <i>Estados psicológicos</i>	If I get angry, I have a headache <i>Si me enfado, me duele la cabeza</i>	0	1.7	21.7	0.78	24.32	0.000*
6.3. Own responsibility <i>Responsabilidad personal</i>	If I shout a lot, I have a headache <i>Si grito mucho, me duele la cabeza</i>	16.7	25	41.7	0.85	9.69	0.008
6.4. Occurs spontaneously <i>Aparición espontánea</i>	Pain just happens <i>El dolor da solo</i>	51.7	43.3	18.3	0.81	15.36	0.000*
6.5. Yes–no answers <i>Respuesta sí-no</i>	–	8.3	18.3	26.7	0.88	6.92	0.031
6.6. Others <i>Otros</i>	–	10	8.3	5	0.93	1.08	0.581
Item 7: Why do you get pain?							
<i>¿Por qué te da dolor a ti?</i>							
7.1. Physical injury <i>Heridas</i>	When I fall down <i>Cuando me caigo</i>	45	65	51.7	0.84	5.01	0.082
7.2. Internal organs <i>Órganos internos</i>	I have tummy ache <i>Porque me duele la barriga</i>	10	6.7	1.7	0.91	3.68	0.159
7.3. Illness <i>Enfermedad</i>	When I am ill <i>Cuando me pongo enfermo</i>	16.7	16.7	11.7	0.92	0.78	0.676
7.4. Psychological states <i>Estados psicológicos</i>	I am disappointed with my parents <i>Por algún problema con mis padres</i>	0	13.3	23.3	0.78	15.33	0.000*
7.5. Own responsibility <i>Responsabilidad personal</i>	If I eat sweets <i>Si como dulces</i>	21.7	28.3	23.3	0.85	0.78	0.676
7.6. Do not know <i>No sabe</i>	–	8.3	6.7	5	0.91	0.54	0.765
7.7. Others <i>Otros</i>	–	8.3	6.7	25	0.93	10.67	0.005

G1 = Group 1, G2 = Group 2, G3 = Group 3.

* $P \leq 0.001$.

Table 3. Items related to the definition and features of pain

Categories	Examples of responses	%G1	%G2	%G3	Kappa	χ^2	P
Item 8: What is the meaning of pain?							
<i>¿Qué significa dolor?</i>							
8.1. Physical injury <i>Daño físico</i>	A blow <i>Un golpe</i>	60	48.3	20	0.90	20.74	0.000*
8.2. A thing <i>Algo o una cosa</i>	Something that makes you feel bad <i>Algo que te sientes mal</i>	18.3	35	23.3	0.78	4.61	0.100
8.3. Body sensations <i>Sensación corporal</i>	A strange sensation <i>Una sensación extraña</i>	20	30	28.3	0.91	1.79	0.410
8.4. Circular answer <i>Respuesta circular</i>	You feel pain <i>Es que duele algo</i>	16.7	16.7	18.3	0.92	0.08	0.962
8.5. Evaluation <i>Valoración</i>	Pain is bad <i>El dolor es malo</i>	6.7	5	5	0.89	0.21	0.900
8.6. Psychological state <i>Estado psicológico</i>	It is sadness <i>Es tristeza</i>	3.3	18.3	48.3	0.86	35.21	0.000*
8.7. Illness <i>Enfermedad</i>	You get sick <i>Que te pones malo</i>	13.3	11.7	1.7	0.94	5.90	0.052
8.8. Others <i>Otros</i>	–	6.7	8.3	15	0.86	2.59	0.274
Item 11: Where in your body can you have pain?							
<i>¿En qué partes de tu cuerpo puedes tener dolor?</i>							
11.1. Entire body <i>Totalidad del cuerpo</i>	Everywhere <i>En todas partes</i>	5	36.7	58.3	0.91	38.85	0.000*
11.2. One body site <i>Una localización</i>	In the belly <i>En la barriga</i>	20	20	6.7	0.85	5.41	0.067
11.3. Two sites <i>Dos localizaciones</i>	In the ear and the leg <i>En el oído y en la pierna</i>	40	23.3	8.3	0.88	16.56	0.000*
11.4. Three or more sites <i>Tres o más Localizaciones</i>	The throat, head, belly and ankle <i>La garganta, cabeza, barriga y tobillo</i>	30	20	23.3	0.99	1.68	0.431
11.5. Others <i>Otros</i>	–	3.3	0	6.7	0.92	4.14	0.126
Item 12: What is bad about pain?							
<i>¿Qué tiene de malo el dolor?</i>							
12.1. Physical injury <i>Daño físico</i>	It hurts <i>Me hace pupa</i>	25	20	6.7	0.81	7.56	0.023
12.2. Unpleasant sensation <i>Sensación desagradable</i>	You feel very bad <i>Que te sientes muy mal</i>	15	16.7	41.7	0.79	14.49	0.001*
12.3. Circular answer <i>Respuesta circular</i>	It is bad because it hurts <i>Es malo porque duele</i>	28.3	41.7	16.7	0.89	9.14	0.010
12.4. Negative psychological state <i>Estado psicológico negativo</i>	I get nervous <i>Me pone nervioso</i>	8.3	8.3	35	0.79	19.95	0.000*
12.5. Activity restraint <i>Restricción de actividad</i>	You cannot do what you did before <i>No puedes hacer lo que hacías antes</i>	16.7	23.3	15	0.79	1.59	0.459
12.6. Others <i>Otros</i>	–	25	6.7	10	0.95	9.57	0.008
Item 13: What is good about pain?							
<i>¿Qué tiene de bueno el dolor?</i>							
13.1. Denial of positive aspects <i>Negación de aspectos positivos</i>	Nothing <i>Nada</i>	73.3	51.7	40	0.91	13.87	0.001*
13.2. Possibility of relief <i>Posibilidad de alivio</i>	It goes away <i>Que se pasa</i>	6.7	26.7	13.3	0.91	9.48	0.009

Table 3. Continued

Categories	Examples of responses	%G1	%G2	%G3	Kappa	χ^2	P
13.3. Secondary gains <i>Ganancias secundarias</i>	You can stay at home when there is an exam <i>Te puedes quedar en casa cuando hay un examen</i>	6.7	18.3	15	0.86	3.75	0.153
13.4. Learning experience <i>Experiencia de aprendizaje</i>	What does not kill you, makes you stronger <i>Lo que no te mata, te hace más fuerte</i>	0	1.7	31.7	1.00	38.59	0.000*
13.5. Others <i>Otros</i>	–	11.7	5	8.3	0.93	1.75	0.418
Item 14: Is there more than one kind of pain? <i>¿Hay más de un tipo de dolor?</i>							
14.1. Pain caused by physical injury <i>Dolor casuado por daño físico</i>	The pain of a blow to the head <i>El dolor de un cabezazo</i>	18.3	10	16.7	0.84	1.83	0.401
14.2. Pain caused by internal organs <i>Dolor causado por órganos internos</i>	Sore throat <i>El dolor de la garganta</i>	40	50	28.3	0.92	5.91	0.052
14.3. Pain caused by illness <i>Dolor por enfermedad</i>	Pain caused by chicken pox <i>El dolor de la varicela</i>	6.7	5	0	0.85	3.87	0.145
14.4. Consider also emotional pain <i>Incluyen dolor emocional</i>	Heart and physical pain <i>El dolor del corazón y el físico</i>	0	46.7	45	0.96	39.64	0.000*
14.5. Yes–no answers <i>Respuestas sí-no</i>	–	28.3	15	50	0.92	17.47	0.000*
14.6. Others <i>Otros</i>	–	16.7	3.3	1.7	0.89	12.11	0.002
Item 15: Who has more pain, adults or children? <i>¿Quiénes tienen más dolor, los adultos o los niños?</i>							
15.1. One alternative, do not give reasons <i>Una alternativa, no dan razones</i>	Adults <i>Los adultos</i>	21.7	1.7	20	0.86	11.96	0.003
15.2. One alternative, intuitive reasoning <i>Una alternativa, razonamiento intuitivo</i>	Boys because they play football <i>Los niños porque juegan al fútbol</i>	56.7	76.7	43.3	0.84	13.95	0.001*
15.3. Both alternatives <i>Ambas alternativas</i>	Both the same <i>Igual los dos</i>	5	15	33.3	0.88	16.95	0.000*
15.4. Others <i>Otros</i>	–	13.3	6.7	5	0.93	3.06	0.217
Item 16: Who has more pain, boys or girls? <i>¿Quiénes tienen más dolor, los niños o las niñas?</i>							
16.1. One alternative, do not give reasons <i>Una alternativas, no da razones</i>	Girls <i>Las niñas</i>	25	3.3	28.3	0.93	14.43	0.001*
16.2. One alternative, intuitive reasoning <i>Una alternativa, razonamiento intuitivo</i>	Girls because they are weaker <i>Las niñas porque son más débiles</i>	21.7	48.3	30	0.88	10.05	0.007
16.3. Both alternatives <i>Ambas alternativas</i>	Both the same <i>Los dos igual</i>	26.7	40	36.7	0.96	2.56	0.278
16.4. Others <i>Otros</i>	–	23.3	8.3	5	0.93	10.67	0.005

G1 = Group 1, G2 = Group 2, G3 = Group 3.

* $P \leq 0.001$.

Table 4. Items related to pain behaviour

Categories	Examples of responses	%G1	%G2	%G3	Kappa	χ^2	P
Item 3: How do you feel when you have pain? <i>¿Cómo te sientes cuando tienes dolor?</i>							
3.1. One emotion <i>Una emoción</i>	Bad <i>Mal</i>	35	31.7	30	0.89	0.36	0.837
3.2. Two or more emotions <i>Dos o más emociones</i>	Bad, sad <i>Mal, triste</i>	18.3	25	36.7	0.90	5.28	0.071
3.3. Emotion caused by pain <i>Emoción explicada por el dolor</i>	Sad because it hurts <i>Triste porque me duele</i>	33.3	25	16.7	0.97	4.44	0.108
3.4. Emotion caused by the negative consequences of pain <i>Emoción explicada por las consecuencias negativas del dolor</i>	I feel sad because I cannot go to school <i>Me siento triste por no poder ir al cole</i>	5	6.7	8.3	0.91	0.54	0.765
3.5. Emotion caused by social adverse reactions <i>Emoción explicada por las consecuencias sociales adversas</i>	Bad because people think that it does not hurt <i>Mal porque la gente cree que no me duele</i>	6.7	8.3	6.7	0.79	0.17	0.920
3.6. Others <i>Otros</i>	–	0	6.7	3.3	0.74	4.13	0.126
Item 9: What words are like pain? <i>¿Qué palabras usarías para hablar de un dolor?</i>							
9.1. Injury <i>Daño</i>	I have fallen down <i>Me he caído</i>	21.7	16.7	18.3	0.86	0.51	0.776
9.2. Pain <i>Dolor</i>	I hurt <i>Tengo dolor</i>	20	15	28.3	0.84	3.27	0.195
9.3. Pain plus site <i>Dolor más ubicación</i>	I have a tummy ache <i>Me duele la barriga</i>	25	43.3	16.7	0.82	10.9	0.004
9.4. Pain plus intensity <i>Dolor más intensidad</i>	It hurts a lot <i>Me duele mucho</i>	8.3	30	10	0.84	12.91	0.002
9.5. Demand for relief <i>Petición de una solución</i>	Put on a plaster <i>Ponme una tirita</i>	21.7	16.7	1.7	0.93	11.25	0.004
9.6. Non-verbal behaviour <i>Comportamiento no- verbal</i>	I cry <i>Lloro</i>	3.3	1.7	38.3	0.79	41.63	0.000*
9.7. Others <i>Otros</i>	–	5	6.7	20	0.89	8.59	0.014
Item 10: What makes you feel better when you are in pain? <i>Cuando tienes dolor, ¿qué hace que te sientas mejor?</i>							
10.1. To take medicine <i>Uso de fármacos</i>	I take a pill <i>Tomarme una pastille</i>	38.3	45	25	0.90	5.39	0.067
10.2. Other curative actions <i>Uso de otros agentes terapéuticos</i>	I put on a plaster <i>Ponerme una tirita</i>	20	28.3	3.3	0.80	13.64	0.001*
10.3. Rest <i>Descanso</i>	I go to bed <i>Irme a la cama</i>	16.7	31.7	30	0.84	4.20	0.122
10.4. Cognitive control <i>Control cognitivo</i>	I avoid thinking about it <i>Trato de no pensar en eso</i>	13.3	25	46.7	0.82	16.91	0.000*
10.5. Medical aid <i>Ayuda médica</i>	I go to the doctor <i>Ir al medico</i>	6.7	6.7	10	0.81	0.62	0.734
10.6. Parents' help <i>Ayuda de los padres</i>	Dad helps me <i>Papá me ayuda</i>	21.7	5	6.7	0.78	10.24	0.006
10.7. Emotional support <i>Apoyo emocional</i>	My friends comfort me <i>El Consuelo de mis amigos</i>	0	1.7	23.3	0.81	26.62	0.000*
10.8. Others <i>Otros</i>	–	1.7	1.7	8.3	0.87	4.76	0.093

G1 = Group 1, G2 = Group 2, G3 = Group 3.

*P ≤ 0.001.

analyses were performed to identify any significant differences between groups in pain perspectives (Tables 1–4). Taking into account the large number of comparisons made in this study (95), the level of significance was increased. According to the Dunn–Bonferroni correction (Dunn 1961), the significance level should be 0.05/95 in this study, thereby increasing the probability of a type 2 error. A less restrictive criterion was adopted to balance the risk of either type of error and differences were considered significant at a 0.001 level.

Results

The results are arranged according to the main aspects of the experience of pain: previous painful personal experiences, the causality of pain, definition and characteristics of pain, and pain behaviours. Tables 1–4 present the percentages of responses for each category and age group and χ^2 comparisons. Examples of each category and its reliability coefficients are also shown in the tables. The names of the categories and the examples are shown in English and Spanish.

Table 1 shows the answers to the items relating to previous personal painful experiences. As can be seen, most of the children in Group 1 (4–6 years) were able to talk about their previous experiences with pain. These mainly related to physical injuries and, to a lesser extent, unpleasant body sensations. In Group 2 (7–11 years), the predominant narratives were those in which pain was described as a sensation in one part of the body. Finally, Group 3 (12–14 years) also told stories about injuries, pain as a body sensation and, in contrast to the other two groups, pain as a psychological state, that is, emotional pain. In fact, their ‘worst pain experience’ was mainly related to psychosocial problems with friends or parents or to an important personal loss.

The answers to the items assessing the causality of pain are shown in Table 2. In contrast to Group 3, Groups 1 and 2 indicated that pain occurs spontaneously. Answers relating to psychological causes were almost absent from Group 1, but increased with age and predominated in Group 3 when they talked about their personal experience. Group 1 mainly considered that pain was caused by injuries.

Table 3 shows the answers to the items relating to the definition and features of pain. As can be seen, the definition of pain as physical injury significantly decreased with age; in contrast, the definition of pain as having an emotional basis significantly increased with age and was more frequent in Group 3. The notion that pain could occur in the entire body also significantly increased with age. In comparison with the other two groups, when adolescents in Group 3 were asked about the negative aspects of pain, they more frequently indicated that pain is bad

because it produces unpleasant sensations and negative emotions. On the other hand, the denial of any positive aspects of pain significantly decreased with age; as shown in Table 3, some children in Group 2 referred to the ‘possibility of relief’ as a positive aspect, and the view that pain is a ‘learning experience’ was significantly more frequent in Group 3 than in the other two groups.

Table 4 shows the answers to questions on pain behaviour. Interestingly, and unlike the other two groups, adolescents in Group 3 communicate pain by non-verbal behaviour and reported that they do not express demands for relief. The use of cognitive strategies to control pain significantly increased with age. In addition, adolescents in Group 3 mainly sought emotional support from friends to obtain relief from pain, whereas children in Group 1 mainly asked for their parents’ help.

Discussion

The purpose of the present study was to investigate the developmental progression of pain perspectives in a sample of healthy Spanish children. Differences between the three age groups showed that children’s understanding of pain and their ability to describe it follows a developmental pattern consistent with the stages of cognitive development described by Piaget (Gaffney & Dunne 1986; Harbeck & Peterson 1992; Crow 1997; Nemeth *et al.* 2005). Like children’s understanding of illness (Bibace & Walsh 1980; Koopman *et al.* 2004), this pattern follows a progression from very concrete and pre-logical thinking to more complex notions of pain.

As in previous studies (Neuman 1996; Kortelnuoma & Nikkonen 2006), when children aged 4–6 described their pain experiences, their narratives were perceptually governed by the external aspect of things and situations, which could explain why the narratives of children in this age group hardly ever refer to the psychological aspects of pain. This should not be understood as a lack of awareness of emotions, but as a manifestation of the inability to reflect on non-observable elements (Widen & Russell 2008). Children aged 7–11 years mentioned pain related to injuries and pain proceeding from internal body organs. This is an expression of a cognitive progression where the interpretation of events is not exclusively determined by external appearances (Flavell 1999), although the notion of internality is not completely distinct. Finally, most of the adolescents aged 12–14 years referred equally to painful physical and emotional experiences. In this group, the ‘worst pain they can remember’ was associated with a psychosocial situation, which reveals the acquisition of formal operations (abstract thought) (Carretero & León 2005).

In relation to causality of pain, children aged 4–6 years considered pain to be externally caused by a physical injury or that it appears spontaneously. These ideas remained in children aged 7–11 years and they also mention their own responsibility, mainly careless behaviour, as causes of pain (e.g. 'To stuff oneself with sweets'). As Franck and colleagues (2010) suggested, the references of young children to injuries could be due to their difficulty in explaining pain by an invisible cause, or simply because at these ages children are frequently exposed to pain from minor injuries. Adolescents aged 12–14 mentioned psychosocial causes more often than the other two groups; thus, the explanations about the causes of pain were increasingly more abstract and complex and progressed from external to internal psychological causes. Interestingly, when adolescents aged 12–14 were asked 'what causes pain?' they understood this to mean 'what are the consequences of pain?' and answered that 'pain causes suffering' (41.7%). In this way, the notion of suffering emerges as a global experience, which goes beyond the sensory component of pain and has many dimensions, including psychological, social and spiritual (Fochtman 2006).

In contrast to previous studies (Gaffney & Dunne 1987), children did not view pain as punishment; furthermore, only one answer appealed to divine justice as the cause of pain. Sociocultural differences could be invoked to explain these contradictory results. It might be taken into account that Gaffney and Dunne's (1987) study was conducted 20 years ago with Irish children attending religious schools; in contrast, this study was conducted in secular schools. The second most cited cause of pain in Groups 1 (4–6) and 2 (7–11) were transgressions (18.3% and 21.7%, respectively); pain was mainly viewed as the result of careless behaviour and not as punishment. In contrast, this was an infrequent answer (3.3%) in Group 3 (12–14). The notion of pain as the outcome of breaking or failing to comply with rules is explained by the heteronomous rule-oriented nature of the child's reasoning about moral issues emphasized by Piaget (1977) and Kohlberg (1992). During the heteronomous stage, the child's moral structure is defined by the rules externally imposed by adults: if something is punished, it is wrong. As the results of this study showed, children in Groups 1 and 2 viewed pain as totally negative; according to Gaffney and Dunne (1987), as in the mind of the child cause and effect are readily interchangeable, the negative nature of pain could make them think that 'if something bad (pain) happens it must be because I may have done something bad'. This conclusion is supported by the findings that children with rheumatoid arthritis found it difficult to accept that bad-tasting medicines could improve their health, whereas nice-tasting medicine could (Beales *et al.* 1983). These results have relevant clinical implica-

tions because children at these ages may perceive that painful medical procedures are the result of their own wrong acts.

Children aged between 4 and 6 years gave an elementary definition of pain, which only contained negative aspects and where physical harm was restricted to certain body areas. This short-range concept is typical of preoperative cognitive egocentrism (Delval 2004; Rodrigo 2005): pain is what it looks like and nothing more (Flavell 1999). A small percentage of answers described pain in terms of a psychological phenomenon (3.30%), which is an unexpected result for this age group.

Although children from 7 to 11 years mainly refer to physical pain, the notion of emotional pain already appears in this group. At this age, children do not consider that pain is a universal experience and they explain this fact by personal theories derived from specific observations of people's behaviour (e.g. 'girls cry more often than boys,' 'adults do not fall down as often as children') (Crow 1997). Although most of the children in this group consider that pain is a negative experience, some answers mention several positive features; for example, the possibility of relief, which can be interpreted as an expression of the decentering and cognitive reversibility that are typical of this developmental stage (Flavell 1999). As a sign of progress in socialization characteristic of this stage, children are able to grasp the notion that being ill may provide secondary gains, for example, avoiding unpleasant activities or obtaining affection from parents.

Adolescents do not deny the physical components of pain, although they mainly define pain as a psychological state, which is consonant with previous studies with healthy adolescents and those in hospital (Gaffney & Dunne 1986; Savedra *et al.* 1988). The idea that pain can affect any part of the body is more frequent in this group than in the other groups (Crow 1997). Most adolescents do not consider pain as having any positive feature but, at the same time, some think that pain experiences make a person stronger and that people can learn from them. Unexpectedly, they still do not consider that pain is a universal phenomenon. Furthermore, the high frequency of circular answers is another surprising finding in this age group; as they show a general tendency to cognitive complexity, this result could be explained by their having an insufficient vocabulary. As mentioned in relation to causality, and in contrast to previous studies (Gaffney & Dunne 1986), adolescents did not define pain as a physiological phenomenon, which could be expected taking into account that their cognitive development would allow them to understand the physiological processes underlying painful sensations. These results could be explained by the influence of psychosocial factors, which may lead to physiological explanations appearing later among these children. In this sense, it is worth referring to the results of studies, which found

that physiological explanations appear very early in children who suffer pain frequently (Nemeth *et al.* 2005; Kortessluoma & Nikkonen 2006).

Pain was mainly characterized as an emotion by adolescents, which also requires a high level of abstraction, but it should be emphasized that, as mentioned, a small percentage of children in the youngest group referred to the emotional aspects of pain. Perhaps, the connotative value of the word 'pain' in the Spanish language could explain these divergent results; this would be an interesting question for future research.

According to previous studies (Stanford *et al.* 2005; Franck *et al.* 2010), children aged 4–6 usually communicated pain by short negative emotional expressions about physical injury plus information about the site of pain. When children aged 7–11 years are in pain, they emphasize information about the pain site and intensity, using sensory (it hurts, it itches) and evaluative words (bad, a lot) (Gaffney 2002; Barajas 2003). Curiously, the adolescent group mainly relies on non-verbal behaviour to express their pain and is the least willing to talk openly about pain and to demand relief. This could be explained by their idea of pain as an emotional experience caused by adverse psychosocial situations, besides the acquisition of social rules on emotional expression according to which emotional disclosure among adolescents is negatively evaluated by peers and strangers (Zeman & Garber 1996). Taking this result into account, adolescents' disclosure about pain should be encouraged in a private environment by parents and health professionals, otherwise pain and suffering may pass unnoticed.

In relation to coping, the younger children mainly relied on analgesics, their parents' emotional support and other curative actions, such as plasters, to pain alleviation. As in the younger group, pain coping among children aged 7–11 is mainly based on taking medicine and other curative actions. Furthermore, a significant increase can be observed in the use of resting and cognitive control strategies, such as distraction. During this period of life there is a significant decrease in the importance of parental support (Branson & Craig 1988). These findings are in agreement with Franck and colleagues (2008) who found that children are not passive recipients of adult help; rather, they view themselves as active agents in pain relief.

The use of cognitive coping strategies is marked among adolescents, which has been explained by their higher level of abstraction that enables them to distinguish between the sensory and affective components of the pain experience and to divert attention from pain and focus it elsewhere (Reissland 1983; Branson & Craig 1988; Goldschneider & Jones 2007). Adolescents relied on their friends' support to cope with pain, as has been observed mainly in teenage girls (Walker *et al.* 2008);

according to these results, interventions in this age group should be aimed at the emotional aspects of pain and training in cognitive coping strategies.

The results of this study showed that there is a progression in children's and adolescents' pain perspectives, which become increasingly complex. According to Piaget's (1975) theory, as a result of changes in the cognitive structure, as age increases, pain perspectives gradually include non-observable components, which is an index of a higher level of abstraction. This progression is not perfectly linear; as this study found, ideas typical of previous stages persisted in higher phases of development and some abstract elements appeared when intuitive thought still prevailed. Given that Piagetian theory accounts for these differences by invoking sociocultural peculiarities, this study is relevant because comparisons can now be made between the results obtained from a sample of Spanish children and previous studies, which were restricted to English-speaking populations.

Further research is needed to determine the influence of sociocultural factors and the individuals' personal history on the concept of pain. Furthermore, chronological age is an imperfect estimation of developmental age and there is wide individual variation. In addition, studies using children from a wider age range could help to clarify the developmental progression of ideas about pain. Finally, the sample was non-random and may not be representative of the general population.

Recent studies have shown that one of the main hospital-related fears of 4- to 6-year-old children was related to pain (Salmela *et al.* 2011) and that prior to hospital admission children asked questions about pain (Gordon *et al.* 2011). The findings of this study suggest that it would be useful to design interventions adapted to the cognitive development of children who are going to suffer painful medical procedures. Additionally, health professionals should be trained in using the interventions.

Key messages

- In children aged between 4 and 6 years, pain related to physical injuries was a predominant theme in the notion of causality and the definition of pain.
- The perspective of pain as having an emotional basis significantly increased with age and was more frequently expressed by adolescents.
- The use of cognitive strategies to control pain significantly increased with age.

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