



Published in final edited form as:

Disabil Rehabil. 2017 June ; 39(11): 1131–1135. doi:10.1080/09638288.2016.1185469.

DEFINING MILD, MODERATE, AND SEVERE PAIN IN YOUNG PEOPLE WITH PHYSICAL DISABILITIES

Jordi Miró, PhD^{a,b,c}, Rocío de la Vega, PhD^{a,b,c}, Ester Solé, MSc^{a,b,c}, Mélanie Racine, PhD^d, Mark P. Jensen, PhD^e, Santiago Gálan, MSc^{a,b,c}, and Joyce M. Engel, PhD^f

^aUnit for the Study and Treatment of Pain – ALGOS, Catalonia, Spain

^bResearch Center for Behavior Assessment (CRAMC), Department of Psychology, Catalonia, Spain

^cInstitut d'Investigació Sanitària Pere Virgili; Universitat Rovira i Virgili, Catalonia, Spain

^dClinical and Neurological Sciences Department, Schulich School of Medicine & Dentistry, University of Western Ontario, London, ON, Canada

^eDepartment of Rehabilitation Medicine, University of Washington, Seattle, WA, USA

^fDepartment of Occupational Science and Technology, University of Wisconsin-Milwaukee, Milwaukee, WI, USA

Abstract

Purpose—To identify the cutoffs that are most suitable for classifying average and worst pain intensity as being *mild*, *moderate*, or *severe* in young people with physical disabilities.

Method—Survey study using a convenience sample of 113 young people (mean age = 14.19; SD= 2.9; age range: 8–20) with physical disabilities (namely, spinal cord injury, cerebral palsy, spina bifida, limb deficiency (acquired or congenital), or neuromuscular disease).

Results—The findings support a non-linear association between pain intensity and pain interference. In addition, the optimal cutoffs for classifying average and worst pain as mild, moderate, or severe differed. For average pain, the best cutoffs were: 0–3 for mild, 4–6 for moderate and 7–10 for severe pain, whereas the optimal classification for worst pain was 0–4 for mild, 5–6 for moderate, and 7–10 for severe pain.

Conclusions—The findings provide important information that may be used to help make decisions regarding pain treatment in young people with disabilities and also highlight the need to use different cutoffs for classifying pain intensity in young people with disabilities than those that have been suggested for adults with chronic pain.

Corresponding author: Jordi Miró, Departament de Psicologia; Universitat Rovira i Virgili; Carretera de Valls, s/n; 43007 Tarragona; Spain; jordi.miro@urv.cat.

Declaration of interest

Conflicts of interest: nothing to be reported

INTRODUCTION

Chronic pain is common in young people with physical disabilities, and can have a profound negative impact on their functioning and quality of life (1–3). In order to help address this problem and guide treatment decisions, clinicians need valid and reliable measures of pain for use in young people with disabilities. It is also important that clinicians and researchers understand the meaning and clinical significance of the specific ratings derived from those measures.

The pain domain most commonly assessed in research and clinical practice is pain intensity (4). The most common strategy for assessing this domain in youth is with the use of unidimensional scales, such as the numerical rating scale (NRS) or the FACES scale. These measures are flexible in that they can be administered verbally (5), via a paper-and-pencil format (6), or more recently via electronic devices (7). The scores from these measures, however, do not have an intrinsic meaning of their own (8). This is a critical problem when health care professionals need to make decisions based on the ratings that are provided by patients on these scales, because most clinical guidelines make treatment recommendations based on classifications of pain intensity that do not have a clear cut association with pain intensity ratings. For example, the cancer guidelines developed by the World Health Organization (9) base treatment recommendations on a patient's category of pain intensity (i.e., mild, moderate, and severe pain). Thus, a critical question can be stated as follows: What are the specific pain rating scores that best represent mild, moderate, and severe pain?

In order to address this problem, Serlin and colleagues (10) suggested three cut-off points for the 0–10 NRS based on the impact of pain on functioning, as measured by the Brief Pain Inventory (11–12). In their study using a sample of adults with cancer pain, they found a nonlinear association between pain intensity ratings of patients' worst pain and pain interference, and determined that ratings between 0 and 4 (in a 0–10 NRS scale) best represented *mild pain*; 5 to 6 best represented *moderate pain* and 7 to 10 best represented *severe pain*.

Many studies have replicated these findings in other samples of adults with chronic pain (e.g., 13–14), although others have reported different cutoffs in different pain samples. For example, in a study with persons who had undergone a lower limb amputation, in which participants were asked to report their overall (i.e., not worst) pain, average back pain and average phantom limb pain, Jensen and colleagues (15) replicated Serlin and colleagues' results for back pain, but not for overall pain or average phantom limb pain. In short, although there are some similarities across pain populations (e.g., scores of 8 or higher are almost always labeled as severe pain, and scores of 2 or lower are almost always labeled as mild pain; (16), the cutoffs that are deemed to be the most appropriate for classifying pain intensity as mild, moderate, and severe appear to depend, at least in part, on the pain population that is being studied.

In addition, some recent studies have demonstrated that the most appropriate cutoffs also varies as a function of the pain intensity *domain* that is being rated (17). For example, slightly different cutoffs have been reported in patients with neck pain between average and

worst pain; that is, 0–3, 4–6, and 7–10 for average pain, and 0–3, 4–7, and 8–10 for worst pain (18). Different cutoffs as a function of average and worst pain have also been found in a sample of veterans with chronic pain (0–3, 4–6, and 7–10 *versus* 0–3, 4–7, and 8–10, (19) and in a sample of individuals with multiple sclerosis with chronic pain (0–2, 3–5, and 6–10 *versus* 0–4, 5–7 and 8–10; (20). In general, this research has found that pain intensity levels for worst pain need to be slightly higher than those for average pain in order to be classified as moderate or severe pain.

To our knowledge, only one study has examined the most appropriate cutoffs for classifying scores on 0–10 NRSs in youth (21). The results of this study with a heterogeneous sample of children with chronic pain suggested that children may use or view NRS ratings somewhat differently than adults. Specifically, they found that for ratings of worst pain (these authors used the term “maximal pain”), cutoffs of 0–3, 4–7, and 8–10 (on the 0–10 NRS) were optimal for classifying mild, moderate and severe pain. These preliminary findings have yet to be replicated in additional samples of young people with chronic pain. Moreover, to our knowledge, no one has yet determined what the optimal cutoffs would be for young people with physical disabilities, a group that often has chronic pain (1–2, 22).

At this point, then, it is not clear which cutoffs might be most appropriate for young people with disabilities and chronic pain. Thus, the aim of the current study was to identify the cutoffs that are most suitable for classifying both average and worst pain intensity as mild, moderate, or severe in this specific population. In particular, we were interested in determining whether the cutoffs identified in this sample of youths would be similar or different from those that have been found in adults with physical disabilities (16, 20, 23), or in the previous study involving children (21). Based on available studies cited above indicating that cutoffs in adults differed between those with and without physical disabilities, we hypothesized that the cutoffs we would identify for these young people with disabilities and pain would be different from those identified for youth with headaches or chronic musculoskeletal pain problems.

METHODS

Participants

The study participants came from a group of 113 young people with physical disabilities who had completed a survey about pain. A number of related papers have been published using data from this survey (2, 22, 24–26), but none of the previous articles addressed the study questions included here. In order to participate in the original survey, participants needed to: (1) have a diagnosis of spinal cord injury, cerebral palsy, spina bifida, limb deficiency (acquired or congenital), or neuromuscular disease; (2) have a chronological age of 8-to-20 years old; (3) have no more than mild cognitive impairment; and (4) be able to understand and speak English. In addition, participants for the current analyses must have indicated that they have a pain problem other than one associated with a minor acute injury or illness, in the three months prior to the interview.

Procedures

Study participants were recruited from different sources and with different techniques including mailing from clinics, word of mouth, and contacts with a summer camp sponsored by the Muscular Dystrophy Association (USA). Potential participants who were 17 years old or younger gave informed assent or written consent to participate, and their parents or guardians gave written consent. Participants who were 18 years old or older provided written consent. Following informed consent, the participants were interviewed either in person (when possible) or via telephone. All of the study procedures were approved by the Institutional Review Board at the Children's Hospital and Regional Medical Center (Seattle, WA; USA).

Measures

Participants were administered a structured interview that assessed a number of pain-related and quality of life domains. The data from the interviews used in the current analyses asked for demographic/descriptive information, as well as information regarding the participants' average and worst pain intensity and pain interference. Participants and their parents were asked to indicate their sex and age, and to confirm their diagnosis. Two 0–10 NRS were then used to assess 7-day recalled average and worst pain intensity by choosing a single whole number between 0 (“*No Pain*”) and 10 (“*Pain as bad as could be*”). Such rating scales have a great deal of evidence supporting the validity and reliability of their scores (4, 6), including in children as young as 6 years old (27).

To assess pain interference, we used a modified version of the Brief Pain Inventory (BPI; 11–12). One of the modifications involved revising the interference with walking item to ask about interference with “*mobility (ability to get around)*” which made it possible for all of the participants – including those who are not able to ambulate independently – to respond to this item. We also added three items to assess the extent to which pain interference with daily activities is important to individuals with disabilities. These included items that assess pain interference with “*self-care (taking care of your daily needs)*”, “*recreational activities*” and “*social activities*”. Scores from the 10-item version of the BPI used in this study demonstrated excellent reliability, as indicated by a Cronbach's alpha of 0.90.

Data Analyses

We first computed descriptive statistics including the mean, standard deviation, and range of the ages, and the numbers and percentages of the sex, and diagnoses of the study participants to describe the sample. We then examined the meaning of different levels of pain intensity with respect to its effects on daily activities using three sets of analyses. First, we computed the means of the total BPI pain interference score for each NRS rating of average and worst pain and plotted them in order to allow for a visual inspection of the nature of the association between pain intensity and pain interference in the sample. Next, with the same procedures used by our group and others to examine the meaning of different pain intensity levels in adults (e.g., 10, 15–16, 18–20, 28–30) we computed the F values associated with ANOVA comparisons in BPI means between groups of participants based on different cutoffs for mild, moderate, and severe pain. As it has been the standard in this research, we labeled the different methods of classification based on the upper levels of the mild and

moderate categories. So, for example, a “CP [*cutpoint* (CP)] 3,6” label was used when mild pain was defined as NRS ratings from 0 to 3, moderate pain from 4 to 6, and severe pain from 7 to 10. As we did in our most recent paper on this issue (20), we compared six possible classification strategies: CP 3,6; CP 3,7; CP 4,6; CP 4,7; CP 2,5; and CP 3,5.

RESULTS

Description of the study sample

Demographic and descriptive information for the 113 study participants is presented in Table 1.

Means of pain interference scores as a function of pain intensity

Table 2 presents the means and standard deviations of BPI total pain interference scores for each rating of average and worst pain, from 0 through 10. These means are also presented visually in Figure 1. These data illustrate the non-linear associations between pain intensity and pain interference, with greater pain interference increasing not at all or very little for some 1-level increases in intensity (e.g., a “1” to “2” increase in worst pain intensity is associated with no change in pain interference), while a much larger increase in pain interference occurring with other 1-level increases in pain intensity (e.g., a “6” to “7” increase in worst pain intensity was associated with an increase in pain interference ranging from 1.92 to 2.88).

Evaluation of different cutoffs

Table 3 presents the F-values associated with group differences in pain interference when group is defined using different cutoff schemes. As can be seen, the optimal cutoffs for average pain and worst pain intensity differed. For average pain, the best cutoff for differentiating mild, moderate, and severe pain were CP 3,6 ($F = 32.05$; that is, mild pain defined as 0–3, moderate pain as 4–6, and severe pain as 7–10). However, CP 3,7 also evidenced a large F value very similar to the CP 3,6 cutoffs ($F = 32.00$), suggesting that this may be a viable option. The optimal classification scheme for worst pain was CP 4,6 ($F = 41.02$; mild = 0–4, moderate = 5–6, severe = 7–10), although CP 4,7 ($F = 40.60$) had a similar level of validity as CP 4,6.

DISCUSSION

The primary aim of this study was to identify the cutoffs that are most appropriate for classifying average and worst pain intensity as being *mild*, *moderate*, or *severe* in a sample of young people with physical disabilities and chronic pain. We also sought to determine (1) if the cutoffs identified in this sample of young people would be similar or different from those that have been identified in adults with physical disabilities and chronic pain, or with those identified in young people who have chronic pain, but no physical disabilities and (2) if the cutoffs would differ between different domains of pain intensity.

As hypothesized, the results indicated that the best cutoffs for classifying average pain as mild, moderate or severe, are not the same as those for worst pain. This finding is consistent

with our previous research (20), and the suggestions of others (17). For average pain, the optimal classification scheme for average pain in the current sample of young people with disabilities was 0–3 for mild, 4–6 for moderate, and 7–10 for severe. For worst pain, these are 0–4, 5–6, and 7–10.

These findings indicate that when clinicians use cutoffs to base their treatment decisions, for example, about what treatment is best or whether treatment should be changed, they should interpret 0–10 scores differently as a function of the pain intensity domain that is being assessed. Our findings are consistent with previous research that shows, in general, lower levels of average pain than worst pain are needed to determine that the pain is moderate (17–20). In our sample, for example, average pain intensity levels of 4 in young people with disabilities can be used to indicate that the person is experiencing moderate pain – pain that is beginning to have a noticeably larger impact on functioning. This increase in impact begins to happen when worst pain intensity levels reach 5. Interestingly, though, for both pain intensity domains, pain intensity levels of 7 can be interpreted as severe pain.

Our findings are also consistent with previous studies reporting a non-linear association between pain interference and pain intensity. That is, pain in the mild range appears to have relatively little impact on functioning. Furthermore, the cutoff points identified here are very similar to those found for adults with disabilities and chronic pain (19), but are different from those found in young people with other pain problems (21). This non-linear association suggests a similarity or continuity of the effects of pain on functioning in individuals with disabilities across age groups. This result supports previous findings showing no age-related differences in cutoff points in a sample of patients with neck pain (18).

The meaning of some pain intensity levels is clearer than others. For example, levels of “7” or higher for either average or worst pain are often classified as severe, and pain levels of “8” or higher are always classified as severe (e.g., 10, 20, 23, 28). These levels suggest that the problems are significant and in need of attention. And levels of “0–2” are consistently classified as mild (16, 28, 30), suggesting that average and worst pain intensity rated at these levels might have some slight impact on functioning, but might not be central to the youth’s life. But a level of “6” for average pain can be viewed as something between “moderate” and “severe”, with some support for it being associated with either. Under these circumstances, it may be safe to consider it as “severe” and treat it accordingly; more so perhaps if we want to prevent pain intensity from worsening or from impacting the youth’s life negatively. This could also be the case for the average level of “3” which might be considered as something more than mild, and thus dealt with accordingly.

Luckily, and even though it would be useful to clinicians and their patients for there to be even more options for the treatment of pain in young people, there exist a number of treatments with evidence supporting their efficacy that can be offered to those whose pain ratings indicate that treatment is warranted. These include medications (e.g., 31–32), cognitive-behavioral therapy (e.g., 33–34), relaxation (e.g., 35–36), hypnosis (e.g., 37–38) and physical therapy (e.g., 39–40). The current findings suggest that it would be reasonable to discuss such treatments with patients when the young person reports his or her pain as having an intensity of 3 or greater, but that such discussions would be especially important

to have when the young person reports his or her pain as having an intensity of 5 or more (out of 10).

A number of limitations of the current study indicate that some caution is needed when interpreting the results. First, the sample included young people with five different disability diagnoses, and the number of participants in each diagnostic group differed. Thus, although the overall sample size of the study was relatively large and adequate for the analyses performed, the sample size was not large enough to allow us to determine if there were any differences in cutoffs as a function of diagnosis. Thus additional studies with other samples of young people with disabilities and chronic pain are needed to help establish the reliability and generalizability of these findings. In addition, it is important to remember that pain is a subjective experience that is influenced by many physical, psychological, and social factors. These factors could potentially influence not only an individual's rating of pain intensity, but could potentially also influence how those ratings are associated with pain interference, and therefore the cutoffs which distinguish mild from moderate pain, and moderate pain from severe pain. Future research is needed to determine the role that these factors may play in the associations between pain intensity and pain interference.

Despite the study's limitations, these findings help advance our knowledge regarding the meaning of pain intensity ratings in young people; specifically in young people with physical disabilities. Clinicians can use this information to make empirically-guided decisions regarding when to intervene in children with disabilities and chronic pain

Acknowledgments

The authors want to thank Dr. Lisa Murphy for her help in reviewing the final version of the manuscript.

JM has been supported by a grant from the Sociedad Española del Dolor. The work of JM is also supported by ICREA-Acadèmia and Fundació Grünenthal. Support for the study upon which the findings reported here are based was provided by Grant P01 ND/NS 33988 from the National Institute of Child Health and Human Development and the National Institute of Neurological Disorders and Stroke, National Institutes of Health. Financial support for this project was provided, in part, by grants from Obra Social de Caixabank, the Spanish Ministry of Economy and Competitiveness (grants PSI2012-32471 and PSI2015-70966-P), and Universitat Rovira i Virgili (PFR Program). MR' work is supported by The Earl Russell Chair in Pain Medicine, Western University, London, Ontario. RdlV's work is supported from a postdoctoral fellowship from URV. SG is supported by a doctoral grant from MINECO.

Funding sources

The work of JM and ALGOS is supported by grants from RecerCaixa, the Spanish Ministry of Economy and Competitiveness (MINECO; PSI2012-32471), and the Institució Catalana de Recerca i Estudis Avançats (ICREA-Acadèmia). Support for the study upon which the findings reported here are based was provided by Grant P01 ND/NS 33988 from the National Institute of Child Health and Human Development and the National Institute of Neurological Disorders and Stroke, National Institutes of Health. MR' work is supported by The Earl Russell Chair in Pain Medicine, Western University, London, Ontario. RdlV's work is supported from a postdoctoral fellowship from URV. SG is supported by a doctoral grant from MINECO.

References

1. Ehde DM, Jensen MP, Engel JM, Turner JA, Hoffman AJ, Cardenas DD. Chronic pain secondary to disability: a review. *Clin J Pain*. 2003; 19(1):3–17. [PubMed: 12514452]
2. Engel JM, Kartin D, Carter GT, Jensen MP, Jaffe KM. Pain in youths with neuromuscular disease. *Am J Hosp Palliat Care*. 2009; 26(5):405–12. [PubMed: 19820205]

3. Miró J, Gertz KJ, Carter GT, Jensen MP. Chronic pain in neuromuscular disease: pain site and intensity differentially impacts function. *Phys Med Rehabil Clin N Am*. 2012; 23(4):895–902. [PubMed: 23137744]
4. Jensen, M., Karoly, P. Self-report scales and procedures for assessing pain in adults. In: Turk, D., Melzack, R., editors. *Handbook of pain assessment*. 3. New York: Guilford Press; 2011. p. 19-44.
5. Sánchez-Rodríguez E, Miró J, Castarlenas E. A comparison of four self-report scales of pain intensity in 6- to 8-year-old children. *Pain*. 2012; 153(8):1715–9. [PubMed: 22703691]
6. Miró J, Castarlenas E, Huguet A. Evidence for the use of a numerical rating scale to assess the intensity of pediatric pain. *Eur J Pain*. 2009; 13(10):1089–95. [PubMed: 19726211]
7. De la Vega R, Roset R, Castarlenas E, Sánchez-Rodríguez E, Solé E, Miró J. Development and testing of painometer: a smartphone app to assess pain intensity. *J Pain*. 2014; 15(10):1001–7. [PubMed: 24854065]
8. Hoffman DL, Sadosky A, Dukes EM, Alvir J. How do changes in pain severity levels correspond to changes in health status and function in patients with painful diabetic peripheral neuropathy? *Pain*. 2010; 149(2):194–201. [PubMed: 20303665]
9. World Health Organization. *Cancer pain relief and palliative care*. 1990
10. Serlin RC, Mendoza TR, Nakamura Y, Edwards KR, Cleland CS. When is cancer pain mild, moderate or severe? Grading pain severity by its interference with function. *Pain*. 1995; 61(2): 277–84. [PubMed: 7659438]
11. Cleland, CS. *The Brief Pain Inventory: user guide*. Houston: The University of Texas M. D. Anderson Cancer Center; 2009.
12. Cleland, CS., Ryan, KM. *Ann Acad Med*. 2. Vol. 23. Singapore: 1994. Pain assessment: global use of the Brief Pain Inventory; p. 129-38.
13. Mendoza TR, Chen C, Brugger A, Hubbard R, Snabes M, Palmer SN, et al. Lessons learned from a multiple-dose post-operative analgesic trial. *Pain*. 2004; 109(1–2):103–9. [PubMed: 15082131]
14. Turner JA, Franklin G, Heagerty PJ, Wu R, Egan K, Fulton-Kehoe D, et al. The association between pain and disability. *Pain*. 2004; 112(3):307–14. [PubMed: 15561386]
15. Jensen MP, Smith DG, Ehde DM, Robinsin LR. Pain site and the effects of amputation pain : further clarification of the meaning of mild, moderate, and severe pain. *Pain*. 2001; 91(3):317–22. [PubMed: 11275389]
16. Hanley, Ma, Masedo, A., Jensen, MP., Cardenas, D., Turner, Ja. Pain interference in persons with spinal cord injury: classification of mild, moderate, and severe pain. *J Pain*. 2006; 7(2):129–33. [PubMed: 16459278]
17. Anderson KO. Role of cutpoints: why grade pain intensity? *Pain*. 2005; 113(1–2):5–6. [PubMed: 15621357]
18. Fejer R, Jordan A, Hartvigsen J. Categorising the severity of neck pain: establishment of cut-points for use in clinical and epidemiological research. *Pain*. 2005; 119(1–3):176–82. [PubMed: 16298059]
19. Tan G, Jensen MP, Thornby JI, Rintala DH, Anderson KO. Categorizing pain in patients seen in a veterans health administration hospital: Pain as the fifth vital sign. *Psychol Ser*. 2008; 5(3):239–50.
20. Alschuler KN, Jensen MP, Ehde DM. Defining mild, moderate, and severe pain in persons with multiple sclerosis. *Pain Med*. 2012; 13(10):1358–65. [PubMed: 22925457]
21. Hirschfeld G, Zernikow B. Variability of “optimal” cut points for mild, moderate, and severe pain: neglected problems when comparing groups. *Pain*. 2013; 154(1):154–9. [PubMed: 23182623]
22. Miró J, Castarlenas E, de la Vega R, Solé E, Tomé-Pires C, Jensen MP, Engel JM, Rancine M. Validity of three rating scales to measure pain intensity among youths and young adults with physical disabilities. *Eur J Pain*. In press.
23. Jensen MP, Smith DG, Ehde DM, Robinsin LR. Pain site and the effects of amputation pain: further clarification of the meaning of mild, moderate, and severe pain. *Pain*. 2001; 91(3):317–22. [PubMed: 11275389]
24. Engel JM, Jensen MP, Ciol MA, Bolen GM. The development and preliminary validation of the pediatric survey of pain attitudes. *Am J Phys Med Rehabil*. 2012; 91(2):114–21. [PubMed: 22019973]

25. Engel JM, Wilson S, Tran ST, Jensen MP, Ciol MA. Pain catastrophizing in youths with physical disabilities and chronic pain. *J Pediatr Psychol*. 2013; 38(2):192–201. [PubMed: 23033363]
26. Wilson S, Washington L, Engel JM, Ciol MA, Jensen M. Perceived social support, psychological adjustment, and functional ability in youth with disabilities. *Rehabil Psychol*. 2006; 51:322–30.
27. Castarlenas E, Miró J, Sánchez-Rodríguez E. Is the verbal numerical rating scale a valid tool for assessing pain intensity in children below 8 years of age? *J Pain*. 2013; 14(3):297–304. [PubMed: 23380267]
28. Paul SM, Zelman DC, Smith M, Miaskowski C. Categorizing the severity of cancer pain: further exploration of the establishment of cutpoints. *Pain*. 2005; 113(1–2):37–44. [PubMed: 15621362]
29. Zelman DC, Dukes E, Brandenburg N, Bostrom A, Gore M. Identification of cut-points for mild, moderate and severe pain due to diabetic peripheral neuropathy. *Pain*. 2005; 115(1–2):29–36. [PubMed: 15836967]
30. Li KK, Harris K, Hadi S, Chow E. What should be the optimal cut points for mild, moderate, and severe pain? *J Palliat Med*. 2007; 10(6):1338–46. [PubMed: 18095813]
31. Schechter, NL., Palermo, TM., Walco, G., Berde, Ch. *Bonica's Management of Pain*. Fishman, SM, Ballantyne, JC., Rathmell, J., editors. Philadelphia: Wolters Kluwer/Lippincott; 2010. p. 767-782.
32. Dowden, SJ. Pharmacology of analgesic drugs. In: Twycross, A, Dowden, SJ., Bruce, E., editors. *Managing pain in children*. Chichester: Wiley-Blackwell; 2009. p. 39-66.
33. Logan, DE., Coakley, RM., Barber-García, BN. Cognitive-behavioural interventions. In: McGrath, PJ, Stevens, BJ, Walker, SM., Zempsky, WT., editors. *Oxford textbook of pediatric pain*. Oxford: University Press; 2014. p. 519-530.
34. Kashikar-Zuck S, Sil S, Lynch-Jordan AM, Ting TV, Peugh J, Schikler KN, Hashkes PJ, Arnold LM, Passo M, Richards-Mauze MM, Powers SW, Lovell DJ. Changes in pain coping, catastrophizing, and coping efficacy after cognitive-behavioral therapy in children and adolescents with juvenile fibromyalgia. *J Pain*. 2013; 14(5):492–501. [PubMed: 23541069]
35. Palermo TM, Eccleston C, Lewandoski AS, Williams AC, Morley S. Randomized controlled trials of psychological therapies for management of chronic pain in children and adolescents: an updated meta-analytic review. *Pain*. 2010; 148:387–97. [PubMed: 19910118]
36. Trautmann E, Lackschewitz H, Kroner-Herwig B. Psychological treatment of recurrent headache in children and adolescents –a meta-analysis. *Cephalalgia*. 2006; 26:1411–26. [PubMed: 17116091]
37. Tomé-Pires C, Miró J. Hypnosis for the management of chronic and cancer procedure-related pain in children. *Int J Clin Exp Hypn*. 2012; 60(4):432–57. [PubMed: 22917107]
38. Lioffi, C., Kuttner, L., Wood, Ch, Zeltzer, L. Hypnosis and relaxation. In: McGrath, PJ, Stevens, BJ, Walker, SM., Zempsky, WT., editors. *Oxford textbook of pediatric pain*. Oxford: University Press; 2014. p. 560-568.
39. Martin L, Baker R, Harvey A. A systematic review of common physiotherapy interventions in school-aged children with cerebral palsy. *Phys Occup Ther Pediatr*. 2010; 30(4):294–312. [PubMed: 20735200]
40. Tupper, SM., Swiggum, MA., O'Rourke, D., Sangster, ML. Physical therapy interventions for pain in childhood and adolescence. In: McGrath, PJ, Stevens, BJ, Walker, SM., Zempsky, WT., editors. *Oxford textbook of pediatric pain*. Oxford: University Press; 2014. p. 581-589.

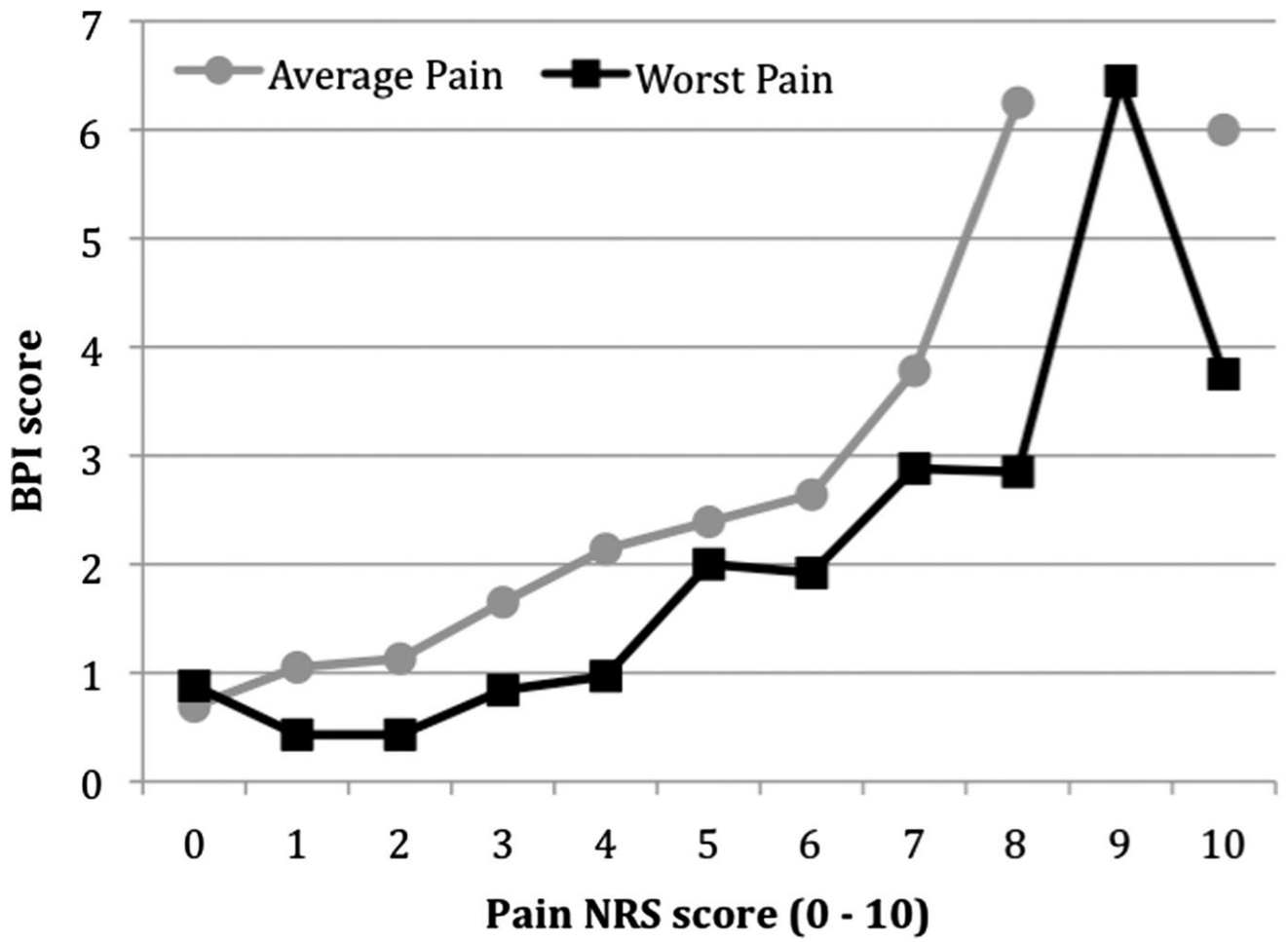


Figure 1.
Average pain interference level at each level of pain intensity for average and worst pain.

Table 1

Description of the study participants.

Variable	N (%)	Mean (SD)	Range
Diagnosis			
Spinal cord injury	10 (9%)		
Cerebral palsy	39 (35%)		
Spina bifida	27 (24%)		
Limb deficiency	9 (8%)		
Neuromuscular disease	28 (25%)		
Age	113	14.19 (2.90)	8–20
Sex			
Male	64 (57%)		
Female	49 (43%)		

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2

Means and standard deviations of the pain interference scores for each level of average and worst pain intensity of pain intensity.

Pain intensity rating	Pain Interference (BPI-10) score			
	Average Pain		Worst Pain	
	Mean (SD)	N	Mean (SD)	N
0	0.69 (1.12)	19	0.88 (1.26)	16
1	1.05 (1.68)	11	0.43 (0.31)	7
2	1.13 (1.23)	23	0.43 (0.52)	8
3	1.65 (1.41)	15	0.84 (0.89)	17
4	2.14 (1.61)	15	0.97 (1.30)	7
5	2.39 (1.19)	8	2.00 (1.37)	10
6	2.64 (1.50)	8	1.92 (1.17)	14
7	3.78 (2.02)	10	2.88 (1.18)	8
8	6.25 (1.48)	2	2.85 (1.45)	11
9		0	6.45 (1.77)	4
10	6.00 (0.85)	2	3.75 (2.03)	11

Note: BPI-10 = 10-item Brief Pain Inventor

Table 3

Comparisons between pain intensity classification groups for each cutoff strategy

Pain intensity domain	CP 3,6	CP 3,7	CP 4,6	CP 4,7	CP 2,5	CP 3,5
Average pain	32.05	32.00	27.90	29.87	27.55	26.67
Worst pain	38.77	37.08	41.02	40.60	28.44	29.97

Note: All scores were $P < 0.001$. CP = cutpoint

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript