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ORIGINAL RESEARCH

Development and feasibility testing of a Pain Neuroscience Education program for children with chronic pain: treatment protocol

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Abstract
Background: Current treatment for adults with chronic pain often includes Pain Neuroscience Education (PNE) to make people understand the nature underlying their pain and thus provides a clear rational for a biopsychosocial approach. Despite recommendations to use PNE as well in children with chronic pain, a specific PNE program, tailored to children aged 6–12 years is lacking.
Objectives: The aim of this study was to develop a PNE program for children with chronic pain and test its feasibility.
Methods: First the internet and scientific literature was searched for sources (e.g., books, videos, etc.) that might be supportive in teaching children about the neurophysiology of pain. Based on this content, we developed a PNE program for children, 'PNE4Kids', which was tested for feasibility in three groups of healthy children ($n = 18$; 9 girls and 9 boys) aged between 6 and 12 years old.

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Results and conclusions: This paper provides both scientists and clinicians with a specific program to explain the neurophysiology of pain to children with chronic pain, since it is past high time to use a modern neuroscience approach in this vulnerable population. Further research should examine the effectiveness of this developed PNE4Kids program on pain-related outcomes in children with chronic pain.

Registration number: NCT02880332 (https://clinicaltrials.gov/ct2/show/NCT02880332).

Background

Chronic pain, generally defined as continuous or recurrent pain episodes lasting more than 12 weeks, is a very distressing and debilitating problem in children and adolescents. Previous epidemiological research suggests median prevalence rates of 11–38% for children with chronic pain.[1] The most occurring chronic pain types in children are headache, abdominal pain, back pain and musculoskeletal pain.[1] Persistent pain periods mainly affect the children's school attendance and participation in recreational activities, possibly leading to academic impairments and social exclusion.[2,3] Even worse is children's greater predisposition to develop chronic pain into adulthood.[4] Considering these disadvantages, children suffering from chronic pain should be treated as fast as possible and in the most optimal way. As such, research regarding the most efficient and affordable strategies to treat this population should be advocated.

Non-pharmacological interventions for the management of chronic pain in children: state of the art

The existing literature on management in children with chronic pain encourages a multidisciplinary approach involving physical therapy and psychological interventions.[5] Landry et al.[5] reported that (1) daily aerobic physical exercise, (2) a progress to sports-specific functional activities and (3) education on pacing and consistent activity level should be prescribed for all children with chronic pain, irrespectively the pain condition.[5] In the past, psychological interventions often included relaxation therapy, sleep and stress management.[5]

Up to recently, research from the psychological field favours the use of behavioural or cognitive behavioural therapy (CBT) for many chronic pain conditions in children (chronic headache, recurrent abdominal pain and juvenile idiopathic arthritis and fibromyalgia).[6] CBT focusses on the development of personal coping strategies, which help patients to solve current problems and change unhelpful patterns in cognitions (e.g., thoughts, beliefs, and attitudes), behaviours, and emotional regulation.[6] A systematic review conducted by Fisher et al.[7] confirmed its effectiveness in reducing pain intensity in children with chronic pain conditions, such as juvenile idiopathic arthritis, musculoskeletal pain, headache and recurrent abdominal pain.[7] Despite its beneficial effects, adherence to CBT is rather low.[8] More specifically, negative attitudes and beliefs regarding the recommended intervention were considered to be the most frequently cited reasons for quitting treatment among non-adherents.[8]

Although CBT for children often includes some educational information on pain before teaching them accurate coping mechanisms, it is often based on the role of cognitions in 'fuelling' pain and the paradigm that pain is 'unavoidable', supporting the need for accurate coping, rather than explaining the underlying biological mechanisms of pain.[9] When patients' beliefs about pain as an accurate marker of tissue damage are not addressed during education, treatment aimed at changing the patient's attitudes and behaviours might be counterintuitive[10] and seems to lose its positive effects in the long-term.[9] Therefore, in addition to the current existing CBT approach, children might benefit from supplementary treatment including an explanation about the neurophysiology of pain.[11]

Pain Neuroscience Education: promising (but unexplored) intervention in children

Pain is conceptualized as a biopsychosocial process, thus requiring interventions targeting the underlying neurophysiology of chronic pain in its totality. Primarily this means teaching patients about the function of pain, how pain originates, which changes occur when pain becomes chronic, and the role of ones' thoughts, feelings, behaviours, environmental and social factors etc. in the origination and sustenance of pain. This initial and crucial educational part, termed Pain Neuroscience Education (PNE), makes people understand the nature behind their pain and thus provides a clear rational for a biopsychosocial approach, thereby increasing the likelihood that an appropriate cognitive and behavioural response will follow.[12] This enables patients to integrate this understanding into their everyday live (i.e. their beliefs, attitudes and behaviours) and subsequent treatment.[13] This innovative education style has shown to be effective in various adult chronic pain populations, by changing their pain beliefs and by improving the patients' pain coping strategies and health status.[14,15] To date, no study examined the effectiveness of PNE in children with chronic pain. Although, one might presume its relevance in this particular population, based on the following reasons.

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