



Original article

Do clinicians think that pain can be a classically conditioned response to a non-noxious stimulus?

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ABSTRACT

Background: Anecdotally, clinical presentations in which pain seems to be elicited by non-noxious stimuli are often explained using a classical conditioning framework. We were primarily interested in whether (a) clinicians think that pain can be a classically conditioned response to a non-noxious stimulus, and (b) clinicians think that there is evidence to support that idea.

Method: Practising healthcare clinicians participated anonymously in an online survey. The information collected included descriptive demographics, clinical experience, personal experience of chronic pain, beliefs about pain, and beliefs about classical conditioning and pain. Responses to the pre-requisite question – whether pain can occur without nociception – were compared to a historical data set from 2004.

Results: 1090 people from 57 countries and eight distinct types of health profession completed the survey. 86% stated that pain can occur without nociception; 96% of those believed that pain can be a classically conditioned response to a non-noxious stimulus; 98% of those believed that there is evidence to support that statement. The 2004 data showed that 44% of participants distinguished between pain and nociception.

Conclusions: This broad sample overwhelmingly endorsed the ideas that clinicians think that pain can be a classically conditioned response to a non-noxious stimulus and think that there is evidence to support that idea, revealing a discrepancy between beliefs in the clinical community and the scientific evidence. The distinction between nociception and pain has become more accepted by the clinical community over the last 10 years.

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1. Introduction

The past few decades have seen substantial changes in our understanding of pain, most notably the recognition that pain and nociception are distinct (Wall and McMahon, 1986). Beliefs about pain and approaches to its treatment have also changed, presumably in response to scientific findings. We now know far more about pain than we did 30 years ago, but much progress is yet to be made, particularly with regard to chronic pain (Mansour et al., 2014; Moseley and Vlaeyen, 2015). Treatment of chronic pain is still far from optimal – two of every three patients who experience chronic

pain will still have pain one year later (Costa et al., 2009) – and the economic and social burden is high (Breivik et al., 2006).

Spinal cord sensitisation is an intuitively accessible explanation for mechanical hyperalgesia and allodynia, and is supported by good evidence (Woolf, 2011). As such, it has been one of the more influential concepts in this process of change. The original theory of spinal cord sensitisation gave rise to new pharmacological therapies and non-pharmacological treatments (e.g. see Nijs et al., 2011), and an opportunity for better management of some pain conditions.

However, there remains a range of clinical phenomena that cannot easily be explained by spinal cord sensitisation, including the triggering of pain by a widening array of stimuli (Moseley and Vlaeyen, 2015). In the clinical setting, treatments are selected to target specific mechanisms thought to be driving pain (Gifford and Butler, 1997; Woolf, 2004). In the absence of a clear mechanistic

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explanation for the pain, this optimal approach to treatment selection remains a challenge.

We have observed that, in cases where spinal cord sensitisation does not adequately explain a clinical presentation, clinicians will often use a classical conditioning framework to explain the occurrence of pain in the apparent absence of nociception. This piqued our interest because, although classical conditioning is an intuitive model for this scenario, there does not seem to be compelling empirical evidence to support this view. With the exception of a few studies - for example, demonstrating that manipulating visual information using virtual reality can alter pain-free range of movement in patients with chronic neck pain (Harvie et al., 2015) – the critical fundamental studies are lacking.

We aimed to establish whether this impression was correct: do clinicians think that pain can be a classically conditioned response to a non-noxious stimulus? If they do, do they also think that their belief is based on scientific evidence?

2. Methods

We developed and piloted an electronic survey hosted by SurveyMonkey (www.surveymonkey.com), and here, we report the methods and results of the survey according to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004). Survey items covered demographic information, years and nature of clinical experience, years and nature of pain-specific experience and training, and whether or not the experienced chronic pain. The final three questions examined respondents' beliefs about pain (see Fig. 1).

For the purposes of this survey, chronic pain was defined as pain on most days for more than three months. Adaptive questioning was used (i.e. some questions were conditionally displayed, depending on answers to preceding questions), such that no participant answered all 18 questions. Questions were presented in a standard order, and it was mandatory to respond to every question that was displayed, except the final two, which were exploratory questions. Participants were able to review and change their responses if necessary, using a 'Back' button. The maximum number of questions per screen was five. Ten pilot participants provided feedback on the clarity of phrasing, on the ease of responding, and on the time taken to complete the survey. In piloting, completion of the survey took less than 5 min. Feedback from pilot participants prompted refining of phrasing for question 14 and response options for questions 14 and 15, and errors in the logic driving the presentation of questions were corrected. All questions are listed in the Appendix, as they appeared in the final version of the survey. The link to the finalised survey was then distributed (see Appendix) via social media and word of mouth to target a convenience sample including any practising healthcare professionals. Social media (e.g. Facebook and Twitter) notifications were also posted, with permission, to the notice boards of societies and associations representing healthcare professionals (e.g. occupational therapists, psychologists, physiotherapists, medical doctors), and all such posts encouraged re-sharing of the survey link. Completion of the survey was entirely voluntary, and any practising healthcare clinician was eligible to participate. No incentives were offered. The SurveyMonkey platform restricted access to one response per computer IP address to minimise the risk that respondents would participate more than once, but IP and email addresses were neither collected nor tracked, so that all data were anonymous. The introductory page specified the eligibility criterion (practising clinician) and the approximate time the survey would take to complete. The second page was a consent form specifying that data would be anonymous, that participants retained the right to stop the survey at any time, that completion of the survey would convey

no known benefit to participants, and that data would be stored with password protection (see Appendix). The study was approved by the institutional Human Research Ethics Committee.

2.1. Historical comparison

A fundamental prerequisite proposition to our primary aim was whether or not the participant believed that pain and nociception are, in fact, distinct. Question 13 of our survey addressed this topic and acted as an end point for those who believed otherwise, because that view clearly predicts the answer to the subsequent items. Collecting this information gave us the opportunity to identify whether acceptance of this idea — that pain and nociception are distinct — has shifted over the last decade. To assess this, we used data obtained from health professionals in 2004, before they undertook a professional education seminar. Seminar registrants were sent a bundle of assessments. They were asked to complete the assessments and return them, via email, prior to the seminar. The assessments included demographic information, years of practice, professional qualification, whether or not respondents worked in a pain clinic or programme, whether or not they suffered from chronic pain, the Pain Knowledge Questionnaire (PKQ) (Moseley, 2003), the pain catastrophising scale (Sullivan et al., 1995), and the fear of pain questionnaire (McNeil and Rainwater, 1998). Only the demographic data and one item of the PKQ were analysed here. The item required a true/false response to this statement: "The timing and intensity of pain matches the timing and number of signals in nociceptors (danger receptors)."

2.2. Data processing

For the current survey, individual responses were exported to Microsoft Excel (2013), and data were erased for cases where respondents had refused consent or had exited the survey without answering Question 13, which required them to agree or disagree with the statement that pain can occur without nociception.

A minor error in the response-dependent ordering of questions had resulted in superfluous questioning of respondents who had disagreed with the statement in question 14. These data were manually corrected by removing the responses to the questions that should not have been posed to these respondents.

An unexpectedly high number of chiropractors, osteopaths, naturopaths and massage therapists completed the survey. Therefore, when profession selections were coded numerically, additional codes were created for osteopaths, chiropractors, and a non-specific 'other soft tissue therapists' group.

Other small manual alterations were made to tidy the data spreadsheet — e.g. if respondents had entered their country's name into the 'other' box instead of selecting their country from the drop-down list, the correct country name was entered in place of 'other'.

3. Results

The survey was opened on 10 September 2014, remained open for one month, and was accessed 1197 times. Three respondents did not consent to participating, and therefore did not move past the first page. Of the 1194 respondents who had given consent, 1090 (91%) had completed up to or beyond Question 13, and results from these respondents were analysed. Data from the remaining 9% of participants, who did not complete our *a priori* determined minimum number of questions, were excluded.

Results are presented for the full sample. In order to determine whether group-wide results are driven by particular countries or professions, the results are also presented in two different ways: first, they are grouped by country, including only the five countries

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