

## Charting medical students' attitudes and beliefs towards people with chronic pain as they progress through their undergraduate programme: An observational study.

Jagjit Mankelov <sup>a</sup>, Cormac G. Ryan <sup>a</sup>, Hayley T Morris <sup>b</sup>, Douglas Lauchlan <sup>c</sup>, Christopher Seenan <sup>c</sup>, Paul Taylor <sup>d</sup>, Denis Martin <sup>a</sup>

<sup>a</sup>. School of Health and Life Sciences, Teesside University, Middlesbrough, UK, TS1 3BX <sup>b</sup> Department of Pathology, University Hospital Crosshouse, Kilmarnock, UK, KA2 0BE; Institute of Cancer Sciences, The University of Glasgow, Glasgow, Scotland, UK, G12 8QQ <sup>c</sup> School of Health and Life Sciences, Glasgow Caledonian University, Cowcaddens Road, Glasgow, Scotland, UK, G4 0BA, <sup>d</sup>. School of Social Sciences, Humanities and Law, Teesside University, Middlesbrough, UK, TS1 3BX

**Corresponding author:** Jagjit Mankelov, j.mankelov@tees.ac.uk, School of Health and Life Sciences, Teesside University, Middlesbrough, TS1 3BX.

### Abstract

#### Background

Healthcare professionals' (HCPs') attitudes towards pain influence their pain management. Attitudes about pain should be aligned with the evidence-base at the undergraduate stage of an HCP's career but pain education at undergraduate level is often lacking, and negative attitudes can pervade HCP practice. Previous studies investigating change in pain attitudes in undergraduate HCPs are cross-sectional in nature and frequently report minimal change in pain attitudes.

#### Objectives

To investigate medical students' attitudes and beliefs towards people with chronic pain over the course of their Scottish undergraduate programme.

#### Design

Five year observational study.

#### Setting

A Scottish university medical school.

#### Participants

Medical students were recruited in first year and followed up to their final year (year one n=205/244, year two n=190/245, year three n=132/279, year four n=110/262, year four n=159/260) for five years.

#### Outcome Measure

The Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS with scores ranging from 15-105) was completed annually.

#### Results

A two-way ANOVA found that attitudes and beliefs improved significantly ( $p < 0.01$ ) from first to final year (10.0 10.0). Medics showed a gradual reduction in scores (signifying improved attitudes) annually.

#### Conclusions

This is the first known published study to chart changes in the same cohort of medical students' attitudes and beliefs towards people with chronic pain over time. Changes in attitudes improved steadily over the five year medical degree course. Future work should explore which aspects of degree courses, if any, impact upon attitudes and beliefs towards people with chronic pain so that courses can be enhanced accordingly.

#### Contributions of the paper

- This is the first known published observational study of pain attitudes in the same group of medical students from first to final year of undergraduate training.
- It confirms the findings from previous cross-sectional literature that there is an improvement in attitudes amongst medical students during the course of their usual undergraduate training.
- The change in attitudes whilst of a meaningful magnitude, is relatively modest and there is clear potential for improvement.

#### Keywords

Medical student pain attitudes observational study

### Introduction

Chronic pain disorders such as low back pain are the leading cause of disability worldwide [1]. It is estimated that one third

of the UK population experiences chronic pain [2]. The cost of analgesia alone in 2016 was £537 million and indirect costs of pain through lost productivity were estimated between £5

and £10.7 billion [3]. 20% of the UK population consult their general practitioner (GP) about a musculoskeletal problem each year [4].

National clinical guidelines from organisations such as NICE (2021) chronic pain assessment and management guideline's [4] and Scottish Intercollegiate Guidelines Network [5], suggest that as pain is always influenced by social factors, emotional factors, expectations and beliefs, mental health and biological factors, it should be managed in accordance with a biopsychosocial approach. However there is evidence that the more limited biomedical management model prevails [6,7]. The biomedical model focuses upon pathological and clinical features of pain only, whereas the biopsychosocial model of care is patient-centred and involves the assessment of the individual's biological, psychological and socio-environmental factors [8,9]. Biopsychosocial care is evidenced to produce better long-term results, cost effectively and is associated with increased patient satisfaction [10].

Evidence-based practice should 'underpin' healthcare and is a fundamental basis for the provision of clinical care [11], however poorly evidenced surgery [12] and medication are still routinely prescribed for people with chronic pain [13]. The outcomes of biomedical intervention can result in a perpetuation of chronic pain as in the case of failed low back pain surgery syndrome or the side-effects of drug use [12,13]. A specific example of a biomedical approach is subacromial decompression surgery for shoulder pain which costs the NHS approximately 50 million in 20,000 procedures annually but is fraught with potential harm and is no better than placebo [14].

A biomedical approach towards patient care can be influenced by multiple factors including negative attitudes of healthcare professionals (HCPs) towards the functional ability of people with pain [15, 16]. These studies found that HCPs are less likely to practice an evidence-based, guideline consistent biopsychosocial approach to care, preferring a less active approach to management. Loeser and Schatman (2017) [17] attribute negative attitudes and beliefs and students' perception that chronic pain management is the hardest condition to deal with, to the undergraduate training stage of health professionals' career and view this stage of a medical career as fundamental to developing improved attitudes. Hojat et al., (2020) [18] noted that medical student empathy erodes during the course of a medical degree. Thus, the undergraduate phase is important for shaping healthcare professionals' attitudes and beliefs towards people with chronic pain as they have the potential to affect patient outcomes [19].

It is generally recognised that pain education at undergraduate level is lacking [17, 20, 21]. An improved

understanding of this period of learning could help to improve the impact of healthcare training in order to optimise its contribution to improved pain management. Several studies have quantified pain attitudes and beliefs of students at the beginning (first year) and end (final year) of students' training in an attempt to chart this impact [22, 23, 24, 25]. All but one study, which focussed exclusively on physiotherapists [22], assessed student attitudes towards pain by comparing different student cohorts. However this made it difficult to identify if attitudes truly change over time in a specific group of students or whether the differences found reflected diverse attitudes and beliefs existing in different student groups. Annual charting of the same cohort has been absent and could enable contextualisation against programme content and structure in order to identify which components of the programme may have the greatest effect on student attitudes and beliefs. Thus, the aim of this cohort study was to chart the attitudes and beliefs of the same cohort of medical students year on year as they progressed from the first to the final year of their studies.

## **Methods**

### *Participants and recruitment*

From 2009 to 2014 the same medical student cohort at a Scottish University were recruited to participate in this study. Students were advised of the study during lectures. Paper questionnaires, participant information leaflets and consent forms were distributed at the same time. Students were told that participation was voluntary, confidential and they could withdraw at any time.

The same cohort was followed for the duration of their five year degree programme. Data were collected over a five-year period. It was intended that students were linked longitudinally year on year, using their student ID numbers, however student ID numbers were not always provided by participants. Data were collected in the first semester of each academic year except for the final year when data were collected at the end of the year. The medical programme was accredited by the UK General Medical Council (UKGMC).

### *Outcome measures*

The Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS) consisting of 15 items on a 7-point Likert scale measuring healthcare professionals' attitudes and beliefs towards pain and function in patients with chronic low back pain [26] was the outcome measure used. A copy of this questionnaire can be found in the supplementary material section. The HC-PAIRS has been extensively used in studies involving healthcare students and qualified clinician populations to reflect change in attitudes and beliefs towards people with chronic pain [27, 25, 28, 29]. It is widely accepted

as a measure of attitude towards chronic musculoskeletal pain more generally although the questions are related to back pain [30]. Moran, Rushworth and Mason (2017) [31] reported good internal consistency ( $\alpha = 0.84$ ), and convergent validity of the HC-PAIRS and good test-retest reliability (ICC – 0.84). Scores in this 15 item version can range from 15 to 105, lower scores indicating a more positive attitude towards patient function in those with chronic pain. In addition, the following data were collected related to participant characteristics; age, gender (male/female), previous degree (yes/no), previous history of low back pain (yes/no), current low back pain (yes/no).

One half of the baseline SD for this outcome measure can be used to estimate a minimally clinically important difference (MCID) and is a well-established method of establishing clinical significance of data [32] and one that has been used for this outcome measure before [22, 33]. As the former study, Mankelov et al., (2021) [22] had a similar population sample and outcome measure this is the preferred MCID that will be used in this study, 4.2 units.

#### Data analysis

Statistical Package for the Social Sciences Version 25.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Additionally, data were analysed for normal distribution using a visual inspection of histograms and Q-Q plots alongside statistical analysis via the Shapiro-Wilkes test and were found to be normally distributed. Inferential statistics were carried out using a two-way ANOVA with year of study and discipline of degree as independent variables. The interaction effect of these two independent variables (year of study\*discipline of degree) was also investigated. A p value of <0.05 was considered statistically significant.

#### Results

In the first year of study there were 244 students in the medical group. The number of students who returned fully completed questionnaires in each year of study is shown in table 1. The participant characteristics are shown in table 2. There were 34 incomplete questionnaires that were removed from the analysis (6 in year 1, 5 in year 2, 9 in year 3, 1 in year 4, 13 in year 5).

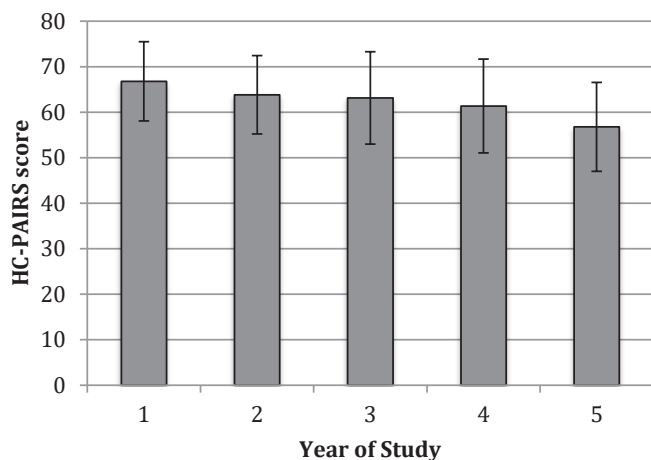
Thirty-eight new students, international and domestic, joined the medical cohort but they were not identifiable from the data collected thus their data could not be removed.

Table 1. Questionnaire response rates

	<b>N = complete data sets (total n in year) (% response rate)</b>
<b>Year 1</b>	205 (244) (84%)
<b>Year 2</b>	190 (245) (78%)
<b>Year 3</b>	132 (279)* (47%)
<b>Year 4</b>	110 (262) (42%)
<b>Year 5</b>	159 (260) (61%)

Table 2. Participant characteristics based on first year cohorts

<b>Age (yrs)</b>	19±2.
<b>Gender (Female)</b>	55%
<b>Previous degree (yes)</b>	14%
<b>History of low back pain (yes)</b>	27%
<b>Current low back pain (yes)</b>	6%



**Legend:** HC-PAIRS scores (Mean  $\pm$  1SD) for medical students, years 1-5 (with lower scores indicating better attitudes to pain)

**Figure 1.** Health Care Providers' Pain and Impairment Relationship Scale (HC-206 PAIRS) scores

A two-way ANOVA found a significant effect on the HC-PAIRS for the year of study ( $F=31.86, p<0.01$ ), but not for discipline of study ( $F=2.76, p=0.09$ ). There was a significant interaction effect of year of study and discipline of study ( $F=3.57, p=0.01$ ). The HC-PAIRS scores for all years are shown in figure 1. Year on year medical students' attitudes and beliefs steadily improved resulting in a reduction in HC-PAIRS score between first and final year of  $10 \pm 10.0$  (mean  $\pm$  SD) as seen in table 3.

Table 3. Mean HC-PAIRS scores for medical students in each year of study.

Year of study	Mean (SD) (n)
1	66.78 (8.71) (205)
2	63.83 (8.60) (190)
3	63.14 (10.15) (132)
4	61.37 (10.31) (110)
5	56.77 (9.77)

**Legend:** The data are based on estimated marginal means  
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## Discussion

A review of the published peer-reviewed literature revealed no previous studies charting annual changes in the same cohort of medical students' attitudes and beliefs towards patients with chronic pain over the course of their undergraduate training from their first to their final year. Attitudes and beliefs improved significantly from first to final year by 10 units. These changes are very similar to those changes reported in physiotherapy students over a four-year degree period in Mankelov et al. (2021) [22], produced by the same research group in the same time frame.

The average mean reductions from first to final year were similar to those reported previously in the literature. Ryan et al. (2010) [23] found that physiotherapy students improved by nine units over a four-year programme. Similarly, Morris et al. (2012) [24] found that medical students improved by nine units over a five-year programme. However, these studies compared different cohorts of students, thus it was unknown if the difference between the first and final years reflected a change in attitudes and beliefs over time or were reflective of different attitudes and beliefs between different student year cohorts. The current cohort data fills this gap in the literature and confirms the findings from those previous studies. The aforementioned study by Morris et al., (2012) [24] was published by our research group and the data collected at the same higher education institution as the data for the current study. The 1st year data in Morris et al., (2012) [24] are the medical cohort that were followed up annually in the current study. Rankin, Stalnacke and Fowler (2018) [34] used a 15 item, 6-point HC-PAIRS Likert Scale to assess final year medical student attitudes towards patients with low back pain (Mean 51.0 [SD] 6.4) and compared them to those of Swedish students (46 [6.2]). The final year results from Rankin, Stalnacke and Fowler's (2018) [34] study are similar to those in this study, however they are not quite comparable with this study as the scale in this study is wider. Thus proportionately Scottish medical students' mean average attitude of 54% towards pain in this study ranked between Australian final year medical 57% and Swedish students at 51%.

The cross-sectional studies discussed above and the data from this observational study showed clinically important changes in attitudes towards pain during the course of HCP training. Correlations have been found between changes in attitude and empathy [39] and biopsychosocial pain education can affect knowledge, attitude and behaviours [40]. Provision of evidence-based pain education may help to improve attitudes towards pain and arrest the erosion of

empathy noted during medical degrees [18], the empathy which is vital to providing optimal patient care.

Based on the MCID method proposed above the MCID for this study would be 4.2 units, a change of 10 units as seen in this study over the course of the medical degree is clinically relevant and exceeds the MCID by 5.8 units. The healthcare professionals with more positive attitude towards function in people experiencing pain are more likely to encourage patients to achieve their functional goals rather than fear patient injury resulting from movement. Helping individual patients to achieve their personal goals is a theme embedded in patient-centred care, a model of care which is associated with higher patient satisfaction and this may contribute to better outcomes [35].

However the level of change reported is smaller over a longer period of time than recent studies which have shown that brief (70 minute) biopsychosocial-informed pain neuroscience education sessions tailored for health care students can improve HC-PAIRS scores by 14-18 points on average in the immediate term [27, 28, 36] and that these changes are still significant at six months follow-up. This suggests that there is potential to implement educational strategies to enhance improvement in attitudes seen over the course of a degree programme such as that in the current study.

Collecting data from the same cohort of students over consecutive years allowed the exploration of attitudes and beliefs and their change over the duration of the undergraduate programme and how this might relate to content and structure of the course. A gradual, steady, year on year improvement in attitudes and beliefs from first to final year occurred. Clinical placements occur regularly from year one onwards for the medical students with a musculoskeletal module in year 2. The nature of the steady improvement could indicate that clinical placements were more influential upon student attitudes and beliefs than the specific musculoskeletal module. In Mankelow et al. (2021) [22] the change in physiotherapy students was seen to occur in the final two years and coincided with placements. However, this hypothesis is purely speculative, and cannot be delineated from the current data set. These results are similar to findings from students on a three-year physiotherapy degree programme in England, wherein a significant change in attitudes and beliefs occurred between the penultimate and final year coinciding with students' first clinical placements [23].

## Limitations

Data has not been linked to individual students year on year as was originally intended. A lack of data provided by participants meant this did not occur. Thus, it cannot be stated that these were all the same individuals being sampled each year. As individuals were not tracked from year to year, a between groups statistical analysis was applied to quantify the differences between years of study on attitudes and beliefs. This analysis was not fully congruent with the study design, as the majority of participants will have been the same individuals in each year. With this analysis (rather than a within-subjects model), the mean differences between years are unlikely to be biased in our sample over the study period. Nevertheless, it would have reduced the precision of the mean difference estimates, i.e. confidence intervals would be wider and P-values larger. However, given the large magnitude of the differences between years, this reduced precision did not materially influence the accuracy of our inferences. It is possible that those with more negative attitudes may have been more likely to drop out of the study. The use of paper questionnaires in this study mean that if students did not choose to disclose information they did not have to. Future studies could use electronic survey methods which can be programmed to prevent progression with the questionnaire until preceding responses are submitted.

There were some new student admissions to the course, transferring across from other medical courses, and it is not known if all or any of those students participated in this study. Consequently it is not possible to statistically analyse the influence of these potential participants.

While the voluntary and confidential nature of data collection provided mitigation, the possible presence and nature of response bias remains unknown.

This study looked at one medical programme in a University in Scotland, thus the findings may not generalise to the rest of the UK and internationally. However, the programme was accredited by the UK professional body. Final year data were collected at the end of the final academic year and approximately 18 months prior to that, thus there is a bigger gap in the data collection. Finally, whilst attitudes predict behaviour [37] it is unknown if these changes resulted in enhanced clinical practice and patient outcomes post-qualification. The data set used for this study is slightly dated as the last part of it was collected in 2014. However, musculoskeletal pain remains a core part of the undergraduate medical curriculum and the concepts underpinning its aetiology, clinical assessment and management options have not substantially changed since this data was collected.

Whilst the HC-PAIRS outcome measure used is focussed on low back pain which is a common complaint, there may be different views to less common disorders and less well understood conditions such as fibromyalgia.

### Conclusions

Over the course of their degree programme medical students improve their attitudes and beliefs towards people with chronic pain. Medical students improved gradually year on year. The magnitude of the improvement from first to final year is 10 units on the HC-PAIRS. It is in keeping with previous literature and exceeds the MCID. Future work should investigate new strategies for improving student pain attitudes and beliefs and explore the impact of such improvements on clinical care post-qualification.

### Acknowledgements

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### Conflict of Interest

There are no conflicts of interest.

### Ethical Approval

Ethical approval was obtained from the West of Scotland Research Ethics Committee and Teesside University's School of Health and Social Care Research Ethics and Governance Committee (062/18).

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- turn to doing the things they used to do unless they first find a cure for their pain
  13. Chronic back pain patients find themselves frequently thinking about their pain and what it has done to their life
  14. Even though their pain is always there, chronic back pain patients often don't notice it at all when they are keeping themselves busy
  15. All of chronic back pain patients' problems would be solved if their pain would go away

### Supplementary Material

#### HC-PAIRS 15 questions

1. Chronic back pain patients can still be expected to fulfill work and family responsibilities despite pain
2. An increase in pain is an indicator that a chronic back pain patient should stop what he is doing until the pain decreases
3. Chronic back pain patients cannot go about normal life activities when they are in pain
4. If their pain would go away, chronic back pain patients' would be every bit as active as they used to be
5. Chronic back pain patients should have the same benefits as the handicapped because of their chronic pain problem
6. Chronic back pain patients owe it to themselves and those around them to perform their usual activities even when their pain is bad
7. Most people expect too much of chronic back pain patients, given their pain
8. Chronic back pain patients have to be careful not to do anything that might make their pain worse
9. As long as they are in pain, chronic back pain patients will never be able to live as well as they did before
10. When their pain gets worse, chronic back pain patients find it very hard to concentrate on anything else
11. Chronic back pain patients have to accept that they are disabled persons, due to their chronic pain
12. There is no way that chronic back pain patients can re-