Kylie Fitzgerald (Orcid ID: 0000-0002-2412-0889)

Brett Vaughan (Orcid ID: 0000-0002-8623-4558)

Title: No gain without pain education: Improving knowledge and biopsychosocial attitudes and beliefs in a predominantly non-health related undergraduate target audience

Authors: Kylie Fitzgerald[1,2*], Brett Vaughan[1], Elizabeth Devonshire[3], Carl Schneider[4], Rebecca Denham[5]

1. Department of Medical Education, University of Melbourne, Melbourne, Australia.
2. School of Health and Biomedical Sciences, RMIT University, Melbourne, Australia. 2.
3. Pain Education Unit, Sydney Medical School - Northern, The University of Sydney, Sydney, NSW, Australia.
4. School of Pharmacy, The University of Sydney, Sydney, NSW, Australia.
5. Educational Innovation, The University of Sydney, Sydney, NSW, Australia.

**Corresponding author:* Department of Medical Education, Melbourne Medical School, Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne, Melbourne, Australia. Phone: +61466922032, Fax: N/A, Email: kylie.fitzgerald@unimelb.edu.au

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1002/msc.1630.

Acknowledgments

Nil.

Sources of Funding

A small education grant ($12,000) from the University of Sydney supported the development of this unit.

Conflict of Interest

The authors report no conflict of interest in relation to the manuscript.

Informed Consent

N/A

Title: No gain without pain education: Improving knowledge and biopsychosocial attitudes and beliefs in a predominantly non-health related undergraduate target audience

ABSTRACT

Objectives

Chronic pain (CP) impacts individuals and society and is the leading cause of disability globally. Pain education interventions are often evaluated in patients and health professional students, but not in non-health student groups. Increasing knowledge of pain may facilitate shifts in attitudes, and beliefs towards sufferers. We report on changes in pain knowledge, attitudes, and beliefs of predominantly non-health-related tertiary degree students participating in online education.

Methods

Quantitative cohort study design. Students reported demographics and completed the Chronic Pain Myth Scale (CPMS) and 12-item Neurophysiology of Pain Questionnaire (NPQ) before (T1) and after (T2) the 7-week online module at The University X in 2020.

Results

Twenty-two students undertaking predominantly non-health-related bachelor's degrees (16.5% response rate, 90.9% female, mean=19.5 years) participated. NPQ scores increased from 47.3% to 62.9%. Attitudes and beliefs towards biopsychosocial impacts improved ($p<0.027$) but not towards individuals suffering from CP or treatment of CP. A negative correlation was found between Age and People suffering from CP ($\rho= -0.437$, $p<0.042$) and Age and Towards treatment of CP) ($\rho = -0.556$, $p<0.007$) at T2.

Conclusion

Completing the elective online module resulted in improved knowledge and biopsychosocial attitudes towards CP in this predominantly non-health cohort, as reported in health and patient cohorts.

Keywords: Chronic Pain; Students; Surveys and Questionnaires; Attitudes; Education.

INTRODUCTION

Chronic pain (CP) is a global issue affecting both individuals and society more broadly. Chronic pain significantly impacts the life of patients, their family and society at large, including workplaces and health care services (Mankelow, Ryan, Taylor, & Martin, 2020). Although most adults have experienced pain, there is a limited community awareness of pain, its socioeconomic impact and burden, and the difficulties associated with accessing prompt and appropriate care. This situation is thought to contribute to the burden of chronic pain in society (Sessle, 2012).

Pain was redefined by the International Association for the Study of Pain (IASP) in 2020 as "An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage" (IASP, 2020). This updated definition reduced the focus on the role of tissue damage, and explicitly states that pain may not be associated with tissue injury (Raja et al., 2020). With this amended definition, pain educators around the world have developed professional education programs to facilitate a contemporary understanding of pain by health professionals and researchers.

Research has been directed towards evaluating the outcomes of pain education programs in pre- and post-professional health curricula (Hush, Nicholas, & Dean, 2018) and patient pain education programs (Watson et al., 2019). Assessment of changes in knowledge of pain and attitudes and beliefs towards pain from educational interventions have been measured and reported in health professional students in Australia (Fitzgerald, Devonshire, & Vaughan, 2020; Hush et al., 2018). However, there is no current data reporting pain knowledge, attitudes, and beliefs in Australian undergraduate student cohorts that are undertaking non-health related undergraduate degree programs.

Improving pain literacy in non-health professions and non-persistent pain cohorts may improve an individual's understanding of the impact of pain and contemporary approaches to pain management; it may challenge their beliefs and experiences about pain including its origins and potential for progression from acute to chronic pain states. In turn, individuals with improved pain literacy may then positively influence their family and social contacts' perceptions of persistent pain, supporting the uptake of evidence-based information in their immediate community. Universities present an environment where non-health professions students can be engaged in education about pain to positively modify knowledge, or attitudes and beliefs towards pain. Education interventions directed towards improving pain literacy warrant evaluation to determine efficacy in effecting a change in knowledge, or attitudes, and beliefs towards pain (Briggs, 2012).

This paper reports on the outcomes of a student group enrolled in predominantly non-health-related bachelor's degree courses undertaking a pain focused open learning environment (OLE) unit – *Health Challenges: Pain and Society* - at The University of X. This unit, which was designed to enhance understanding of pain at an individual and society level, forms part of the University's reimagined undergraduate curriculum strategy to provide all undergraduate students with the opportunity to build novel skills and knowledge in different fields of study. In this initiative students from non-health-related degrees can access content that would usually only be included in a health professional curriculum.

Typically, evaluation of student knowledge, attitudes, and beliefs is assessed through administration of questionnaires exploring these domains. A recent systematic review reported the use of 11 pain knowledge, attitudes, and beliefs questionnaires over the last 25 years in pain education (Thompson, Johnson, Milligan, & Briggs, 2018). We selected two questionnaires (administered pre and post course completion) – the Neurophysiology of Pain

Questionnaire (NPQ) and the Chronic Pain Myth Scale (CPMS) to evaluate changes in pain knowledge, attitudes, and beliefs of students participating in the OLE.

Our study investigated the outcomes of the implementation of the undergraduate Open Learning Environment (OLE) - *Health Challenges: Pain and Society* at the University of X, Australia. Specifically, we report on changes in pain knowledge, attitudes, and beliefs of students enrolled in predominantly non-health-related bachelor's degree courses participating in the OLE, using the CPMS and 12-item NPQ and relationships with demographic variables.

METHODS

Sample

Our project utilised a quantitative cohort design. Students enrolled in *Health Challenges: Pain and Society - OLET1512* in semester 1, 2020 were invited to participate. The unit is part of the Open Learning Environment (OLE) at the University of X (Australia), where students enrolled in undergraduate (Bachelor) degrees in the university can select units of interest outside their course enrolment requirements. Ethics approval was issued by the University of X Human Ethics Committee [2019/310].

Intervention and educational design

The OLE was developed following approval from the University of X's Board of Interdisciplinary Studies committee. The development of this unit, *Health Challenges: Pain and Society*, utilised a range of strategies to inform the learning design underpinned by the first domain of competence of the endorsed IASP competency framework - the Multidimensional Nature of Pain (Fishman et al., 2013). An advisory group with representation from various discipline areas (pharmacy, dentistry, education, psychology) and a consumer representative, was established. It provided advice on the proposed unit structure, content, and assessment, in keeping with the first domain of the IASP pain competency framework (Fishman et al., 2013). Measuring the student's changes in knowledge, attitudes, and beliefs formed a key component of the evaluation of this unit to determine the potential impacts of this OLE.

The *Health Challenges: Pain and Society* OLE was developed to run online with three modules over seven-week period, representing approximately 40 hours of work for the student. Each module housed a short introductory video, 2 interactive workbooks with set readings, discussion forum and assessment tasks (see appendix 1 for full details). The unit

was delivered to students via an asynchronous online learning approach on the University's learning management system (Canvas), across a seven-week period from March to April in 2020.

Enrolled students received a recruitment email prior to the commencement of the unit (Time 1 = T1) and a link to the online surveys hosted in Qualtrics. The consent page of the survey offered a further summary of the project and consent to participate was obtained. Participants who provided consent then were asked to self-generate a unique code to enable matching of data at T1 and when the unit was completed (Time 2 = T2). They were then asked to complete several demographic questions, the 26-item Chronic Pain Myth Scale (Martorella, Lacasse, Kostic, & Schluck, 2019) and the 12-item Neurophysiology of Pain Questionnaire (NPQ) (Catley, O'Connell, & Moseley, 2013). A copy of the survey questions can be found in Appendix 2.

At the end of the seven-week unit, students were again invited to complete online evaluation surveys (T2). Completed surveys from T1 and T2 were extracted as Microsoft Excel files. The identifying codes that enabled matching of the T1 and T2 respondent's data were sorted and matched, before being imported into SPSS (IBM Corp, USA) for analysis. Data sets identified at either T1 or T2 that did not have a corresponding match were discarded.

Measures

To evaluate change in student's knowledge, attitudes, and beliefs towards chronic pain through undertaking the OLE, we used two questionnaires. The first questionnaire, developed by Moseley (8), is the 19 item Neurophysiology of Pain Questionnaire (NPQ). The patient version of the NPQ was devised to evaluate how and why pain is perceived and knowledge of neurobiological pain mechanisms in patients before and after a pain education intervention

(Moseley, 2003). We used the 12-item version as it has been psychometrically analysed and validated for use with patient populations (Catley et al., 2013; Vaughan, Mulcahy, Fitzgerald, & Austin, 2019) and reported in student populations (Adillón, Lozano, & Salvat, 2015; Fitzgerald et al., 2020; Fitzgerald et al., 2018). The total score for the 12-item Neurophysiology of Pain Questionnaire (NPQ) is based on number of correct responses to a series of statements about pain. Correct responses receive a score of 1, and incorrect or undecided receive a score of 0, for a maximum possible score of 12. The NPQ items were recoded as 'correct' and 'incorrect' in accord with the authors' description and a total score for the NPQ was calculated (Catley et al., 2013). A higher NPQ scores indicate higher pain neurophysiology knowledge. A minimal clinically important difference was described for this measure by a recent publication evaluating pain knowledge in health professional students as 0.9 points or 7.3% (Mankelow et al., 2020).

The second questionnaire we chose was the 26-item Chronic Pain Myth Scale (CPMS), developed originally for French speaking Canadian populations (Lacasse, Connelly, & Choinière, 2016) and adapted into English (Martorella, Lacasse, et al., 2019). The CPMS is validated to measure community knowledge, beliefs, and attitudes towards individuals suffering from chronic pain (CP), biopsychosocial impacts of CP, and treatment of CP. This questionnaire was developed for use with community members, and therefore it may offer insight into change in knowledge, attitudes, or beliefs not able to be captured by similar measures developed and reported for health professional pain education (Thompson et al., 2018).

The CPMS is a five-point Likert scale where the participant records their level of agreement with each statement from "Strongly disagree = 1" and "Strongly agree = 5". Several items are

negatively formulated, and scores reversed. Factor subscale scores for the Chronic Pain Myth Scale (CPMS) were calculated as per the author instructions (Martorella, Lacasse, et al., 2019).

CPMS scores were obtained by summing items specific to each dimension:

- Knowledge, attitudes, and beliefs about people who suffer from chronic pain (CP). Scoring key: Sum items 1-9. (Reverse score – 2,3,4,5,7,8, 9) Range 9-45.
- Knowledge, attitudes, and beliefs about biopsychosocial impacts of CP. Scoring Key: Sum items 10-19 (reverse score 14) Range 10-50.
- Knowledge, attitudes, and beliefs about treatment of CP. Scoring key: Sum items 20-26 (Reverse score 20, 21, 24, 25, 26) Range 7-35.

A higher overall score for each dimension corresponds to a better pain knowledge and more positive attitudes and beliefs about chronic pain, its impacts, and its treatment.

Data Analysis

Descriptive statistics were generated for each of the survey items including the demographic data, and the NPQ and CPMS. Nonparametric inferential and correlation statistics was used to evaluate changes in NPQ scores and CPMS subscale scores and relationships with demographic data. Effect size data and 95% confidence intervals are presented where appropriate.

ETHICAL APPROVAL

This project was approved by the University of X Human Research Ethics Committee (HREC) on 22/5/2019. Application number: [2019/310]

RESULTS

A total of 142 students (57.7% aged <20 years, 78.1% female) were enrolled in the *Health Challenges: Pain and Society* unit for the duration of semester 1, 2020. Completed online surveys were collected from 106 students at T1 (79% response rate). A total of 39 completed surveys were collected at T2 (29% response rate). There were 22 matched data sets collected from both T1 & T2 forming the participant group (16.5% response rate of students enrolled in the unit).

Demographic Data

The participant group identified as 90.9% (n=20) female, with a mean age of 19.5 years (SD +/-1.11, range 17-24). Five participants (22.7%) reported experiencing chronic, persistent pain for more than 6 months. One participant (4.5%) reported completing a pain education course prior to undertaking the unit. Nineteen students were enrolled in non-health related degrees (n=19, 86.4%), while three students indicated they were enrolled in double degree- Master of Nursing (n=3, 13.6%). The degree representation across the cohort is explored in detail elsewhere (Devonshire & Nicholas, 2021).

Changes in Pain Knowledge – NPQ

The 12-item NPQ scores demonstrated a statistically significant increase from a mean raw score of 5.68 (+/- 2.77) correct responses at T1 to 7.55 (+/-1.82) ($p<0.01$, $r_{rb} = 0.86$ 95%CI[0.64, 0.95]) correct responses at T2 (Table 1).

Insert Table 1 here

Changes in Pain Knowledge, Attitudes, and Beliefs as measured by the Chronic Pain Myth Scale (CPMS)

The Dimension 2 subscale (Biopsychosocial impacts of CP) demonstrated an increase in the subscale score from T1 to T2 ($p<0.027$, $r_{rb} = 0.61$ 95%CI[0.22, 0.83]). There were no significant increases found in CPMS Dimension 1 subscale (People suffering from CP) ($p=1.000$) or CPMS Dimension subscale 3 (Towards treatment of CP) ($p=0.064$) (see Table 2).

Insert table 2 here

Impact of demographics on NPQ or CPMS score

There were no significant differences in NPQ or CPMS subscale scores for gender or previous experience of chronic pain. As only one participant reported having previously completed pain education, this comparison was made. A medium negative correlation was observed between Age and T2 CPMS-subscale 1 (People suffering from CP) ($\rho= -0.437$, $p<0.042$) and Age and T2 CPMS-subscale 3 (Towards treatment of CP) ($\rho = -0.556$, $p<0.007$).

DISCUSSION

Our project is the first to report on changes in knowledge, attitudes, and beliefs towards pain of Australian undergraduate students in predominantly non-health related bachelor's degree courses undertaking an online pain education unit. Most respondents were enrolled in non-health related majors; thus, our results may offer an initial insight into impacts of a pain education unit for this unique group. The *Health Challenges: Pain and Society* two credit point unit was open to all students in liberal studies degrees and some specialist degrees. The unit's availability was designed to address interest in pain education in non-health professions cohorts.

Students' pain knowledge scores as measured by the NPQ increased by 15.6% from pre-unit to post-unit. This increase is greater than the MCID of the NPQ of 7.3% described with health professions students (Mankelow et al., 2020) suggesting a significant improvement in knowledge that exceeds the minimum clinically important difference. Total NPQ scores at T1 in our cohort were comparable to studies from the health professions. Work by Adillón et al (Adillón et al., 2015) reported NPQ scores of 42.14% correct responses with 47.33% correct being observed in the current study.(Adillón et al., 2015) When considering the T2 results, respondents in the current study demonstrated higher correct NPQ scores at T2 (62.91%) compared to final year medical (54.4%) and nutrition students (42.3%) (Adillón et al., 2015). However, our cohort were assessed after a seven-week module, whereas these health professional populations were re-assessed at the end of their pre-professional degree course. Our results may be an outcome of the short duration between NPQ administration and a reflection of short-term knowledge retention. Comparing our cohorts NPQ score gain with similar non-health professions cohorts or six-week online education interventions is a challenge. There is a paucity of literature for comparison with non-health professional

student cohorts as the majority of pain education evaluations report on health professions cohorts (Thompson et al., 2018). Further investigation of online interventions in non-health professional tertiary cohorts should be considered as well as long term retention of pain knowledge, the need for ongoing education or refreshers to maintain knowledge.

Our cohort's Chronic Pain Myth Scale scores demonstrate improved attitudes, and beliefs towards CP on the biopsychosocial (BPS) sub-scale only. The BPS model, which underpins contemporary pain education (Fishman 2013), is a strong focus in the *Health Challenges: Pain and Society* unit. The syllabus illustrates the complex, multidimensional and individual specific nature of CP and its impact on society, which may explain this shift. Examination of the positive score change in items such as item 10 "Chronic pain causes several physical symptoms (muscle tension, change in appetite, reduced mobility, fatigue)" and item 13 "Chronic pain may be associated with negative emotions (e.g., fear, anger, or sadness)" suggests the design of the OLE has positively influenced the students understanding of the biopsychosocial impacts of chronic pain. However, the OLE also focused on the complexity of pain and the individual experience of pain, which may not have been captured by the CPMS. Whether these attitudes and beliefs persist over the long-term requires additional investigation.

We found no significant changes in CPMS scores representing attitudes towards people with CP and treatment of CP. The *Health Challenges: Pain and Society unit* focused on what pain is, why pain is a health challenge, and how the challenge was being addressed at a societal level. The CPMS attitudes towards CP treatment subscale collected agreement responses about impacts of work, sleep, diet, and health professional roles, which may not adequately capture shifts resulting from engagement with the OLE content. The use of the English

CPMS is only reported in one other study in nurses in the US, which only included subscale 1 of the CPMS, making comparisons difficult (Martorella, Kostic, Lacasse, Schluck, & Abbott, 2019), and so further evaluation of the CPMS is needed.

Gender did not influence scores, while increasing age was weakly linked to lower pain knowledge levels and poorer biopsychosocial attitudes towards CP, which contrasts to our work in allied health professional students (Fitzgerald et al., 2020; Fitzgerald et al., 2018). The age range was narrower in the OLE cohort, with a maximum age of 24 years, whereas the allied health cohort had a broader age range (20-36 years). The relatively narrow age range in our cohort is representative only of this group and broader community groups require evaluation to determine if age across the life span relates to knowledge and beliefs towards CP.

Some limitations of our data include the level of reliability of the questionnaires and the response rates. While the NPQ showed acceptable reliability at T1 (α=.742) the Cronbach alpha at T2 was below acceptable level (α=.474). Similarly, the 3 subscales of the CPMS were all below acceptable, despite reporting adequate reliability in the original validation survey of the English version (Martorella, Lacasse, et al., 2019). Further research is required to evaluate the psychometric properties of the English version of the CPMS to ensure that it is suitable for evaluating attitudes and beliefs associated with CP. These issues reinforce the importance of evaluating and reporting on psychometric properties of questionnaires in pain education research to enable understanding of the probable accuracy of the findings.

Response rates remain a challenge for evaluation using online survey instruments. Authors assessing pain knowledge using different questionnaires have reported comparable response rates for online evaluations in preprofessional physiotherapy (31.3%) (Louw,

Puentedura, Zimney, Cox, & Rico, 2017)and osteopathy students (21.3%) (Fitzgerald et al., 2020). Other studies utilising the NPQ to evaluate pain knowledge before and after an education invention report use of paper-based questionnaires with response rates reported from 40.5% to 75% (Beetsma, Reezigt, Paap, & Reneman, 2020; Colleary, O'Sullivan, Griffin, Ryan, & Martin, 2017; Fitzgerald et al., 2020). Recruitment of students to completing online questionnaires remains a challenge and additional avenues should be explored. Response bias may be an issue in the OLE cohort, as they might have a higher score due to motivation as they chose to study the OLE as an elective, compared to mandatory coursework within a health professions course

CONCLUSION

Our seven-week online pain education unit resulted in improvements in pain knowledge, and attitudes and beliefs towards biopsychosocial impacts of chronic pain in our predominantly non-health student cohort. Attitudes towards people with CP and treatment of CP did not change significantly. Our results offer some insight into how pain education can be undertaken with non-health professions populations and the potential for reaching a wider audience through higher education. Further work should be directed towards the retention of knowledge, attitudes, and beliefs in this cohort and the community.

REFERENCES

1. Adillón, C., Lozano, È., & Salvat, I. (2015). Comparison of pain neurophysiology knowledge among health sciences students: a cross-sectional study. *BMC research notes, 8*(1), 592. doi:https://doi.org/10.1186/s13104-015-1585-y
2. Beetsma, A. J., Reezigt, R. R., Paap, D., & Reneman, M. F. (2020). Assessing future health care practitioners' knowledge and attitudes of musculoskeletal pain; development and measurement properties of a new questionnaire. *Musculoskeletal Science and Practice, 50*, 102236. doi:https://doi.org/10.1016/j.msksp.2020.102236
3. Briggs, E. (2012). Evaluating the impact of pain education: how do we know we have made a difference? *British journal of pain, 6*(2), 85-91. doi:https://doi.org/10.1177/2049463712449961
4. Catley, M. J., O'Connell, N. E., & Moseley, G. L. (2013). How good is the neurophysiology of pain questionnaire? A Rasch analysis of psychometric properties. *The journal of pain, 14*(8), 818-827. doi:https://doi.org/10.1016/j.jpain.2013.02.008
5. Colleary, G., O'Sullivan, K., Griffin, D., Ryan, C., & Martin, D. (2017). Effect of pain neurophysiology education on physiotherapy students' understanding of chronic pain, clinical recommendations and attitudes towards people with chronic pain: a randomised controlled trial. *Physiotherapy, 103*(4), 423-429. doi:https://doi.org/10.1016/j.physio.2017.01.006
6. Devonshire, E., & Nicholas, M. (2021). *Educating and engaging a new target audience about the problem of chronic pain for society*. Pain Management Research Institute. The University of X.
7. Fishman, S. M., Young, H. M., Lucas Arwood, E., Chou, R., Herr, K., Murinson, B. B., . . . Stevens, B. J. (2013). Core competencies for pain management: results of an interprofessional consensus summit. *Pain Medicine, 14*(7), 971-981. doi:https://doi.org/10.1111/pme.12107
8. Fitzgerald, K., Devonshire, E., & Vaughan, B. (2020). Pain knowledge, attitudes and beliefs of allied health learners across three curricular models. *Health Professions Education*. doi:https://doi.org/10.1016/j.hpe.2020.09.001
9. Fitzgerald, K., Fleischmann, M., Vaughan, B., de Waal, K., Slater, S., & Harbis, J. (2018). Changes in pain knowledge, attitudes and beliefs of osteopathy students after completing a clinically focused pain education module. *Chiropractic & manual therapies, 26*(1), 42. doi:https://doi.org/10.1186/s12998-018-0212-0
10. Hush, J. M., Nicholas, M., & Dean, C. M. (2018). Embedding the IASP pain curriculum into a 3-year pre-licensure physical therapy program: redesigning pain education for future clinicians. *Pain reports, 3*(2). doi:https://dx.doi.org/10.1097%2FPR9.0000000000000645
11. IASP. (2020). IASP Terminology - Pain. Retrieved from https://www.iasp-pain.org/terminology?navItemNumber=576#Pain
12. Lacasse, A., Connelly, J.-A., & Choinière, M. (2016). The chronic pain myth scale: development and validation of a French-Canadian instrument measuring knowledge, beliefs, and attitudes of people in the community towards chronic pain. *Pain Research and Management, 2016*. doi:https://doi.org/10.1155/2016/5940206

13. Louw, A., Puentedura, E. J., Zimney, K., Cox, T., & Rico, D. (2017). The clinical implementation of pain neuroscience education: a survey study. *Physiotherapy Theory and Practice, 33*(11), 869-879. doi:https://doi.org/10.1080/09593985.2017.1359870
14. Mankelow, J., Ryan, C., Taylor, P., & Martin, D. (2020). The effect of pain neurophysiology education on healthcare students' knowledge, attitudes and behaviours towards pain: A mixed-methods randomised controlled trial. *Musculoskeletal Science and Practice, 50*, 102249. doi:https://doi.org/10.1016/j.msksp.2020.102249
15. Martorella, G., Kostic, M., Lacasse, A., Schluck, G., & Abbott, L. (2019). Knowledge, Beliefs, and Attitudes of Emergency Nurses Toward People With Chronic Pain. *SAGE Open Nursing, 5*, 2377960819871805. doi:https://doi.org/10.1177%2F2377960819871805
16. Martorella, G., Lacasse, A., Kostic, M., & Schluck, G. (2019). Cross-Cultural Validation of the English Chronic Pain Myth Scale in Emergency Nurses. *Pain Research and Management, 2019*. doi:https://doi.org/10.1155/2019/1926987
17. Moseley, L. (2003). Unraveling the barriers to reconceptualization of the problem in chronic pain: the actual and perceived ability of patients and health professionals to understand the neurophysiology. *The journal of pain, 4*(4), 184-189. doi:https://doi.org/10.1016/S1526-5900(03)00488-7
18. Raja, S. N., Carr, D. B., Cohen, M., Finnerup, N. B., Flor, H., Gibson, S., . . . Sluka, K. A. (2020). The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. *Pain, 161*(9), 1976-1982.
19. Sessle, B. J. (2012). The pain crisis: what it is and what can be done. *Pain research and treatment, 2012*. doi:doi:10.1155/2012/703947
20. Thompson, K., Johnson, M. I., Milligan, J., & Briggs, M. (2018). Twenty-five years of pain education research—what have we learned? Findings from a comprehensive scoping review of research into pre-registration pain education for health professionals. *Pain, 159*(11), 2146-2158.
21. Vaughan, B., Mulcahy, J., Fitzgerald, K., & Austin, P. (2019). Evaluating Patient's Understanding of Pain Neurophysiology. *The Clinical journal of pain, 35*(2), 133-139. doi:https://doi.org/10.1097/AJP.0000000000000658
22. Watson, J. A., Ryan, C. G., Cooper, L., Ellington, D., Whittle, R., Lavender, M., . . . Martin, D. J. (2019). Pain neuroscience education for adults with chronic musculoskeletal pain: a mixed-methods systematic review and meta-analysis. *The journal of pain, 20*(10), 1140. e1141-1140. e1122. doi:https://doi.org/10.1016/j.jpain.2019.02.011

Table 1 – Pre and post 12-item Neurophysiology of Pain (NPQ) Scores

	NPQ Total Score Time 1	NPQ Total Score Time 2
Mean % Score	47.33%	62.91%
Mean Raw Score + SD	5.68 (2.77)	7.55 (1.82)
Median	6.00	8.00
Minimum	0	4
Maximum	10	12
Cronbach's alpha	α=.742	α=.474

Table 2. Changes in Pain Knowledge, Attitudes, and Belief's subscales in the Chronic Pain Myth Scale (CPMS)

	Time 1			Time 2		
Subscales of CPMS	Mean (SD)	Range	Cronbach's alpha	Mean (SD)	Range	Cronbach's alpha
1 - People suffering from CP	22.77 (3.66)	13-29	α=.663	21.86 (3.49)	14-28	α=0.562
2 - BPS impacts of CP	38.14 (3.48)	33-46	α=.523	40.23 (4.09)	30-46	α=0.691
3 - Towards treatment of CP	19.68 (2.75)	14-24	α=.321	18.18 (2.74)	14-25	α=0.402