

## **Empathy among health science undergraduates toward the diagnosis of chronic pain: An experimental study.**

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## **Empathy among health science undergraduates toward the diagnosis of chronic pain: An experimental study.**

### **Abstract**

*Objectives:* To analyse the empathetic response of future health professionals toward people diagnosed with chronic pain differentiated by the degree of visibility and credibility of symptoms.

*Methods:* A total of 203 undergraduates performed an experimental task using vignettes depicting different diagnoses of chronic pain and completed questionnaires measuring dispositional and situational empathy. A MANCOVA analysis was conducted.

*Results:* The main effects of chronic pain diagnoses did not significantly affect situational empathy ( $p = .587$ ,  $\eta^2 = .007$ ,  $d = 0.229$ ). The dispositional empathy variables perspective-taking and personal distress affected the situational empathy scores ( $p = .002$ ,  $\eta^2 = .072$ ,  $d = 0.906$ , and  $p = .043$ ,  $\eta^2 = .032$ ,  $d = 0.547$ , respectively).

*Conclusions:* It would seem appropriate to foster intra-individual empathy factors among health science undergraduates such that they can more readily understand the process of individual adaptation to chronic pain and thus manage it more effectively.

*Practice implications:* It would be useful for dispositional empathy to form part of the transversal competences of the training programmes of future health professionals from the beginning of their studies.

# **Empathy among health science undergraduates toward the diagnosis of chronic pain: An experimental study.**

## **1. Introduction**

Chronic pain is a complex condition that negatively impacts people's quality of life. Although chronic pain is considered as a disease in its own right, as stated in the "Declaration of Pain" [1], people with chronic pain are more likely to experience stigmatising reactions from others [2]. Stigmatisation implies that a person's social identity or membership in some social category is devalued or deemed defective by others [2].

Some diagnoses of pain disease may also be more stigmatised than others. Two of the main variables that could modulate the stigmatisation process are the presence (or absence) of clear pathophysiological processes underlying pain [3,4] as well as visible (or nonvisible) physical symptoms of pain [5]. Studies with health professionals have shown that most of them consider chronic pain to be difficult to treat and a symptom of somatised psychological disease [6]. As a result, health care providers could attribute less pain to patients, limit therapeutic efforts, feel less sympathy, and be more suspicious of possible deception, all of which is accentuated when symptoms and pathophysiology are not well understood [7]. For example, fibromyalgia is a chronic pain diagnosis that is associated with a higher rate of multiple pains that cannot be explained by discernible impairment or damage [8] in the absence of visible physical symptoms [5]. This contributes to a lack of universal acceptance of fibromyalgia among health professionals and makes it one of the most delegitimised conditions, evoking a sense of disdain, marginalisation, and discrimination from family, friends, co-workers, healthcare professionals, and others [9]. There is some evidence demonstrating that women with fibromyalgia feel particularly stigmatised during the assessment process because physicians tend to psychologise their symptoms in the absence of evidence indicating a pathophysiological condition [10].

Previous studies have investigated stigmatisation or lack of credibility in other types of chronic pain diagnoses, such as rheumatoid arthritis [11], specific chronic low back pain [12,13], and irritable bowel syndrome [14]. In these conditions, the presence of a defined aetiology may reduce the experience of stigmatisation [3,4]. Nevertheless, compared to people with these chronic pain conditions, people diagnosed with

fibromyalgia report more daily stigma [3,14] and healthcare professionals show less empathy and less focused behaviour toward these people [5].

Research has shown that a lack of empathy on the part of physicians may also contribute to stigmatisation [15] and that, conversely, fostering empathy may prevent the adoption of negative stereotypes common to people experiencing medically unexplained illnesses, such as some of the symptoms of chronic pain [16]. Empathy has been shown to have multiple benefits in situations involving ambiguity about the nature of symptoms, thus helping patients to feel less misunderstood and devalued by those around them [17]. Empathy, as a multidimensional and skills-based construct, has been defined as the ability to understand a person's situation, perspective, and feelings, communicate that understanding to them, and act on it in a helpful and therapeutic way [18]. Previous findings have demonstrated that people's perceptions of empathy among healthcare professionals contributes to greater adherence to treatment and greater activation by the person [19,20], decreased depressive and anxiety symptoms [21,22], and to positive changes in the way they experience their own pain and the meaning they attribute to it [21]. Some researchers have suggested that empathy is an essential element in clinical practice and that it is related to better outcomes in the treatment of patients [23], particularly in people experiencing chronic pain [24]. The results of a recent systematic review have supported the view that empathic practice improves patient care, and that empathy education can benefit practitioners, thereby reducing their risk of burnout and increasing their well-being and job satisfaction [25]. Despite this, concerns have been raised that undergraduate education may suppress empathy instead of promoting it [26,27].

In the specific setting of chronic pain research, studies have suggested that previous and personal experience of pain might be a variable that affects empathic responses to people experiencing this condition [28,29]. It has also been suggested that although health science undergraduates may have a great deal of knowledge of physiology and the ability to understand the different diseases related to chronic pain, they may have problems in empathising with people with chronic pain if they have not had any close experience of chronic pain in their lives [24].

The International Association for the Study of Pain (IASP) reported pain education in universities among health science students in many countries is insufficient [30]. It has declared the need to change the approach of the standard pain curriculum in university programmes, emphasising interpersonal, emotional, and social aspects [31].

Based on the IASP Pain Curriculum Outline and a systematic search of the available literature, Hernández-Sánchez et al. [32] have made targeted recommendations to educate health science trainees based on significant gaps in education chronic pain. Their results highlight that educating health science students in a person-centred approach and empathic communication are essential to improve the quality of attention to people who suffer from this condition. However, it has been found that healthcare professionals' opinions about people with chronic pain progress negatively throughout healthcare education leading to a decline in empathy for people with chronic pain [24].

A search has failed to find previous research that investigates if healthcare undergraduates' empathic responses to chronic pain diagnoses differ depending on the clarity of pain cause. Given this background, the main objective of this experimental study was to investigate whether different chronic pain diagnoses could have a differential effect on the empathic response of undergraduate students following different health science degrees (i.e., medicine, nursing, occupational therapy, physiotherapy, podiatry, and psychology). We hypothesized that future health care professionals would show more empathy toward people with a diagnosis with a clearer cause for their pain—and, therefore, a higher degree of credibility—such as low back pain and arthritis, than toward those with a less clear and specific cause, such as fibromyalgia. If confirmed, it would be relevant to include empathy in the training of health professionals who may have to care for people with chronic pain.

## **2. Method**

### *2.1. Participants and procedures*

Ethics approval was obtained from the Ethics Committee of the University of Málaga (CEUMA 4-2022-H), was authorised by the Research Commission of the Faculty of Health Sciences, and complies with the requirements of the Declaration of Helsinki for research of this nature.

The total sample comprised 203 undergraduate students following several health science undergraduate degrees at the University of Málaga (i.e., medicine, nursing, occupational therapy, physiotherapy, podiatry, and psychology). Inclusion criteria were as follows: students between the 3rd and 5th year of their respective degree to ensure that they had fulfilled curricular internships that gave them the opportunity to be in contact with people with physical diseases; and the ability to understand the Spanish language.

The sample size was calculated following the guidelines proposed by Cohen [31]. Thus, 53 participants would be needed for each experimental condition using a cutoff for statistical significance of 0.05, a power of 0.80, and an effect size of 0.25.

We requested permission to conduct the study from the management teams of the faculties offering the degrees linked to the study. Subsequently, we contacted the staff who taught compulsory subjects in the final years of each degree to set the date on which the evaluation would be conducted. Before the study task began, we informed all students on each course of confidentiality and anonymity, and asked for their voluntary participation, for which they would not receive any type of compensation. The sample included all students in the class at the time of the study task who agreed to participate voluntarily (i.e., they were free to choose to participate without any pressure, could leave the study at any time, did not have to justify leaving the study and had prior knowledge of the risks and benefits). Those students who opted not to participate were able to leave or remain in the classroom during the completion of the study task. All who wished to participate were asked to sign the informed consent form. Data collection were conducted in groups at the beginning of each class. Participants read a single vignette, which was randomly assigned to them. They answered the situational empathy questionnaire and the dispositional empathy questionnaire. Finally, each participant answered the questions related to the sociodemographic variables. Data were collected between March 7 and 15, 2022. The task took between 20 and 25 minutes.

## *2.2. Measures*

### *2.2.1. Sociodemographic variables and knowledge of chronic pain*

All participants were asked about their age, sex, degree in health sciences, and specific academic course. They were also asked about their experience with chronic pain because this aspect could affect the measure of situational empathy. Personal experience included living with or living in close contact with people or relatives with chronic pain or illnesses involving pain or experiencing a pain condition themselves. Professional experience included volunteering activities, and curricular or extracurricular clinical placements.

### *2.2.2. Experimental task*

The participants were presented with three short vignettes (see supplementary material) describing a situation related to people experiencing three different chronic pain

conditions: arthritis, fibromyalgia, and secondary low back chronic pain. The vignettes had the same structure, the only difference being the characteristics of the specific diagnosis. As credibility of symptoms was a key aspect of the study, the vignettes presenting the cases of arthritis and low back pain specifically indicated the medical origin of these diagnoses (see supplementary materials). The vignettes were developed according to the recommendations of Evans et al. [34]. Vignettes have been particularly useful in research on health and mental health professionals and their use is gaining increasing attention in research on chronic pain [35-37].

### 2.2.3. *Dispositional empathy*

We used the Spanish adaptation of the Interpersonal Reactivity Index [32] to assess dispositional empathy. This questionnaire comprises 28 items with four dimensions: (a) perspective-taking, defined as the respondent's spontaneous attempts to adopt other people's perspective in real-life situations (e.g. "I often find it difficult to see things from another person's point of view"); (b) fantasy, defined as the tendency to identify with characters in films and literature (e.g., "After watching a play or film I felt as if I were one of the characters"); (c) empathic concern, defined as people's emotional reactions to the negative experiences of others (e.g., "Sometimes I don't feel very concerned about other people when they have problems"); and (d) emotional distress, defined as feelings of compassion, worry, and caring about distress of others (e.g., "In emergency situations I feel apprehensive and uncomfortable"). Each item is scored on a Likert scale with response options ranging from 0 (*Does not describe me well*) to 4 (*Describes me very well*). Cronbach's alpha coefficient values for each of the subscales of the study sample were .71, .77, .65, and .75, for perspective-taking, fantasy, empathic concern, and emotional distress, respectively.

### 2.2.4. *Situational empathy*

We assessed situational empathy using the Empathy Assessment System [33]. After reading the vignette, participants were asked "How do you feel about the person described in the text above?" They were then asked to rate a total of four self-oriented adjectives (i.e., worried, annoyed, anxious, and sad) and three other-oriented adjectives (sympathetic, compassionate, and caring) using an 11-point Likert scale ranging from 0 (*Not at all*) to 10 (*Very much*). Cronbach's alphas were .75 and .81 for the self-oriented empathy variable and the other-oriented empathy variable, respectively.

### 2.3. Data analyses

All analyses were conducted using IBM SPSS Statistics (version 25, IBM, Armonk, NY, USA). Analyses were conducted to detect frequently missing data. No outliers were present within the data set. We also tested the variables analysed for normality and homoscedasticity. Skewness and kurtosis values indicated that the study variables were approximately normal.

We calculated the descriptive statistics of the sample characteristics, means and standard deviations of the variables, and Pearson's bivariate correlations between dispositional and situational empathy. After controlling for the effect of the covariates, a multiple analysis of variance with covariates (MANCOVA) was performed to test for any differences in the scores on situational empathy (self- or other-oriented) as a function of the type of diagnosis presented in the vignette (i.e., arthritis, fibromyalgia, and low back pain). Specifically, we tested scores on the four dispositional empathy variables (perspective-taking, empathic concern, fantasy, and personal discomfort), sociodemographic variables (i.e., sex, degree, and academic course), and personal experience or knowledge of chronic pain or non-recurrent pain conditions. Box's test was used to check whether the assumption of homoscedasticity of variance-covariance had been met. A P-value of  $<0.05$  was used as the cut-off for statistical significance and the confidence interval (CI) was 95%. Effect sizes were calculated using the eta-squared value ( $\eta^2$ ) (reference values of .01, .06, and  $>.14$  for small, medium, and large effects, respectively), and statistical power was calculated using Cohen's  $d$  (reference values of 0.2, 0.5, and 0.8 for small, medium, and large, respectively).

## 3. Results

### 3.1. Characteristics of the participants

In total, six responses were excluded due to several missing values from the measures used; thus, the final sample comprised 197 subjects (151 women and 46 men). The mean age was 23.6 years ( $SD = 6.3$ ; range = 20–72 years).

Of the 197 participants, 46 (24%) were following degrees in medicine, 32 (16%) in nursing, 26 (13%) in occupational therapy, 17 (9%) in physiotherapy, 21 (11%) in podiatry, and 53 (27%) in psychology. A total of 125 participants (64%) had had contact with people with chronic pain through their personal or professional experience. In addition, 16 participants (8%) had experienced chronic pain and 90 (46%) had



experienced non-recurrent chronic pain (e.g., dysmenorrhoea, headaches). In total, 61 participants were given the arthritis vignette, 68 were given the fibromyalgia vignette, and 68 were given the low back pain vignette. Table 1 shows the main characteristics of the study sample.

### 3.2. Descriptive statistics and correlations between dispositional and situational empathy

We calculated the means, standard deviations, and Pearson's bivariate correlations for the continuous empathy variables measured (i.e., the situational empathy variables [self-oriented and other-oriented] and the dispositional empathy variables [perspective-taking, fantasy, empathic concern, and personal discomfort]) (see Table 2).

### 3.3. Results of the MANCOVA

The MANCOVA showed that there were no significant associations between the type of diagnosis and self-oriented and other-oriented situational empathy (Wilks'  $\Lambda = .985$ ,  $F [4, 386] = 0.708$ ,  $p = .587$ ,  $\eta^2 = .007$ ,  $d = 0.229$ ). Therefore, we rejected the hypothesis that the type of diagnosis would differentiate the values of situational empathy.

The effects of the covariates showed that the dispositional empathy variables significantly affected the situational empathy scores: perspective-taking (Wilks'  $\Lambda = .928$ ,  $F [2, 169] = 6.562$ ,  $p = .002$ ,  $\eta^2 = .072$ ,  $d = 0.906$ ) and personal distress (Wilks'  $\Lambda = .968$ ,  $F [2, 169] = 2.812$ ,  $p = .043$ ,  $\eta^2 = .032$ ,  $d = 0.547$ ). Specifically, the situational empathy variable other-oriented was significantly affected by the dispositional empathy variables of perspective-taking ( $F [1, 170] = 9.253$ ,  $p = .003$ ,  $\eta^2 = .052$ ,  $d = 0.857$ ) and empathic concern ( $F [1, 170] = 10.830$ ,  $p = .001$ ,  $\eta^2 = .060$ ,  $d = 0.905$ ), with high statistical power and medium effect size. The situational empathy variable self-oriented was significantly affected by the dispositional empathy variables empathic concern ( $F [1, 170] = 5.999$ ,  $p = .015$ ,  $\eta^2 = .034$ ,  $d = 0.683$ ) and personal distress ( $F [1, 170] = 3.079$ ,  $p = .042$ ,  $\eta^2 = .024$ ,  $d = 0.529$ ), with high statistical power and small effect size. The situational empathy variables were not affected by any other covariates considered in the analysis (sex, degree, academic course, and personal/professional experience with chronic pain or with diseases with recurrent pain). Table 3 summarises the MANCOVA results.

In light of these results, we investigated whether there was an interaction effect between the dispositional empathy variables that significantly affected the situational

empathy variables (i.e., other-oriented and self-oriented empathy). The results of the univariate analyses (ANOVA) showed that there were no significant interactions between the dispositional empathy variables perspective-taking and empathic concern ( $F [1, 192] = 0.942, p = .333, \eta^2 = .005, d = 0.162$ ) or between empathic concern and distress ( $F [1, 170] = 0.002, p = .968, \eta^2 = .001, d = 0.050$ ).

## **4. Discussion and conclusion**

### *4.1. Discussion*

The main objective of this study was to investigate whether different chronic pain diagnoses could have a differential effect on the empathic response of undergraduates in the final years of several health science undergraduate degrees (i.e., medicine, nursing, physiotherapy, psychology, podiatry, and occupational therapy), according to the potential level of stigmatisation of the symptoms according to the degree of their credibility. Based on previous studies, we hypothesized that future health professionals would show greater empathy toward people with a diagnosis in which there was clear and specific physiological disease (such as arthritis or low back pain) than toward those with a diagnosis of fibromyalgia. Lower empathy would be due to the latter diagnosis being more stigmatised in the literature. However, the results did not support the predictions, because no differences were found between the values of situational empathy according to the type of diagnosis presented in the vignette.

It may be the case that the expected results were not obtained because the study sample comprised students, whereas previous studies have been conducted with samples of professionals in real clinical contexts [5,6]. Previous studies have suggested that the continuous health care of people with chronic pain can lead to "compassion fatigue" [40], which has been described as physical and emotional exhaustion caused by caring for others with pain. "Compassion fatigue" can foster stigmatising responses toward people and a loss of empathy. In relation to people with chronic pain, the curricular internships of the students were the work experiences closest to those of practising health professionals. It should be noted that the experimental task was developed in line with the parameters proposed in the literature [34] related to this type of task. However, although the only aspect that changed between the similar vignettes was the type of diagnosis, the characteristics of the experimental procedure were very different from those of real-world clinical setting. It may be the case that no differences were found in

the students' empathic responses because they are receiving appropriate and extensive training in chronic pain diseases and, specifically, in relation to fibromyalgia.

The decreasing stigmatisation of people with this disease may be explained by the development of specific diagnostic criteria for fibromyalgia by the American College of Rheumatology and by its recognition by the World Health Organisation as a pain disorder [41] and as a central sensitization syndrome [42]. However, despite advances in the acceptance of fibromyalgia as a real diagnosis by the professional community, the great physical distress associated with this health problem—together with the difficulties in finding effective therapy—means that many people experiencing this disease do not receive the medical response they expect. Recent studies have shown that people still report feeling stigmatised by health professionals [3]. It is relevant to bear in mind that the person's own point of view and that of the professional may differ. Several factors, such as a long history of fibromyalgia, a lack of knowledge about the causes of their illness, identification with negative stereotypes, self-blame, and deterioration in daily physical and psychological well-being [3] may contribute to the anticipation of misunderstanding and stigmatisation, thus affecting the individual's perception of and response to pain.

Previous studies have described the high prevalence of chronic pain in Spain [43], which increases the possibility of having close contact with someone experiencing this disease. The study data showed that 125 participants had had close contact or had lived with family members or people with chronic pain. This could also contribute to a greater empathetic response to this type of person, without distinguishing between diagnoses. Some authors have supported this possibility, as they have found an association between familial social support of the person with fibromyalgia and the degree of acceptance of the disease [44].

This is the first study of its kind with undergraduate students following different degrees in the field of health sciences. It is worth noting that the use of an experimental methodology using vignettes has proved useful.

This study has several limitations. It is not a longitudinal study, so it remains unknown whether first-year students stigmatise people more than final-year students, or whether—once they are practicing as professionals in a work environment—there is a decrease in their initial levels of stigmatising behaviour. The empathy variables were measured by means of self-reports, so it can be assumed that the data collection may be biased by phenomena such as social desirability, and that real empathic behaviour, which

is very complex, has not been accurately captured. Although the sample comprised an appropriate number of participants according to current methodological guidelines, it may not be representative of the entire population of students following different degrees in the field of health care. The sample was not homogeneous regarding the number of participants following the degree studied, the year of study, and gender. Only some of the students had the opportunity to be in contact with and care for people with chronic pain. Regarding gender, the sample comprised more women than men, likely because there are always more women than men following nursing, occupational therapy, and psychology degrees. This aspect may have affected the results, given that previous studies have found gender differences in empathy in undergraduate students following different health degrees [45,46]. The absence of a significant association between the dispositional variable of fantasy and the situational variables of empathy (self-oriented or other-oriented) could be due to the participants' imaginative capacity to adopt the perspective of characters in fictional situations [38] rather than that of people in real situations, which may hinder self-oriented or other-oriented responses. Further research is needed in this regard.

#### *4.2. Conclusion*

The results of this study show that the attitude of future health professionals toward people with chronic pain, specifically toward a diagnosis of fibromyalgia, is not influenced by the visibility of symptoms or by their credibility. However, it would seem appropriate to foster intra-individual empathy factors among health science undergraduates such that they can more readily accept and understand the process of individual adaptation to chronic pain and manage it more effectively, thus increasing the level of satisfaction with treatment among people with chronic pain.

#### *4.3. Practice implications*

Although the results did not support the proposed hypothesis, they yielded very encouraging results. A strong positive association was found between the dispositional variables of perspective-taking empathy (understood as the ability to understand the other) and empathic concern (understood as other-oriented feelings) and the situational variable other-oriented empathy. Although people may or may not tend to act empathetically, empathy is an ability or skill that can be modified or enhanced by learning and education [47]. Based on our results, the dimensions of empathic perspective-taking,

empathic concern, and understanding emotional distress should form part of the transversal competences of education programmes for future health professionals from the beginning of their studies.

The results showed a strong positive association between the dispositional variables empathic concern and personal distress and the situational variable self-oriented empathy. In this case, the dispositional variable personal distress directly measures "self-oriented" feelings [38], and thus, it is not surprising to obtain these results. Although empathic concern measures other-oriented feelings, these feelings may have come into conflict with self-oriented feelings. Thus, self-regulation has been posited as a key factor in avoiding confusion between self- and other-oriented feelings. People who are unable to dissociate their own feelings (evoked by observing another's pain) from the other's feelings may experience high levels of distress or anxiety and, consequently, avoid the threatening event [2]. It has also been suggested that both affective responses may sometimes co-occur, despite their being qualitatively different and having different behavioural consequences [48].

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**Table 1**

Sociodemographic characteristics of the final sample of participants (N = 197)

	<i>M (DT)</i>	N (%)
Age, y	23.6 (6.3)	
Gender		
Female		151 (76.6)
Male		45 (22.8)
University degree		
Medicine		46 (23.4)
Nursing		32 (16.2)
Occupational Therapy		26 (13.2)
Physiotherapy		17 (8.6)
Podiatry		21 (10.7)
Psychology		53 (26.9)
Academic course		
3rd		37 (18.8)
4th		113 (57.4)
5th		43 (21.8)
Experience of chronic pain disease		
Yes		36 (18.3)
No		157 (79.7)
Have had contact with people with a chronic pain disease		
Yes		90 (45.7)
No		103 (52.3)
Has undertaken internships with people in chronic pain		
Yes		119 (60.4)
No		76 (38.6)

**Table 2**

Descriptive statistics and Pearson correlations between dispositional and situational empathy measures (N = 197)

Variables	Range	Mean (SD)	1	2	3	4	5	6
Situational empathy								
Self-oriented	2-40	22.4 (8.2)	1	.30**	.02	.12	.23**	.22**
Other-oriented	8-30	24.5 (4.2)		1	.36**	.27**	.36**	.02
Dispositional empathy								
Perspective-taking	16-35	27.1 (4.1)			1	.19**	.28**	-.17*
Fantasy	10-34	24.8 (5.1)				1	.42**	.27**
Empathic concern	20-40	31.3 (4.1)					1	.28**
Emotional distress	6-23	14.6 (4.3)						1

*Note:*\*  $p < .05$ , \*\*  $p < .01$

**Table 3**

MANCOVA results for situational empathy comparing vignette diagnostic type after controlling for covariates (N = 197)

	Situational empathy	Mean square	F	p	$\eta^2$
Vignette diagnostic type	Self-oriented	10.883	.175	.840	.002
	Other-oriented	12.526	.869	.421	.010
Sex	Self-oriented	.359	.550	.078	.018
	Other-oriented	4.658	.323	.570	.002
Degree	Self-oriented	101.786	1.633	.203	.010
	Other-oriented	1.747	.121	.728	.001
Academic course	Self-oriented	195.056	3.129	.079	.018
	Other-oriented	1.595	.111	.740	.001
Personal experience with chronic pain	Self-oriented	45.440	.729	.394	.004
	Other-oriented	1.620	.112	.738	.001
Professional experience with chronic pain (volunteering activities)	Self-oriented	145.126	2.328	.129	.014
	Other-oriented	4.193	.291	.590	.002
Professional experience with chronic pain (clinical training)	Self-oriented	17.920	.288	.593	.002
	Other-oriented	2.133	.148	.701	.001
Diseases with recurrent pain	Self-oriented	.974	.016	.901	.000
	Other-oriented	16.492	1.144	.286	.007
Dispositional empathy (perspective taking)	Self-oriented	10.357	.166	.684	.001
	Other-oriented	133.358	9.253	.003	.052
Dispositional empathy (fantasy)	Self-oriented	373.890	5.999	.015	.034
	Other-oriented	156.078	10.830	.001	.060
Dispositional empathy (empathic concern)	Self-oriented	12.250	.197	.658	.001
	Other-oriented	44.372	3.079	.081	.018
Dispositional empathy (emotional distress)	Self-oriented	260.177	4.174	.043	.024
	Other-oriented	4.443	.308	.579	.002

**Empathy among health science undergraduates toward the diagnosis of chronic pain: An experimental study.**

**Supplementary material**

**Chronic low back pain vignette**

Julia has been in pain for years. The pain is persistent and seems to get worse over time. She has consulted several doctors and is doing everything she can to get well, but the pain remains. She explains that her back hurts a lot, focusing on her lower back. She says there are days when the pain radiates down her legs or spreads down her spine. Five years ago, she went to a rheumatologist who performed a series of medical tests, the results of which indicated the presence of an abnormality in an intervertebral disc. He made a diagnosis of chronic low back pain, taking into account the symptoms she described and the diagnostic tests she underwent.

**Fibromyalgia diagnosis vignette**

Julia has been in pain for years. The pain is persistent and seems to get worse over time. She has consulted several doctors and is doing everything she can to get well, but the pain remains. She explains that her whole body hurts a lot, she is exhausted all the time, she does not rest when she sleeps, and she has trouble concentrating or paying attention. She says there are days when even her hair, fingernails, and eyelashes hurt. Five years ago, she went to a rheumatologist who performed a series of medical tests, the results of which indicated there was no disease that could explain her pain. He made a diagnosis of fibromyalgia, taking into account the symptoms she described and the diagnostic tests he carried out.

**Arthritis rheumatoid vignette**

Julia has been in pain for years. The pain is persistent and seems to get worse over time. She has consulted several doctors and is doing everything she can to get well, but the pain remains. She explains that all her joints hurt a lot, but especially her wrists and fingers. She says that there are days when it hurts to even move her hands the slightest bit because they are so swollen. Five years ago, she went to a rheumatologist who carried out a series of medical tests, the results of which indicated the presence of joint inflammation. He made a diagnosis of rheumatoid arthritis, taking into account the symptoms she described and the diagnostic tests he carried out.