

## Comparison of pain perception among university students using musculoskeletal injury scenarios: a vignette study

### *Kas iskelet sistemi yaralanma senaryolarıyla üniversite öğrencilerinin ağrı algısının karşılaştırılması: bir kısa öykü çalışması*

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#### ABSTRACT

**Objective:** The intensity of pain experienced in sports or daily life injuries can be perceived differently in different social environments. The aim of this study is to compare the perceived intensity of pain in sports and daily life musculoskeletal injuries among university students with different social backgrounds.

**Methods:** Pain beliefs of 521 university students (309 physical education and sport, 212 physical therapy and rehabilitation students) were evaluated using the Pain Beliefs Questionnaire. Pain fear was evaluated using the Fear of Pain Questionnaire-III Scale. Perceived pain intensity was measured using vignette scenarios of musculoskeletal injuries in sports and daily life. The students were grouped according to department, gender, and professional sports branch.

**Results:** A significant difference was found in pain psychological beliefs between groups ( $p<0.01$ ). Psychological pain beliefs of women were lower than men ( $p<0.01$ ). Estimated pain intensity in vignettes containing sport injury scenarios was found to be higher in women than men ( $p=0.01$ ). A strong positive correlation was found between fear of pain and pain intensity in both sport and daily life vignettes ( $p=0.001$ ). Individuals who are professionally involved in sport activities reported higher pain intensity in daily life scenarios ( $p=0.01$ ).

**Conclusion:** The vignette method can be used to determine pain intensity in musculoskeletal injuries for different genders. Women are more sensitive in perceiving and determining pain intensity. Professional athletes did not yield high scores to sport vignettes, despite giving high scores to daily life vignettes. This may suggest that the sport social environment normalizes pain from sport injuries.

**Keywords:** Empathy, pain measurement, pain perception, social behavior

#### ÖZ

**Amaç:** Spor veya günlük yaşam yaralanmalarında yaşanan ağrının şiddeti farklı sosyal ortamlarda farklı algılanabilir. Bu çalışmanın amacı, farklı sosyal ortamlardaki üniversite öğrencileri arasında spor ve günlük yaşamda meydana gelebilecek kas-iskelet sistemi yaralanmalarındaki algılanan ağrı şiddetini karşılaştırmaktır.

**Yöntem:** 521 üniversite öğrencisinin (309 Beden Eğitimi ve Spor Bölümü, 212 Fizyoterapi ve Rehabilitasyon öğrencisi) ağrı inançları, Ağrı İnançları Anketiyle ve ağrı korkusu, Ağrı Korkusu-III Ölçeğiyle değerlendirildi. Ağrı şiddet algısı spor ve günlük yaşamda karşılaşılan yaralanma vignette senaryolarıyla ölçüldü. Öğrenciler bölüm, cinsiyet ve profesyonel spor dalına göre gruplara ayrıldı.

**Bulgular:** Gruplar arası ağrı psikolojik inançlarında anlamlı bir fark görüldü. ( $p<0.01$ ). Kadınların psikolojik ağrı inançları, erkeklere göre daha düşüktü ( $p<0.01$ ). Spor yaralanma senaryoları içeren vignette tahmin edilen ağrı şiddeti, kadınlarda erkeklere göre daha yüksek bulundu ( $p=0.01$ ). Spor ve günlük yaşam kısa öykü (vignette) senaryolarıyla ağrı korkusu arasında güçlü pozitif korrelasyon saptandı ( $p=0.001$ ). Profesyonel spor yapan bireylerde günlük yaşam aktivite senaryolarındaki ağrı şiddeti daha yüksek değerler verdi ( $p=0.01$ ).

**Sonuç:** Cinsiyetler arasında kas-iskelet sistemi yaralanma ağrı yoğunluğunu belirlemek için kısa öykü yöntemi kullanılabilir. Kadınlar ağrı yoğunluğunu algılama ve belirlemede daha hassastır. Profesyonel sporcular günlük yaşam kısa öykülerine yüksek puan vermelerine karşın sportif kısa öykülerine yüksek puan vermediler. Bu durum, sporun sosyal çevresinin spor yaralanmalarından kaynaklanan ağrıyı normalleştirdiğini gösterebilir.

**Anahtar Sözcükler:** Ağrı değerlendirilmesi, ağrı ölçümü, empati, sosyal davranış

#### INTRODUCTION

Pain is a sensation, an unpleasant emotional feeling and behavior associated with real or potential tissue damage occurring in any part of the body, which is linked to past

experiences (1). Factors such as cultural characteristics, lifestyle, society, education, gender, language, religion, and many others can affect the perception of pain (2). Pain is

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perceived by the patient and can only be reported by the patient. Describing and feeling the intensity of pain is influenced by past experiences, familial behavior, and culture. One of the factors determining the perceived pain intensity is the social environment (3). Individuals who constitute society develop a social memory against injury situations that cause pain. The transmission of social pain perception is achieved through empathy and focus on pain. As a social signal, recognizing the pain of another can prevent a potential harm. It can regulate the behavioral approach in individuals with pain (4). Responses that emerge in the social environment can significantly alter factors such as perceived pain intensity and pain duration (3).

An individual observing someone suffering from pain in their social environment is affected by the automatic (unintentional, reflexive) and controlled (intentional, reflective) reactions of the person in pain. The severity of pain from sports injuries or injuries that occur in daily life can be perceived differently in different social environments. The perception and severity of pain can vary depending on the frequency of interaction with individuals with different pain thresholds (5). While coaches and athletes give familiar responses to sports injuries, individuals less accustomed to such events may give quite different responses when exposed to them (6).

In the process of social stratification, the education system differentiates people starting from primary school level to higher levels of education. It creates people who think and react differently. These people, who form small groups within themselves, influence each other as long as their interactions continue (7). Students of physical education and sport (PES) are highly exposed to competitive sports culture both academically and practically. They play a role in maintaining the continuity of sports norms through generations. Individuals who have less participation in sports and other activities are more vulnerable to tolerate pain in activities compared with their peers (8). Physical therapy and rehabilitation (PT) students, the healthcare providers, the decision-making process for treatment and the treatment approach are influenced by patients' pain experiences and pain empathy (5).

There may be differences in pain perception as a result of social stratification. The vignette technique is suggested as a useful method to assess this perception, and is considered as a method utilized in determining pain perception, which involves assessing the knowledge, attitudes, opinions, and responses of participants using hypothetical scenarios composed of vignettes. The vignette method enables researchers to gather information from larger samples, surpasses participants' personal experiences, facilitates the

systematic standardization of non-standardizable variables, and mitigates any ethical issues that may arise (9).

Other methodological approaches (e.g., record reviews, interviews, focus groups, diary, survey) can be applied as an alternative. They are suitable for individuals' judgments and decision-making processes. A hypothetical vignette provides a better research tool for assessing attitudes and perceptions than asking abstract questions about them. Vignette studies, as a hybrid of survey and experimental methods, can offer both the high internal validity of experimental approaches and the high external validity of survey studies. If well designed to test judgments and decision-making, they can be generalized to real-life perceptions. To increase construct validity, well-crafted and realistic vignettes should be designed. To increase internal validity, the coherence of causal inferences should be ensured. To increase external validity, findings should be generalizable (10,11). Robinson and Clore found that vignettes are consistent with 0.95 correlation coefficients (12). Brunner et al. have evaluated the effectiveness of vignettes by clinicalizing the vignettes and assessing them with physiotherapists and found that verbal vignettes are successful (13).

It is emphasized in the literature that psychological and socio-cultural factors affect the perception of pain intensity among certain groups. However, the number of studies measuring the effect of factors that create social stratification among people such as education and sports on pain intensity perception is limited. In this study, we aimed to predict pain intensity in university students by empathizing using the vignette method. The hypothesis of our study was determined as 'factors that constitute social stratification such as education in different departments and being a professional athlete affect the perception of pain intensity in university students'.

## **MATERIAL and METHODS**

### **Sample and Participants**

This study aims to identify the 3<sup>rd</sup> and 4<sup>th</sup> year students of the Faculty of Health Sciences, Physiotherapy and Rehabilitation Department, and the Faculty of Sport Sciences, Department of Physical Education and Sports at Süleyman Demirel University as the target sample groups, to recruit the participants. The study included university students who were willing to participate and were between the ages of 18-45. Inclusion criteria were volunteering to participate in the study and studying at the university where the study was conducted. Exclusion criteria were participants with pre-existing psychiatric conditions (dementia, etc.) or cognitive impairments caused by medication or alcohol, students who were double majoring in the departments included in

the study, and students who had already graduated from one of the departments included in the study. A total of 650 students were invited to participate, out of which 521 students agreed to participate. Seventeen students were excluded because they studied in two different departments, 41 students could not be analyzed because they filled in the data incompletely, and 71 students did not agree to participate in the study.

**Ethical Aspects of the Study and Data Collection**

The study was approved by the Scientific Research Ethics Committee of Süleyman Demirel University Faculty of Medicine on December 21, 2021, meeting decision number 54/6. The purpose of the study was explained to the students and it was emphasized that participation in the study was based on voluntary principle. The study was conducted in the form of a survey.

**Data Collection Instruments**

Pain perception, pain beliefs, pain fears, and descriptive information of the participants were evaluated in the study. Pain perception was evaluated using vignette injury scenarios that may be encountered in daily life and sports, pain beliefs were evaluated using the Pain Beliefs Questionnaire, and pain fears were evaluated using the Fear of Pain Questionnaire III. Participants were also asked about their age, height, weight, gender, department and class of study, whether they engage in professional sports, whether they have any chronic diseases, and their smoking and alcohol habits.

The Pain Beliefs Questionnaire consists of a total of 12 items, divided into two test areas: eight items assessing organic beliefs and four items assessing psychological beliefs. Organic beliefs relate to questions about pain primarily caused by tissue damage, while psychological beliefs relate to questions about pain caused by thinking and worrying. The internal consistency scores of the scale, as measured by Cronbach's alpha coefficient, were 0.71 for the organic beliefs subdimension, and 0.73 for the psychological beliefs subdimension (14).

Fear of Pain Questionnaire III measures the intensity of fear experienced by the participants related to their pain experience by having them select the best option that describes it. If they have not experienced the pain described in the items, they mark it assuming that they have. Fear of Pain Questionnaire III is evaluated in three subcategories: minor pain fear, medical pain fear, and severe pain fear. The Cronbach alpha reliability coefficient for the scale as a whole is 0.93, and the test-retest reliability is 0.84 (15).

Vignette scenarios of common injuries encountered by professional athletes or individuals in daily life were created by three researchers. Ten vignette scenarios were created from common types of injuries in sports. Additionally, ten similar vignette scenarios of injuries that may occur in daily life were also created. Participants were asked to 'answer based on the pain intensity that would occur in the scenarios we gave you, considering if you were experiencing it in daily life or during sports'. The perceived pain intensity was reported using a numerical analog scale between 1 and 10. The score of 10 is considered as unbearable pain and 1 is considered as no pain. Participants were asked to evaluate the pain based on the pain intensity felt in the vignette.

In creating the vignettes, the ICF-11 field study recommendations by Evans et al. were taken into consideration (10):

- A similar narrative approach was followed,
- The vignettes were based on literature and clinical experience,
- Long plots were not chosen,
- A similar structure and style were used for all vignettes,
- Current tense was used,
- Relatable events were selected,
- Any potential extraneous injuries were excluded,
- The vignettes were written in a clear and straightforward manner, avoiding misleading plots.

A few examples of cases with vignette scenarios can be seen in Table 1.

**Table 1.** A sample of vignette scenarios

Vignette scenario	Perceived pain intensity										
	0	1	2	3	4	5	6	7	8	9	10
A football player has stopped the ball coming from a distant shot with his head. Afterwards, he has sustained an injury in his neck.											
An individual travelling in the front seat of a car, with the seatbelt fastened, hit his head forward during sudden braking.											
A field hockey player has been hit by a hockey ball on the knee bone while aiming for the goal post.											
An individual hit his knee bone against a metal railing while walking on the sidewalk.											

**Statistical Analysis of Data**

The normality of data was tested with the Shapiro-Wilk test, and skewness and kurtosis values were checked. Attention was paid to the skewness and kurtosis values within the range of +1.0 to -1.0 (16). It was found that the data had normal distribution. Descriptive statistics analysis was applied. For the evaluation of the groups created according to different department students, gender and professional sports status, Independent Sample T-test and Pearson correlation analysis were used as parametric test techniques for the sub-test.

**RESULTS**

Table 2 displays the basic statistics within the groups. In the vignettes of sports, the PES group had an average score of 75.9±14.2 (min: 18, max: 100), and the PT group reached a score of 76.0±12.4 (min: 37, max: 100) on the pain numerical rating scale. Table 2 examines the relationships between pain beliefs, pain fear, and vignettes between two departments of the university. A statistically significant difference (p<0.01) is found between the groups in terms of psychological pain beliefs. The psychological pain beliefs of the PES department students are higher than those of the PT students. No statistical significance was found between the other parameters (p>0.05).

**Table 2.** Relationship between pain beliefs, fear of pain and interdepartmental vignettes and descriptive statistics

Parameter	Group	N	Min-Max	X±SS	Independent Sample t-test		
					t	df	p
Age	PES	309	17-41	21.0±2.9	-0.14	519	0.88
	PT	212	17-44	21.0±2.3			
OB	PES	309	1-6	3.34±0.83	-0.55	506	0.58
	PT	212	1.3-6	3.31±0.67			
PB	PES	309	1-6	2.72±1.14	-4.51	503	0.00†
	PT	212	1-6	2.31±0.94			
SV	PES	309	18-100	75.9±14.2	0.09	519	0.92
	PT	212	37-100	76.0±12.4			
DLV	PES	309	22-100	74.2±13.6	-0.30	519	0.75
	PT	212	36-100	73.8±12.6			
SP	PES	309	10-50	31.7±9.2	1.06	519	0.29
	PT	212	15-50	32.5±8.3			
MP	PES	309	10-50	23.0±7.6	0.63	519	0.52
	PT	212	10-50	23.4±7.2			
MEDP	PES	309	10-50	25.3±8.7	-0.24	519	0.80
	PT	212	10-50	25.1±7.9			
TP	PES	309	30-150	80.0±21.8	0.56	519	0.57
	PT	212	35-150	81.0±20.2			

PT: physical therapy and rehabilitation, PES: physical education and sport; OB: organic beliefs, PB: psychological beliefs, SV: sports injury vignette, DLV: daily life injuries vignette, SP: fear of severe pain, MP: fear of minor pain, MEDP: fear of medical, TP: fear of total pain; \*: p<0.05, †: p<0.01

The participants were divided into two groups based on their gender to investigate the relationship between pain perception. Table 3 displays the relationship between pain belief, pain fear and pain vignettes among genders. There is a significant difference in psychological pain beliefs between

genders (p<0.01), with women's psychological pain beliefs being lower than men's. The predicted pain intensity in vignettes involving sports injury scenarios was higher in women than in men (p=0.01). Severe pain fear was found to be significantly more common in women than in men (p<0.001). Medical pain fear was higher in women than in

men ( $p=0.05$ ). Total pain fear was found to be significantly higher in women than in men ( $p=0.002$ ). No significant relationship was found with other parameters ( $p<0.05$ ).

Table 4 reveals the relationship between pain belief, pain fear, and pain vignettes in individuals who are professional

in any sport, and those who are not. Vignettes of daily life activities were found to be more prevalent in professional athletes ( $p=0.01$ ). No significant relationship was found between other parameters ( $p>0.05$ ).

**Table 3.** The relationship between pain beliefs, fear of pain and pain vignettes across genders

Parameters	Group	N	X±SS	Independent Samples t-test		
				t	df	p
OB	M	239	3.32±0.84	-0.19	469	0.84
	F	282	3.34±0.71			
PB	M	239	2.75±1.11	3.88	519	0.000‡
	F	282	2.38±1.03			
SV	M	239	74.37±13.52	-2.44	519	0.01*
	F	282	77.26±13.4			
DLV	M	239	73.02±13.39	-1.62	519	0.1
	F	282	74.9±12.92			
SP	M	239	30.26±8.88	-4.26	519	0.000‡
	F	282	33.51±8.48			
MP	M	239	22.59±7.20	-1.63	519	0.1
	F	282	23.65±7.57			
MEDP	M	239	24.42±8.34	-1.96	519	0.05*
	F	282	25.86±8.28			
TP	M	239	77.27±21.03	-3.12	519	0.002*
	F	282	83.03±20.9			

M: male, F: female; OB: organic beliefs, PB: psychological beliefs, SV: sports injury vignette, DLV: daily life injuries vignette, SP: fear of severe pain, MP: fear of minor pain, MEDP: fear of medical, TP: fear of total pain; \*:  $p<0.05$ , †:  $p<0.01$

**Table 4.** Relationship between pain beliefs, pain fear, and pain vignettes in professional athletes and non-athletes

Parameter	Group	N	X±SS	Independent Samples t-Test		
				t	df	p
OB	N-Ath	413	3.30±0.73	-1.34	147	0.18
	P-Ath	108	3.43±0.89			
PB	N-Ath	413	2.56±1.06	0.36	519	0.71
	P-Ath	108	2.52±1.17			
SV	N-Ath	413	75.5±13.4	-1.61	519	0.10
	P-Ath	108	77.8±14.1			
DLV	N-Ath	413	73.3±13.3	-2.42	519	0.01‡
	P-Ath	108	76.8±12.5			
SP	N-Ath	413	32.1±8.6	0.14	153	0.88
	P-Ath	108	31.9±9.7			
MP	N-Ath	413	23.2±7.4	0.19	519	0.86
	P-Ath	108	23.1±7.5			
MEDP	N-Ath	413	25.2±8.1	-0.23	519	0.81
	P-Ath	108	25.4±9.3			
TP	N-Ath	413	80.4±20.7	0.03	519	0.96
	P-Ath	108	80.3±22.7			

N-Ath: non-athletes, P-Ath: professional athletes; OB: organic beliefs, PB: psychological beliefs, SV: sports injury vignette, DLV: daily life injuries vignette, SP: fear of severe pain, MP: fear of minor pain, MEDP: fear of medical, TP: fear of total pain; \*:  $p<0.05$ , †:  $p<0.01$ , ‡:  $p=0.01$

All the participants' data were analyzed using Pearson correlation analysis. A strong positive correlation was found between the sport vignette and daily life vignette scales and the Fear of Pain Questionnaire ( $p=0.001$ ).

**DISCUSSION**

In this study, the use of the vignette technique was considered to reveal the difference in the level of pain intensity among professional athletes by education departments and gender. Women reported higher pain values in sports injury vignettes than men. Individuals who professionally engage in any sport reported higher pain values in daily life vignettes.

PES students believe more than PT students that pain is psychological. Women reported higher fear of severe pain, medical pain, and overall pain than men.

Vignettes are used to enhance the training of clinicians and decision-making skills of medical practitioners (10). Vignettes can be completed faster than file reviews or standardized patient programs (17). It is a correct, valid, applicable and affordable tool for measuring the quality of health services (18). In this study, we used the vignette method to evaluate the intensity of pain from injuries that can occur during sports and daily life. We prepared our vignettes by

paying attention to the parameters that Evans et al. (10) have determined for high measurement accuracy.

Bishop et al. (19) have investigated the effect of vignette scenarios of lower back pain on bed rest and job leave processes by physiotherapists and physicians. About 28% of the participants made a decision contrary to the bed rest and work leave guidelines despite guidance. Martinez et al. (18) used case vignettes that described different types and etiologies of neuropathic pain to help primary care physicians diagnose and manage pain. The students were able to provide appropriate treatment for one of the two patients seeking treatment for neuropathic pain. Vignette scenarios were designed to be simple, short, non-ambiguous and the cases were equalized (gender, chronic pain condition, clinical symptoms etc.). Clinical case solving scenarios are commonly preferred for students in the health department in determining the type and clinical signs of pain. However, studies using vignettes that aim to predict pain intensity have not been encountered.

In our study, scenarios that would cause pain were intended to be empathized by the person, thinking that it happened to them alone. Green et al. (20) have stated that women with more empathy are more successful in predicting the pain of another person. The perception of pain includes not only sensory but also emotional components (21). In one study, in which participants were shown videos of individuals experiencing pain, it was found that women rated the pain of others as significantly higher than men did (22). In our study, we observed that female participants had higher levels of anxiety regarding severe pain and medical pain compared with their male counterparts. This could be attributed to the fact that women have a higher capacity for empathy. Alternatively, societal gender norms that discourage men from expressing pain or portraying sensitivity to pain may lead to men being more dismissive of pain. It is known that women have lower pain thresholds and are better able to cope with pain (23). Despite these fears, it is possible that women may feel less pain when faced with severe or medical pain.

It has been reported that individuals who have previously experienced similar situations exhibit a higher degree of empathy for pain (24). Our study revealed that the fear of severe and general pain is higher in women. Women gave higher ratings for perceived pain intensity in sports vignettes. This suggests that women find sports injuries more serious and daunting. However, there was no significant difference between the two genders in daily life vignettes. This may be because both male and female participants have an equal likelihood of experiencing the scenarios described in the past.

In a vignette study where nursing students' pain intensity predictions were compared to the intensity reported by expert nurses, it was found that the students were unable to accurately determine the level of pain (25). In our study, PES students stated that the pain in body was psychologically-based. On the other hand, PT students, knowing that the pain was not only caused by psychological factors, might have made this difference. No significant difference was found between the departments in terms of predicting pain intensity in vignettes. This could suggest that students from different social environments in health and sports have difficulty determining pain intensity through empathy, similar to the inadequacy found in Chuk's study.

Dewall and Baumeister (26) have reported that social exclusion increases pain threshold and tolerance. Craig (27) defined pain's social context as a social communication model. It has been suggested that judgments about pain are influenced by pain perceptions in those who observe the painful situation and recall the painful memory. In our study, professional athletes rated the pain that could be felt higher in daily life vignettes. However, no difference was found between pain intensity and pain fear scale in sports vignettes. The lack of difference in the prediction of sports vignettes may indicate that sports social environments inhibit the fear of pain. Also, in contrast to the Craig study, there was no difference in professional athletes' imagining a sports injury.

### **Limitations**

The strengths of this study include its large sample size and the use of pain belief and fear questionnaire. However, it is noted that the short scenario-based vignettes were unsuccessful in eliciting strong emotional responses. The likelihood of emotional responses being affected by the attachment to the person in the scenario is higher. Attachment plays a role in determining pain intensity (28,29). A limitation of our study is the use of short stories and the inability to measure the level of complete attachment to the person in the scenario. Another limitation of this study is the lack of pain perception estimation among professional athletes in different branches. Future studies can work on this issue since this study did not fully overlap with its purpose.

### **CONCLUSION**

In this study, it was found that the perception of pain intensity predicted by empathy in individuals from different social environments did not reveal a difference. However, the vignette method can be used to determine the perceived pain intensity in sport injuries, as there was a significant difference in the evaluation of pain between genders. Women were found to be more sensitive in perceiving and de-

termining the intensity of pain comparing to men. Professional athletes in this study reported higher pain intensity in vignettes of daily life scenarios, but no significant difference was found in sport injuries. This suggests that the social environment in sports may have a mitigating effect on pain. In the future, it is planned to conduct a comparison of pain intensity prediction using the vignette method between graduated individuals with specific professional experience, and students.

#### Ethics Committee Approval / Etik Komite Onayı

The approval for this study was obtained from Süleyman Demirel University, Ethics Committee, Isparta, Türkiye (Decision no: 54/06, Date: 22/12/2021).

#### Conflict of Interest / Çıkar Çatışması

The authors declared no conflicts of interest with respect to authorship and/or publication of the article.

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#### Author Contributions / Yazar Katkıları

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