




# Pain Catastrophizing in Dental Students and its Relation with Dental Anxiety and Pain Intensity

## Diş Hekimliği Öğrencilerinde Ağrı Felaketleştirme'nin Dental Anksiyete ve Ağrı Şiddeti ile İlişkisi

Halenur ALTAN<sup>1</sup>   
halenuronat@gmail.com

Ömer KARAKAŞ<sup>2</sup>   
omerkarakas29@hotmail.com

Kiraz SİDAL<sup>2</sup>   
kirazsidal34@gmail.com

Tuğba ŞEN<sup>2</sup>   
dt.tugbasenn@gmail.com

Nihal ALTUNOK ÜNLÜ<sup>3\*</sup>   
altunoknihal@gmail.com

### ABSTRACT

**Aim:** The aim of this study was to evaluate the pain catastrophizing and dental anxiety among dental students. Additionally, we explore the relation of pain catastrophizing scores with gender, pain intensity and dental treatment experience.

**Material and Methods:** This questionnaire study was conducted among dental students in 2020. The questionnaire, which was prepared via Google forms and students studying in different faculties of dentistry filled out the questionnaire via e-mail. The Visual Analogue Scale (VAS), the Corah's Dental Anxiety Scale (C-DAS), and Pain Catastrophizing Scale (PCS), helped the clinician examine how the participants felt and what they thought regarding pain, were used. Spearman's rho correlation was used to analyze the correlations between the variables. The MANOVA test was used to evaluate whether the main effects of gender, grade, and treatment on C-DAS and PCS were significant.

**Results:** Of the total, 22.5% of the students were considered to be catastrophic individuals. According to the regression model, a one-unit increase in VAS value led to an increase of 0.164 in the total PCS score. Similarly, while the increase in the C-DAS score led to an increase of 0.575 in the PCS score, girls' PCS score was higher by 4.091.

**Conclusion:** Our study is the first to report the prevalence of pain catastrophizing among dental students and the effect of gender and PCS-subcales. The increased knowledge level of dental students about pain may effectively reduce the tendency toward pain catastrophizing.

**Keywords:** Pain catastrophizing, Dental anxiety, Dental student

**Received:** 11.04.2023

**Accepted:** 12.07.2023

**Published:** 27.12.2023

### ÖZ

**Amaç:** Bu çalışmanın amacı diş hekimliği öğrencileri arasında ağrı felaketleştirme ve dental anksiyeteyi değerlendirmektir. Ek olarak, ağrı felaketleştirme puanlarının cinsiyet, ağrı şiddeti ve dental tedavi deneyimi ile ilişkisini araştırdık.

**Gereç ve Yöntemler:** Bu anket çalışması 2020 yılında diş hekimliği öğrencileri arasında yapılmıştır. Google formları aracılığıyla hazırlanan anket ve farklı diş hekimliği fakültelerinde okuyan öğrenciler anketi e-posta yoluyla doldurmuştur. Görsel Analog Skala (VAS), Corah's Dental Anksiyete Skalası (C-DAS) ve Ağrı Felaket Skalası (PCS), klinisyenin katılımcıların nasıl hissettiklerini ve ağrı hakkında ne düşündüklerini incelemesine yardımcı oldu. Değişkenler arasındaki korelasyonları analiz etmek için Spearman's rho korelasyonu kullanıldı. MANOVA testi, cinsiyet, dönem ve tedavinin C-DAS ve PCS üzerindeki ana etkilerinin anlamlı olup olmadığını değerlendirmek için kullanıldı.

**Bulgular:** Öğrencilerin %22,5'i felaket durumdaki bireyler olarak değerlendirildi. Regresyon modeline göre VAS değerindeki bir birimlik artış toplam PCS puanında 0.164'lük bir artışa neden olmuştur. Benzer şekilde, C-DAS puanındaki artış, PCS puanında 0,575'lik bir artışa yol açarken, kızların PCS puanı 4.091'den daha yüksekti.

**Sonuç:** Çalışmamız diş hekimliği öğrencileri arasında ağrıyı felaketleştirme prevalansını ve cinsiyetin ve PCS-alt ölçeklerinin etkisini bildiren ilk çalışmadır. Diş hekimliği öğrencilerinin ağrı hakkında artan bilgi düzeyi, ağrıyı felaketleştirme eğilimini etkili bir şekilde azaltabilir.

**Anahtar Kelimeler:** Ağrı felaketi, Dental anksiyete, Diş hekimliği öğrencisi

**Geliş:** 11.04.2023

**Kabul:** 12.07.2023

**Yayın:** 27.12.2023

**Atıf/ Citation:** Altan H., Karakaş Ö., Sidal K., Şen T., Altunok Ünlü N., Pain Catastrophizing in Dental Students and its Relation With Dental Anxiety and Pain Intensity. NEU Dent J. 2023;5:146-51.

\* Sorumlu Yazar/Corresponding Author

1. Assoc. Prof. Faculty of Dentistry, Necmettin Erbakan University, Konya, Turkey
2. Dt., Faculty of Dentistry, Tokat Gaziosmanpaşa University, Tokat, Turkey
3. Specialist Dt., Pediatric Dentistry, Ankara, Turkey



"This article is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License. (CC BY-NC 4.0)"

## INTRODUCTION

Pain is a distressing feeling that restricts the actions and activities of a person in daily life.<sup>1</sup> Regarding the commonly accepted definition of pain, according to the International Association for the Study of Pain (IASP), pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage".<sup>1,2</sup> According to this information, pain is always individual since it is a sensation and has an unpleasant nature. Therefore, while evaluating the concept of pain, it is necessary to consider both physical and psychological components together.<sup>3</sup>

Effective pain management requires accurate knowledge, a good attitude, and evaluation skills. Dental students, as with other health care workers, frequently encounter and perform interventions for the "pain" that accompanies many diseases; it affects the quality of life of the individual and occurs due to different interventions and problems.<sup>4,5</sup> Therefore, candidates for the dentistry profession should have sufficient knowledge and skills related to pain and pain-relieving/reducing. One of the pain markers is catastrophizing.<sup>6</sup> Catastrophizing is described as an exaggerated negative orientation to a painful stimulus.<sup>7</sup> In 1995, Sullivan et al.<sup>8</sup> developed the PC scale, which is the most common scale for measuring the catastrophic thinking associated with pain. PCS is a questionnaire with 13 questions answered on a 5-point scale according to the last painful experience of the individual. The scale has three subscales: rumination, magnification, and helplessness.

The intensity of the individual's pain has a significant role in the occurrence of catastrophic thinking.<sup>7</sup> Catastrophic individuals are defined as those who have difficulty in magnifying or exaggerating danger or distractions.<sup>9</sup> The intensity of pain has consequences, such as more severe depression and anxiety, higher insufficiency levels, the use of more analgesics, and more extended hospital stays for individuals with high pain catastrophizing.<sup>6,10,11</sup>

Catastrophizing is a conceptual component of anxiety and depression and can be considered a component or precursor of dental anxiety. Anxiety is a natural state against the stressors in life that arise when a person feels physical or physiological risks.<sup>12</sup> A decrease in pain tolerance is observed with anxiety. In other words, patients who have high levels of anxiety are more sensitive to pain. Age, gender, humor,

educational level, and traumatic dental experiences affect dental anxiety. Researchers have found that psychological and environmental factors also play a role in the development of dental anxiety.<sup>13</sup> In the literature, some studies suggest that anxiety increases as the level of education decreases.<sup>14,15</sup> Apart from the educational level, the field of education received also affects dental anxiety.<sup>15,16,17</sup>

The approaches aimed to minimize catastrophizing thoughts can help prevent or reduce the occurrence of dental anxiety. Therefore, our study was designed to investigate the effect of dental students' increased knowledge level on pain catastrophizing and dental anxiety levels. Furthermore, in this study, we aimed to examine the effect of the same factors on pain catastrophizing.

## MATERIAL AND METHODS

The design of this is a questionnaire. The questionnaire, which was prepared via Google forms, was provided on a voluntary basis. Individuals were reached via e-mail, and 346 dental students, including 196 girls and 150 boys studying in different dentistry faculties, participated in the study. The age and gender were noted, and three scales were used to assist the researcher: the Visual Analogue Scale (VAS), for determining the last pain intensity; the Corah's Dental Anxiety Scale (C-DAS), for determining the dental anxiety level; and the Pain Catastrophizing Scale (PCS), for examining students' feelings and thoughts regarding pain (Tables 2-3).

### Visual Analogue Scale

The VAS is a scale used to discern the severity of individuals' pain from toothaches and other causes. Individuals were asked to mark the severity of their last pain on a 10-point scale, with 0 referring to no pain and 10 referring to the worst pain. In the scale, a score between 0 and 40 refers to tolerable pain, a score between 41 and 70 refers to moderate pain, and a score between 71 and 100 refers to severe pain.

### Corah's Dental Anxiety Scale (C-DAS)

The C-DAS consists of four questions and five answer options for each item to determine dental anxiety level. A minimum of 4 and a maximum of 20 points can be obtained from this test. A score less than 13 refers to a low level of anxiety, a score of 13-14 refers to a moderate level of anxiety, and a score of 15 and above refers to a high level of anxiety.

### Pain Catastrophizing Scale

The PCS is a 5-option scale consisting of 13 questions prepared to examine how students feel and think when they have pain. The scale consists of three subgroups: magnification (questions 6–7 and question 13), helplessness (questions 8–10 and 11), and rumination (questions 1–5 and 12). The total score is a minimum of 0 and a maximum of 52 points. Individuals were asked to choose the most appropriate scoring for them. According to Sullivan et al.<sup>14</sup>, a total PCS score greater than 30 represents a clinically relevant catastrophizing level.<sup>8</sup>

### Statistical Analysis

The data were analyzed by IBM SPSS V23. Conformity to normal distribution was investigated using the Kolmogorov-Smirnov test and skewness-kurtosis. Spearman's rho correlation was used to examine the correlations between the variables. A chi-square test evaluated the status of being a catastrophic individual according to the grades. The MANOVA test was used to evaluate whether the main effects of gender, grade, and treatment on C-DAS and PCS were significant. A linear regression analysis was used to predict the PCS score. The significance level was considered to be  $p < 0.05$ .

### RESULTS

**Table 1:** Descriptive statistical (n, %, mean and standard deviation), frequency of C-DAS, PCS and VAS scores by gender, grade, and treatment

	PCS		p
	Noncatastrophizing	Catastrophizing	
<b>Gender</b>	<b>(n, %)</b>		
Girl	64	132	0,006
Boy	70	80	
<b>Grade</b>	<b>Mean SD</b>		
Grade 1	10.17 (5.16), %38.7	27.29 (7.34), %61.3	0,210
Grade 2	8.40 (4.45), %31.6	27.11 (7.5), %68.4	
Grade 3	10.85 (4.07), %42	29.75 (8.94), %58	
Grade 4	9.40 (4.87), %32.8	26.85 (7.29), %67.2	
Grade 5	7.03 (4.37), %49.2	26.06 (8.02), %50.8	
<b>Treatment</b>	<b>Mean SD</b>		
Yes	9.39 (4.63), %36.8	27.54 (7.98), %63.2	0,018
No	7.78 (5.02), %58,1	27.51 (7.89), %41.9	
<b>VAS</b>	<b>Mean SD</b>		
Low	8.50 (4.80), %52.2	24.43 (6.83), %47.8	0,000
Severe	10.11 (4.43), %33.1	28.52 (7.27), %66.9	
Moderate	10.75 (4.03), %8.2	30.89 (9.02), %91.8	

A total of 346 undergraduate students consented to participate in the study. Among them, 196 girls and 150 boys dental student participated. There was a

significant difference between catastrophic and non-catastrophic properties according to the gender ( $p=0.006$ ) Table 1.

The median value of magnification was 5 in the first grade, 5 in the second grade, 6 in the third grade, 5 in the fourth grade, and 3 in the fifth grade. The difference was due to the higher median value of the third grade compared to the fifth grade. The magnification score differed according to grade ( $p = 0,015$ ) Table 2.

**Table 2:** Comparison of PCS-Subscale according to grades

	Helplessness	Rumination	Magnification
<b>Grade</b>	(Median, Min-Max)	(Median, Min-Max)	(Median, Min-Max)
Grade 1	6 (0 - 20)	8 (0 - 19)	5 (0 - 12) <sup>ab</sup>
Grade 2	9 (0 - 21)	7 (0 - 19)	5 (0 - 11) <sup>ab</sup>
Grade 3	7 (0 - 24)	7 (0 - 16)	6 (0 - 12) <sup>a</sup>
Grade 4	8 (0 - 18)	7 (0 - 16)	5 (0 - 12) <sup>ab</sup>
Grade 5	7 (0 - 20)	5 (0 - 15)	3 (0 - 12) <sup>b</sup>
	$\chi^2=6,304$	$\chi^2=9,503$	$\chi^2=12,352$
<b>p</b>	0,178	0,050	<b>0,015</b>

Same letters indicate that there is no statistically significant difference ( $p > 0.05$ ), and different letters indicate that there is a statistically significant difference ( $p < 0.05$ ).

As a result of the analysis, it was determined that PCS values changed according to gender and treatment ( $p = 0.008$ ,  $p=0.021$ ). While the C-DAS did not differ according to gender, the C-DAS and the PCS did not differ according to grades ( $p > 0.05$ ) Table 3.

**Table 3:** Examination of the effect of gender, grade, and treatment factors on the total values of C-DAS and PCS

Factor	Dependent Variable	F	p	Partial Eta Squared
Gender	C-DAS	1.681	0.188	0.01
	PCS	7,136	<b>0,008*</b>	0,02
Grade	C-DAS	1.147	0.319	0.007
	PCS	1,520	0.218	0,004
Treatment	C-DAS	0.206	0.814	0.001
	PCS	5,418	<b>0,021*</b>	0,016

\* $<0.05$

### DISCUSSION

Pain and pain management is a broad and important subject taught in dental education.<sup>18, 19</sup> The evaluation and management of pain during dental treatments are critical since pain directly affects behavior. Pain-related catastrophizing, which is considered a component of anxiety and depression, may be

a fundamental problem for patients and dentists. Therefore, the factors that effectively predict the pain-related catastrophizing levels of dental students, dental anxiety, and pain catastrophizing were evaluated for the first time.

Gender is among the influential factors in the perception and tolerance of pain. While some studies have reported that women<sup>20, 21</sup> have higher PC levels than men, other studies have suggested no difference between genders.<sup>11, 21, 22</sup> In our study, we found a serious relationship between sex and pain catastrophizing, and girls exhibited more catastrophic characteristics than boys.

The PCS has three subscales: rumination, magnification, and helplessness.<sup>8</sup> It is unclear whether each of the three components of catastrophizing significantly contributes to pain perception or whether specific components are more determinant than others.<sup>23-26</sup> In a study comparing the pain catastrophizing and subgroup scores of first- and final-year medical faculty students, no difference in PC scores was found between pain catastrophizing behaviors. However, a decrease in pain catastrophizing was observed among medical faculty students in the final year.<sup>27</sup> Moreover, a significant decrease in the rumination scale was reported in final-year medical faculty students. In our study, 22.5% of all the students were determined to be individuals with high catastrophizing scores, and we found that all three subscales were strong factors for pain catastrophizing. We assessed that the decrease in pain catastrophizing among final-year students was associated with the increase in students' knowledge and experience regarding pain and treatment methods.

When the subscales were examined in our study, no difference was discerned in helplessness and rumination values according to the grades, but a difference was observed in magnification values according to the grades. While magnification was mostly scored in the third grade, it was observed the least in the fifth grade. The third grade is a period where a transition occurs from preclinical to clinic, when the student encounters a painful patient for the first time and makes diagnosis and treatment planning in the dental curriculum worldwide. We determined that the magnification scale was found to be higher due to the new experiences of the students in the third grade, the education they received as their classes progressed, and

the observations they made in clinics. The fact that they saw the results of the treatments they applied to the patients decreased the "magnification" value.

A person with pain catastrophizing has negative thoughts about pain, which can be defined as a reaction to previous pain experiences.<sup>28</sup> The intensity of the individual's pain has a significant role in the occurrence of catastrophic thinking.<sup>20, 24, 29</sup> In our study, the results confirmed that students who experienced severe pain further catastrophized the pain. Although dental students had information about pain levels and coping methods, the increased pain experience negatively affected the students. Similar to the literature, the pain catastrophizing score was found to be higher in dental students who had previously received dental treatment compared to those who had not received treatment.

In the dental anxiety studies conducted with dental students in the literature, it has been reported that first-year students had higher levels of anxiety compared to final-year students.<sup>30-33</sup> Al-Omari et al.<sup>9</sup> evaluated the relationship between university students' fields of education and dental anxiety and reported that medical and engineering faculty students had higher dental anxiety values compared to dental students. Erguven et al.<sup>32</sup> evaluated the dental anxiety levels of first-year and fifth-year dental students and found that the anxiety-fear level was higher in first-year students. In our study, the dental students exhibited a low level of anxiety. The highest anxiety was observed in the first year, while the lowest anxiety scores were observed in the final year. When dental students' dental anxiety was evaluated according to their grades, a lower level of dental anxiety was observed among final-year students. Their dental anxiety decreased due to the increase in their professional experience and the education they received and reduced their problems as they paid attention to oral health.

## CONCLUSION

Our study is the first study reporting the prevalence of pain catastrophizing among dental students and the effect of gender and pain catastrophizing subscales. Dental students who have received dentistry education and whose knowledge and experience about the practices have increased catastrophize pain less and feel less dental anxiety. The increase in dental students' knowledge level about pain may help



reduce the tendency toward pain catastrophizing. Therefore, it is necessary to focus on increasing the level of knowledge about pain in dentistry to cope with pain catastrophizing among dental students in university curricula.

### **ETHICAL COMMITTEE APPROVAL**

The necessary ethical approval for this study was received by the clinical research ethics committee of Tokat Gaziosmanpaşa University Faculty of Medicine. (Project no: 21-KAEK-256) (Number: 83116987-921)

### **FINANCIAL SUPPORT**

The authors declare that this study received no financial support.

### **CONFLICT OF INTEREST**

The authors deny any conflicts of interest related to this study.

### **AUTHOR CONTRIBUTIONS**

Design: HA, Data collection and processing: ÖK, KS, TŞ, NAÜ, Analysis and interpretation: HA Literature review: ÖK, KS, TŞ, Writing: HA.

### **REFERENCES**

1. Merskey H, Albe-Fessard D, Bonica JJ, Carmon A, Dubner R, Kerr FWL, et al. Pain terms: a list with definitions and notes on usage. *Pain*. 1979; 6:249-52.
2. Merskey H, Bogduk N. Classification of chronic pain: description of chronic pain syndromes and definition of pain terms. *Pain*. 1986; 3:216-21.
3. Frischenschlager O, Pucher I. Psychological management of pain. *Disabil Rehabil*. 2002; 24:416-22.
4. Leila NM, Pirkko H, Eeva P, Eija K, Reino P. Training medical students to manage a chronic pain patient: Both knowledge and communication skills are needed. *Eur J Pain*. 2006; 10:167.
5. Shipton EE, Bate F, Garrick R, Steketee C, Shipton EA, Visser EJ. Systematic review of pain medicine content, teaching, and assessment in medical school curricula internationally. *Pain Ther*. 2018; 7:139-61.
6. Sullivan MJ, Neish N. The effects of disclosure on pain during dental hygiene treatment: the moderating role of catastrophizing. *Pain*. 1999; 79:155-63.
7. Sullivan MJL, D'Eon JL. Relation between catastrophizing and depression in chronic pain patients. *J Abnorm Psychol*. 1990; 99:260.
8. Sullivan MJL, Bishop S, Pivik J. The pain catastrophizing scale: development and validation. *Psychol Assess*. 1995; 7:524.
9. Crombez G, Eccleston C, Baeyens F, Eelen P. When somatic information threatens, catastrophic thinking enhances attentional interference. *Pain*. 1998; 75:187-98.
10. Osman A, Barrios F, Kopper B, Hauptmann W, Jones J. Factor structure, reliability, and validity of the pain catastrophizing scale. *J Behav Med*. 1997; 20:589-605.
11. Altan A, Akkoç S, Erdil A, Çolak S, Demir O, Altan H. Effects of pain catastrophizing and anxiety on analgesic use after surgical removal of impacted mandibular third molars. *J Dent Anesth Pain Med*. 2019; 19:379-88.
12. Klingberg G, Broberg AG. Dental fear/anxiety and dental behaviour management problems in children and adolescents: a review of prevalence and concomitant psychological factors. *Int J Paediatr Dent*. 2007; 17:391-406.
13. Locker D, Thomson WM, Poulton R. Psychological disorder, conditioning experiences, and the onset of dental anxiety in early adulthood. *J Dent Res*. 2001; 80:1588-92.
14. Erten H, Akarslan ZZ, Bodrumlu E. Dental fear and anxiety levels of patients attending a dental clinic. *Quintessence Int*. 2006; 3: 304-10.
15. Al-Omari W, Al-Omiri M. Dental anxiety among university students and its correlation with their field of study. *J Appl Oral Sci*. 2009; 17:199-203.
16. Jasser RA, Almashaan G, Alwalaan H, Alkhazim N, Albougami A. Dental anxiety among dental, medical, and nursing students of two major universities in the central region of the Kingdom of Saudi Arabia: a cross-sectional study. *BMC oral health*. 2019; 19:1-5.
17. Peretz B, Mann J. Dental anxiety among Israeli dental students: a 4-year longitudinal study. *Eur J Dent Educ*. 2000; 4:133-7.
18. Alonso AA, Heima M, Lang LA, Teich ST. Dental students' perceived level of competence in orofacial pain. *J Dent Educ*. 2014; 78:1379-87.
19. Klasser GD, Gremillion HA. Past, present, and future of predoctoral dental education in orofacial pain and TMDs: a call for interprofessional education. *J Dent Educ*. 2013; 77:395-400.
20. Sullivan MJ, Tripp DA, Santor D. Gender differences in pain and pain behavior: the role of catastrophizing. *Cognit Ther Res*. 2000; 24:121-34.
21. Keefe FJ, Lefebvre JC, Egert JR. The relationship of gender to pain, pain behavior, and disability in osteoarthritis patients: the role of catastrophizing. *Pain*. 2000; 87:325-34.
22. Süren M, Okan I, Gökbakan AM, Kaya Z, Erkorkmaz Ü, Arıcı S, et al. Factors associated with the pain catastrophizing scale and validation in a sample of the Turkish population. *Turk J Med Sci*. 2014; 44:104-8.
23. Sullivan MJL, Neish N. Catastrophizing, anxiety and pain during dental hygiene treatment. *Comm Dent Oral Epidemiol*. 1998; 26:344-9.

24. Sullivan MJL, Stanish W, Waite H, Sullivan ME, Tripp D. Catastrophizing, pain, and disability following soft tissue injuries. *Pain*. 1998; 77:253-60.
25. Heyneman NE, Fremouw WJ, Gano D, Kirkland F, Heiden L. Individual differences and the effectiveness of different coping strategies for pain. *Cog Ther Res*. 1990; 14:63-77.
26. Craner JR, Gilliam WP, Sperry JA. Rumination, magnification, and helplessness: how do different aspects of pain catastrophizing relate to pain severity and functioning? *Clin J Pain*. 2016, 32.12: 1028-35.
27. Marić A, Banožić A, Ćosić A, Kraljević S, Sapunar D, Puljak L. Validation of the croatian pain catastrophizing scale through a study on the influence of medical education on pain catastrophizing. *Period Biol*. 2011; 113:171-5.
28. Granot M, Ferber SG. The roles of pain catastrophizing and anxiety in the prediction of postoperative pain intensity: a prospective study. *Clin J Pain*. 2005; 21:439-45.
29. Lin CS. Pain catastrophizing in dental patients: implications for treatment management. *JADA*. 2013; 144:1244-51.
30. Korpela I, Vaununmaa K, Tolvanen M, Suominen A, Freeman R, Lahti S. Dental students and patients perceived importance and knowledge of dental anxiety. *Eur J Dent Educ*. 2019; 23:515-21.
31. Chowdhury CR, Khijmatgar S, Chowdhury A, Harding S, Lynch E, Gootveld M. Dental anxiety in first- and final-year Indian dental students. *BDJ Open*. 2019; 5:15.
32. Ergüven SS, Işık B, Kılınç Y. Comparative evaluation of dental anxiety and fear levels between first and final year dental students. *Acta Odontol Turc*. 2013; 30:70-6.
33. Menziletoğlu D, Akbulut MB, Büyükerkmen EB, Işık BK. Diş hekimliği fakültesi öğrencilerinin dental anksiyete-korku düzeylerinin değerlendirilmesi. *Selcuk Dent J*. 2018; 5:22-30.