Lee *et al. The Journal of Headache and Pain* (2025) 26:68
https://doi.org/10.1186/s10194-025-02010-6

The Journal of Headache and Pain

RESEARCH Open Access

Associations between personality traits and pain experiences in trigeminal neuralgia

Jeong-A Lee[1,2], Yoon Kyung Han[2], Won Je Jung[2], Byung H. Lee[3] and Seunghoon Lee[1*]

Abstract

Background Pain is influenced by many factors such as personality traits and nociceptive stimuli. This study identified personality traits in patients with trigeminal neuralgia (TN) and investigated the relationships between personality traits and pain perception, pain acceptance, anxiety, and depression.

Methods From March to June 2024, the personality traits of 50 patients with TN and 50 healthy controls (HC) were measured using the 50-item International Personality Item Pool representation of Goldberg markers for the Big-Five factor structure. Patients' pain perception, pain acceptance, anxiety, and depression were measured.

Results The mean neuroticism scores and median anxiety and depression scores of patients with TN were higher than those of HC ($p=0.006$, $p<0.001$, and $p=0.010$). There were no significant differences in pain perception and pain acceptance according to the personality traits. The higher the neuroticism score, the higher the anxiety and depression scores ($\rho=0.437$, $p=0.002$ and $\rho=0.344$, $p=0.014$). The higher the anxiety score, the higher the pain catastrophizing score, and the lower the pain acceptance score ($\rho=0.488$, $p<0.001$ and $\rho=-0.365$, $p=0.009$). Higher depression score was associated with a pain frequency of 11 or more times per 24 h (odds ratio = 1.243, $p=0.015$). The higher the depression score, the lower was the pain acceptance score ($\rho=-0.324$, $p=0.022$).

Conclusions In patients with TN, neuroticism was not associated with pain. However, higher levels of neuroticism were associated with higher levels of anxiety and depression, and higher levels of anxiety and depression were associated with higher pain catastrophizing or pain frequency, and lower pain acceptance. These results can be used to establish individualized treatments for patients with TN, that focus on their emotional states according to personality traits, such as adapting psychological therapies differently for individuals with high neuroticism.

Keywords Anxiety, Depression, Pain, Personality, Trigeminal neuralgia

*Correspondence:
Seunghoon Lee
seunghoonben@gmail.com
[1]Department of Neurosurgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, 81 Irwon-ro, Gangnam-gu, Seoul 06351, Korea
[2]Department of Nursing, Samsung Medical Center, Seoul, Korea
[3]Department of Neurology, Samsung Medical Center, Seoul, Korea

© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

Introduction

Trigeminal neuralgia (TN) refers to paroxysmal facial pain caused by harmless stimulation such as lightly touching the face or speaking, mainly around the mouth and nasal cavity region [1]. The incidence rate is estimated to be 5.5 per 100,000 people and increases with age, with a higher incidence rate of 7.3 in women than 3.7 in men [2]. These patients suffer not only functional limitations in activities of daily living, but also significant psychosocial burdens such as pain catastrophizing, anxiety, and depression, leading to reduced quality of life [3–5]. TN can be treated medically and surgically. Treatment outcomes can be improved by services, including psychological support by a multidisciplinary team consisting of medical specialists, psychologists, and advanced practice nurses with access to various treatment methods [6]. Psychometrically sound patient-reported outcomes are essential to evaluate treatment outcomes [7].

Pain is a complex symptom influenced by psychological, demographic, and genetic factors [8, 9]. Pain is associated with temporary emotional states and persistent personality traits [10]. Patients with chronic pain exhibited prominent personality traits [11]. Moreover, personality traits affect the development, perception, sensitivity, and adjustment to pain [9–13]. Previous studies have shown that the personality traits such as neuroticism in patients with chronic pain may influence their experience of disability, their ability to manage pain, and adjustment to pain, thereby exacerbating distress and disability, and potentially contributing to pain development [11, 13]. Thus, understanding patient personality traits can help identify at-risk patients, improve prognostic accuracy, and provide clues for clinical interventions to improve health [14]. Furthermore, incorporating information about the personality types of patients with specific pain disorders into clinical practice may facilitate and enhance the implementation of personalized and evidence-based medicine [15, 16].

Although the relationship between personality traits and pain has been studied extensively, understanding the influence of personality traits on the pain experienced by patients with TN is lacking. We hypothesized that patients with TN may have distinct personality traits that influence pain perception and pain acceptance, and these personality traits are expected to affect pain intensity or pain management. In this study, we identified the personality traits of patients with TN and investigated the relationship between their personality traits and pain perception, pain acceptance, anxiety, and depression. Personality traits, pain catastrophizing, and pain acceptance were considered modifiable states in the study. The study aimed to understand individual patient's pain experience, establish a personalized treatment strategy, and improve treatment outcomes by incorporating the psychological characteristics of patients with TN into treatment strategies.

Methods

Study population

This was a cross-sectional study. From March to June 2024, patients diagnosed with TN at the neurosurgery outpatient clinic of Samsung Medical Center (Seoul, Korea) were enrolled consecutively. Visitors to the hospital and staff were recruited as healthy controls (HC). The inclusion criteria for patients diagnosed with TN were as follows: (a) adults aged over 18 years, (b) patients diagnosed with TN according to the ICHD-3 diagnostic criteria [17], (c) patients whose pain began more than 6 months prior, and (d) patients who had no communication problems, understood the purpose of the study, and agreed to participate. The exclusion criteria were as follows: (a) patients with secondary TN and (b) patients who underwent an invasive procedure or surgery such as percutaneous rhizotomy with balloon, glycerin, or radiofrequency, stereotactic radiosurgery, and microvascular decompression. The HC were adults aged over 18 years with no history of neurological or mental diseases, no communication problems, those who understood the purpose of the study, and agreed to participate. The sample size was calculated using data from Gustin et al. [18] and the G*Power analysis program of Cohen [19] with an effect size of 0.6, significance level of 0.05, and power of 0.8, resulting in 45 patients and 45 HC. Considering a dropout rate of 10%, 100 participants were required, with 50 participants in each group.

We collected questionnaires assessing personality traits, pain perception, such as pain level (intensity, duration, and frequency) and pain catastrophizing, pain acceptance, anxiety, and depression directly filled by the patients. Furthermore, we reviewed the electronic medical records for clinical information for patients who completed the questionnaires. Detailed descriptions of the questionnaires used in this study are provided below. This study was approved by the Institutional Review Board (study number: 2024-02-019), and written informed consent was obtained from all participants.

Clinical assessment

Personality traits

Personality traits were measured using the Korean version of the 50-item International Personality Item Pool (IPIP) representation of Goldberg markers for the Big-Five factor structure (available at https://ipip.ori.org/). This questionnaire is an Internet version of Costa and McCrae's Revised NEO Personality Inventory (NEO PI-R) [20], developed based on the Five Factor Model developed by Goldberg [21] and translated by Guay et al. [22]. It consists of 50 questions, ten each for the 5 factors:

extraversion, agreeableness, conscientiousness, neuroticism, and openness. Each question is assigned a score of 1–5 and the total score for each factor is used. The scores range from 10 to 50, with higher scores indicating a greater tendency.

Pain perception

Pain level; pain intensity, pain duration, and pain frequency. Pain level was measured using Neuropathic Pain Intensity Scoring Questionnaire based on Korean Neuropathic Pain Questionnaire (KNPQ), developed by Yun et al. [23]. It consists of seven questions, each of which is assigned a score from 0 to 10. The total scores range from 0 to 70, with higher scores indicating more severe pain level. The duration and frequency of pain were also measured.

Pain catastrophizing. Pain catastrophizing was measured using the Short Form of the Pain Catastrophizing Scale (PCS-6). This questionnaire was developed by Sullivan et al. [24] and McWilliams et al. [25] and translated by Cho et al. [26]. It consists of six questions, each of which is assigned a score of 0 to 4. The total scores range from 0 to 24, with higher scores indicating higher pain catastrophizing.

Pain acceptance

Pain acceptance was measured using the Chronic Pain Acceptance Questionnaire-8 (CPAQ-8). This questionnaire was developed by McCracken et al. [27] and Fish et al. [28] and translated by Cho et al. [29]. It consists of eight questions, each of which is assigned a score of 0 to 6. The total scores range from 0 to 48, with higher scores indicating higher pain acceptance.

Anxiety and depression

Anxiety and depression were measured using the Korean version of the Hospital Anxiety and Depression Scale (HADS). The questionnaire was developed by Zigmond et al. [30] and translated by Oh et al. [31]. It consists of 14 questions, with seven odd-numbered questions measuring anxiety and seven even-numbered questions measuring depression. Each question is assigned a score of 0–3 and the total scores for anxiety and depression are used. The scores range from 0 to 21, with higher scores indicating higher levels of anxiety and depression.

Statistical analysis

Data were analyzed using SPSS (version 29.0; IBM Corporation, Armonk, New York, USA). Before the analysis, normality and homogeneity of variance were tested using the Shapiro-Wilk and Levene tests. General and clinical characteristics, personality traits, pain perception, pain acceptance, anxiety, and depression of patients and controls were analyzed using descriptive statistics of the mean, standard deviation/median, first and third quartiles, numbers, and percentages. Differences in general characteristics between patients and controls were analyzed using the independent samples t-test/Mann-Whitney U test and chi-square test. Differences in personality traits, anxiety, and depression between patients and controls were analyzed using analysis of covariance (ANCOVA) and Quade non-parametric ANCOVA, adjusting for age and education level. The relationships between general and clinical characteristics and personality traits were analyzed using an independent samples t-test and Pearson's correlation/Spearman's correlation. The relationships between personality traits and pain perception, pain acceptance, anxiety, and depression were analyzed using Pearson's correlation/Spearman's correlation, and logistic regression. The relationships between anxiety, depression and pain perception, pain acceptance were analyzed using Spearman's correlation and logistic regression.

Results

The general and clinical characteristics of the patients with TN are presented in Table 1. Among the 50 patients, the mean age was 64.8 years, the female-to-male ratio was 7:3, and the median education level was 12 years. For HC, the mean age was 55.9 years, the female to male ratio was 7.6:2.4, and the median education level was 13.5 years. There were significant differences in age and educational level between the two groups. The median duration of symptoms was 8.2 years and involvement of V2 ($n = 40$, 80%) and a single division ($n = 29$, 58%) was the most common. Thirty-seven patients (74%) received polytherapy, with carbamazepine (80%) and gabapentin (72%) being the most commonly administered drugs.

Comparison of personality traits between TN patients and HC

The TN patients' average neuroticism score was 28.4 points, which was higher than 25.0 points of HC ($p = 0.006$, Cohen's $d = 0.50$). There were no significant differences in extraversion, agreeableness, conscientiousness, and openness scores between the two groups. Regarding pain level, the average pain intensity score was 32.6 points, pain duration was more than 1 h per 24 h in 14 patients (28%), and the pain frequency was more than 11 times per 24 h in 20 patients (40%). The median pain catastrophizing score was 14.5 points and the median pain acceptance score was 24.0 points. A comparison of anxiety and depression in patients with TN and HC showed that the median anxiety score was 7.0 points, which was higher than the 3.0 points in the HC group ($p < 0.001$), and the median depression score was 6.0 points, which was higher than the 4.5 points in the HC group ($p = 0.010$) (Table 2).

Table 1 General and clinical characteristics of TN patients ($n = 50$)

Characteristics	Mean ± SD /*n* (%) / Median (IQR)	Characteristics	*n* (%)
Age (years)	64.8 ± 12.1	Division involved	
Sex		V1	3 (6.0)
Male	15 (30.0)	V2	19 (38.0)
Female	35 (70.0)	V3	7 (14.0)
Education (years)	12.0 (9.0, 16.0)	V1 + V2	6 (12.0)
Employment status		V2 + V3	14 (28.0)
Employed	20 (40.0)	V1 + V2 + V3	1 (2.0)
Unemployed	30 (60.0)	Medications	
Other bodily chronic pain[a]	4 (8.0)	No/mono/polytherapy	1 (2.0)/12 (24.0)/37 (74.0)
Comorbid medical conditions[b]	26 (52.0)	Carbamazepine	40 (80.0)
Symptom duration (months)	98.5 (27.8, 149.3)	Oxcarbazepine	8 (16.0)
Side affected		Gabapentin	36 (72.0)
Right	32 (64.0)	Pregabalin	4 (8.0)
Left	18 (36.0)	Baclofen	1 (2.0)

IQR interquartile range (25th and 75th percentiles), *SD* standard deviation, *TN* trigeminal neuralgia

[a]arthritic pain or migraine; [b]hypertension, diabetes, hypothyroidism, cardiovascular disease, or malignancy

Table 2 Clinical assessment of personality traits, pain perception, pain acceptance, anxiety, and depression in TN patients and comparison with HC ($N = 100$)

Clinical assessment	TN patients (*n* = 50) Mean ± SD / Median (IQR)	HC (*n* = 50) Mean ± SD / Median (IQR)	*p*-value
Personality traits			
Extraversion	30.2 ± 6.1	31.4 ± 6.2	0.053
Agreeableness	35.6 ± 4.1	35.5 ± 5.0	0.911
Conscientiousness	40.0 (37.0, 45.0)	41.0 (35.8, 44.0)	0.995
Neuroticism	28.4 ± 6.8	25.0 ± 7.0	0.006**
Openness	31.0 (25.0, 35.0)	31.0 (28.8, 34.0)	0.727
Pain level		-	-
Intensity	32.6 ± 11.9		
Duration (hrs/24 hrs)			
12≤	9 (18.0)		
8–12	0 (0.0)		
3–8	3 (6.0)		
1–3	2 (4.0)		
< 1	36 (72.0)		
Frequency (times/24 hrs)			
21≤	15 (30.0)		
11–20	5 (10.0)		
6–10	14 (28.0)		
1–5	14 (28.0)		
0	2 (4.0)		
Pain catastrophizing	14.5 (8.8, 19.3)	-	-
Pain acceptance	24.0 (19.8, 26.0)	-	-
Anxiety	7.0 (4.0, 9.3)	3.0 (2.0, 5.3)	< 0.001
Depression	6.0 (5.0, 9.3)	4.5 (2.0, 7.3)	0.010

HC healthy controls, *hrs* hours, *IQR* interquartile range (25th and 75th percentiles), *SD* standard deviation. *TN* trigeminal neuralgia

Personality traits difference according to patient's characteristics

Female patients with TN showed a higher average neuroticism score of 30.0 points compared to male patients' 24.5 points ($p = 0.007$). The openness score was higher as the level of education was higher ($\rho = 0.491$, $p < 0.001$). There were no other significant differences in personality traits according to patient characteristics (Table 3).

Personality traits impact on pain perception, acceptance, anxiety, and depression

There were no significant differences in pain perception or acceptance according to the personality traits. Higher neuroticism scores were associated with higher anxiety and depression scores ($\rho = 0.437$, $p = 0.002$ and $\rho = 0.344$, $p = 0.014$) (Table 4).

Anxiety and depression impact on pain perception and acceptance

The higher the anxiety score, the higher the pain catastrophizing score and the lower the pain acceptance score ($\rho = 0.488$, $p < 0.001$ and $\rho = -0.365$, $p = 0.009$). A higher depression score was associated with a pain frequency of 11 or more times per 24 h (odds ratio = 1.243, $p = 0.015$). The higher the depression score, the lower the pain acceptance score ($\rho = -0.324$, $p = 0.022$) (Table 5).

Discussion

The present study was conducted under the hypothesis that patients with TN with unique pain patterns have distinct personality traits and that their pain experience and pain response differ depending on these personality traits. The demographic data and clinical characteristics of the patient groups collected in our study were similar to those reported previous researches [2, 32]. The ratio

Table 3 The relationships between TN patients' characteristics and personality traits ($n=50$)

Characteristics	Personality traits									
	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Mean ± SD/r/ρ	*p*-value	Mean ± SD/r/ρ	*p*-value	Mean ± SD/r/ρ	*p*-value	Mean ± SD/r/ρ	*p*-value	Mean ± SD/r/ρ	*p*-value
Age	0.247	0.084	-0.050	0.728	0.081	0.576	-0.022	0.878	-0.044	0.759
Sex										
Male	31.5 ± 4.5	0.306	35.7 ± 3.9	0.917	39.3 ± 4.4	0.326	24.5 ± 4.7	0.007	30.5 ± 7.0	0.631
Female	29.6 ± 6.6		35.6 ± 4.2		41.1 ± 6.5		30.0 ± 6.9		29.5 ± 6.5	
Education	0.009	0.953	0.088	0.542	-0.067	0.643	0.218	0.129	0.491	< 0.001
Employment status										
Employed	30.9 ± 6.1	0.529	35.6 ± 4.1	0.956	40.4 ± 5.4	0.893	27.1 ± 5.7	0.270	31.0 ± 6.0	0.336
Unemployed	29.7 ± 6.1		35.7 ± 4.1		40.6 ± 6.3		29.2 ± 7.4		29.1 ± 6.9	
Symptom duration	-0.109	0.452	-0.203	0.157	0.008	0.957	-0.069	0.634	0.004	0.978
Division involved[a]										
V1 vs. -V1	29.5 ± 3.7	0.696	34.1 ± 6.0	0.186	39.9 ± 6.3	0.707	30.6 ± 5.6	0.248	29.6 ± 6.4	0.899
V2 vs. -V2	29.8 ± 6.3	0.350	35.6 ± 4.0	0.892	40.7 ± 6.2	0.751	28.2 ± 7.0	0.743	29.6 ± 7.1	0.649
V3 vs. -V3	31.3 ± 5.3	0.243	36.2 ± 3.8	0.374	41.9 ± 5.7	0.165	27.6 ± 6.6	0.458	30.1 ± 6.1	0.781
Extent										
1	30.1 ± 6.9	0.918	35.8 ± 3.6	0.708	39.9 ± 5.8	0.348	28.4 ± 6.9	0.981	30.2 ± 6.5	0.648
2–3	30.3 ± 4.9		35.4 ± 4.8		41.5 ± 6.2		28.3 ± 6.8		29.3 ± 6.8	

SD standard deviation, *TN* trigeminal neuralgia

[a]-V1, -V2, or -V3 means that involved areas do not include V1, V2, or V3, respectively. Only the values for the cases that included V1, V2, and V3 are shown

Table 4 The relationship between personality traits and pain perception, pain acceptance, anxiety, and depression ($n=50$)

Personality traits	Pain perception, r/OR/ρ				Pain acceptance, ρ	Anxiety, ρ	Depression, ρ
	Intensity	Duration < 1 vs. 1 h≤	Frequency ≤ 10 vs. 11T≤	Catastrophizing			
Extraversion	0.132	1.018	0.983	0.095	-0.109	0.009	-0.137
Agreeableness	0.219	1.051	0.971	0.075	-0.060	0.059	0.049
Conscientiousness	-0.051	0.990	0.965	-0.167	0.212	-0.222	-0.186
Neuroticism	0.026	0.950	1.062	0.237	-0.242	0.437**	0.344*
Openness	0.073	1.020	1.022	-0.029	0.199	-0.015	-0.229

hr hour, *OR* odds ratio, *T* = times

*$p<0.05$, **$p<0.01$

Table 5 The relationship between anxiety, depression and pain perception, pain acceptance ($n=50$)

	Pain perception, ρ/OR				Pain acceptance, ρ
	Intensity	Duration < 1 vs. 1 h≤	Frequency ≤ 10 vs. 11T≤	Catastrophizing	
Anxiety	0.211	0.963	1.061	0.488**	-0.365**
Depression	0.098	1.150	1.243*	0.269	-0.324*

hr hour, *OR* odds ratio, *T* times

*$p<0.05$, **$p<0.01$

of age and sex and the characteristics of pain were more common on the right side, in the V2 branch, and in one branch of the trigeminal nerve; thus, the patient group was representative of general TN patients.

Our study found that patients with TN exhibited personality traits of neuroticism, using the 50-item IPIP representation of Goldberg markers for the Big-Five factor structure. People with neuroticism are perceived as anxious, generally apprehensive, and prone to worry [33]. Previous studies have found that most patients with chronic pain, including facial pain, share common personality traits. Patients with chronic pain, such as trigeminal neuropathy or temporomandibular disorders, show high harm avoidance and low self-directedness in the Temperament and Character Inventory-Revised assessment [18]. High harm avoidance, a characteristic of the so-called pain personality, tends to be fearful, pessimistic, sensitive to criticism, and requires high levels

of reassurance [11]. Identifying the distinct personality traits of patients with TN can help us understand, manage, and treat them effectively.

The average pain intensity score of the patients measured using the KNPQ was 33 out of 70. Converting this to a percentile corresponds to 47%, which is lower than or similar to the pain scores measured by the painDETECT questionnaire and Short-Form McGill Pain Questionnaire-2 in another study, where the pain scores were 7 and 4 out of 10, respectively [5]. The median pain catastrophizing and pain acceptance scores of the patients were 15 out of 24 and 24 out of 48, respectively. Regarding pain catastrophizing in patients with TN, 86% of the patients in our study experienced pain catastrophizing, which was higher than the 77% reported in another study [4]. These data provide basic information on how patients with TN experience and react to pain. The median anxiety and depression scores were 7 and 6, respectively. Although the median scores for anxiety and depression were within the normal range, they were significantly higher than those of the controls, and 38% and 34% of the patients had borderline to abnormal anxiety and depression scores, respectively. Previous studies have reported anxiety and depression in patients with TN [3, 4], and psychological support may be helpful in treating them.

Regarding the relationship between general and disease-related characteristics and personality traits in patients with TN, women had a higher tendency for neuroticism than men, and patients with higher levels of education had a higher tendency for openness. Women have long been reported to be more prone to neuroticism than men [34]. Healthcare professionals should consider these findings when treating patients with TN. Although there are limitations, gaps, and challenges to the evidence on how gender contributes to variation in pain experience, gender as a dimensional set of psychosocial constructs offers a helpful approach to improving our understanding of pain in men and women [35]. Therefore, further analyses on gender differences in pain perception and pain acceptance are needed. In contrast, pain duration was not related to any personality trait. One study suggested that persistent pain may cause anatomical changes in the brain, which may alter an individual's personality [36]. This indicates that disease progression may influence personality changes, in contrast to our finding that disease progression was not associated with personality changes. Our findings indicate that personality traits may influence disease occurrence or progression. High neuroticism may be a premorbid personality trait in patients with TN. Further studies are needed to determine whether high neuroticism in patients with TN is a premorbid or comorbid condition.

Several studies have reported that personality traits influence the perception, sensitivity, and adjustment to pain [9–13]. Cold-pressor pain intensity ratings were associated with personality traits [9], and neuroticism was associated with clinical pain [10]. However, in one study, there was no significant relationship between negative emotional states and clinical pain [10]. In our study, there were no direct relationships among personality traits, pain perception, and pain acceptance in patients with TN. In contrast to previous studies reporting links between personality traits and pain, the lack of a direct relationship between personality traits and pain perception or pain acceptance may be due to sample size limitations, measurement differences, or mediation effects. In addition to these, another possible explanation is that TN has a unique pathophysiology compared to other chronic pain conditions. Because TN is caused by neurovascular compression [17], neurological rather than psychological factors may contribute more to pain compared to other chronic pain conditions. If these relationships are confirmed in a further study with larger patient numbers, it will help to understand patients' pain experiences more deeply and develop interventions tailored to their personality traits. Patients with higher levels of neuroticism had higher levels of anxiety and depression. These findings indicate that patients with TN experience different levels of anxiety and depression depending on the degree of neuroticism. Moreover, the higher the levels of anxiety and depression, the higher the level of pain catastrophizing, the higher the frequency of pain, and the lower the level of pain acceptance.

In summary, there were no direct relationships between neuroticism and pain in patients with TN, but there were significant relationships between the degree of neuroticism and the level of anxiety and depression, and between the level of anxiety and depression and the perception and acceptance of pain. Therefore, the pain experience of patients with TN should not be considered homogeneous and treatment should be provided differently by incorporating patients' emotional states according to their personality traits into the treatment regimen. For example, psychological therapies should be adapted differently for patients with high neurotic TN. Cognitive behavioral therapy or mindfulness-based interventions may be considered as potential strategies for managing TN-related distress. This will help patients with TN better adapt to their disease and achieve satisfactory treatment outcomes.

Our study has several limitations. Although we recruited patients with TN and HC prospectively and consecutively, there may have been selection bias and the findings may not be generalizable. There were differences in age and education level between TN patients and HC because TN patients were mostly elderly, making matching difficult. Even if statistical adjustments were made and some studies have shown that neuroticism decreases

with age [37, 38], it cannot be ruled out that our results may be age-related. And the HC included visitors to the hospital and staff, which may introduce bias. Healthcare professionals may have different stress levels or coping mechanisms compared to the general population. In addition, since this is a cross-sectional study, the relationships between factors limit causal inference. Lastly, the potential self-report bias in personality assessments and medication use that could influence mood and anxiety scores, are included.

Conclusions

Neuroticism was not associated with pain in the patients with TN. However, higher levels of neuroticism were associated with higher levels of anxiety and depression, and higher levels of anxiety and depression were associated with higher pain catastrophizing or pain frequency, and lower pain acceptance. These results can be used to establish individualized treatments for patients with TN, that focus on their emotional states according to personality traits, such as adapting psychological therapies differently for individuals with high neuroticism.

Acknowledgements
The authors thank Professor Danbee Kang for advice on research design.

Author contributions
JL, YH, WJ, BL and SL participated in the conception and design of the study, and in the analysis and interpretation of the data. YH and WJ also participated in the acquisition of data. JL wrote the first draft of the manuscript. All authors read and approved the final manuscript.

Funding
Not applicable.

Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional Review Board of Samsung Medical Center (study number: 2024-02-019) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Received: 12 February 2025 / Accepted: 21 March 2025
Published online: 07 April 2025

References

1. Di Stefano G, Maarbjerg S, Nurmikko T, Truini A, Cruccu G (2018) Triggering trigeminal neuralgia. Cephalalgia 38(6):1049–1056. https://doi.org/10.1177/0333102417721677
2. Svedung Wettervik T, Snel D, Kristiansson P, Ericson H, Abu Hamdeh S (2023) Incidence of trigeminal neuralgia: A population-based study in central Sweden. Eur J Pain 27(5):580–587. https://doi.org/10.1002/ejp.2081
3. Melek LN, Devine M, Renton T (2018) The psychosocial impact of orofacial pain in trigeminal neuralgia patients: a systematic review. Int J Oral Maxillofac Surg 47(7):869–878. https://doi.org/10.1016/j.ijom.2018.02.006
4. Moisak GI, Amelina EV, Zubok NA, Rzaev JA (2021) Psychological status before and after surgery in patients with trigeminal neuralgia. Clin Neurol Neurosurg 203:106578. https://doi.org/10.1016/j.clineuro.2021.106578
5. Melek LN, Smith JG, Karamat A, Renton T (2019) Comparison of the neuropathic pain symptoms and psychosocial impacts of trigeminal neuralgia and painful posttraumatic trigeminal neuropathy. J Oral Facial Pain Headache 33(1):77–88. https://doi.org/10.11607/ofph.2157
6. Singhota S, Tchantchaleishvili N, Wu J, Zrinzo L, Thorne L, Akram H, Zakrzewska JM (2022) Long term evaluation of a multidisciplinary trigeminal neuralgia service. J Headache Pain 23(1):114. https://doi.org/10.1186/s10194-022-01489-7
7. Venda Nova C, Zakrzewska JM, Ni Riordain SRB R (2021) Patient reported outcome measures in trigeminal neuralgia - A systematic review of psychometric performance. Eur J Pain 25(7):1449–1461. https://doi.org/10.1002/ejp.1779
8. Riley JL, Wade III JB (2004) Psychological and demographic factors that modulate the different stages and dimensions of pain. In: Price DD, Bushnell MC (eds) Psychological methods of pain control: basic science and clinical perspectives. IASP, Seattle, WA, pp 19–41
9. Vassend O, Roysamb E, Nielsen CS (2013) Five-factor personality traits and pain sensitivity: a twin study. Pain 154(5):722–728. https://doi.org/10.1016/j.pain.2013.01.010
10. Strachan E, Poeschla B, Dansie E, Succop A, Chopko L, Afari N (2015) Clinical and evoked pain, personality traits, and emotional States: can Familial confounding explain the associations? J Psychosom Res 78(1):58–63. https://doi.org/10.1016/j.jpsychores.2014.09.019
11. Naylor B, Boag S, Gustin SM (2017) New evidence for a pain personality? A critical review of the last 120 years of pain and personality. Scand J Pain 17:58–67. https://doi.org/10.1016/j.sjpain.2017.07.011
12. Pulvers K, Hood A (2013) The role of positive traits and pain catastrophizing in pain perception. Curr Pain Headache Rep 17(5):330. https://doi.org/10.1007/s11916-013-0330-2
13. Ramirez-Maestre C, Esteve R (2013) Disposition and adjustment to chronic pain. Curr Pain Headache Rep 17(3):312. https://doi.org/10.1007/s11916-012-0312-9
14. Chapman BP, Roberts B, Lyness J, Duberstein P (2013) Personality and physician-assessed illness burden in older primary care patients over 4 years. Am J Geriatr Psychiatry 21(8):737–746. https://doi.org/10.1016/j.jagp.2012.11.013
15. Oldham MA (2020) Personality-Informed care: speaking the Language of personality. Psychosomatics 61(3):220–230. https://doi.org/10.1016/j.psym.2020.01.005
16. Redelmeier DA, Najeeb U, Etchells EE (2021) Understanding patient personality in medical care: Five-Factor model. J Gen Intern Med 36(7):2111–2114. https://doi.org/10.1007/s11606-021-06598-8
17. Olesen J (2018) International classification of headache disorders. Lancet Neurol 17(5):396–397. https://doi.org/10.1016/S1474-4422(18)30085-1
18. Gustin SM, Burke LA, Peck CC, Murray GM, Henderson LA (2016) Pain and personality: do individuals with different forms of chronic pain exhibit a mutual personality?? Pain Pract 16(4):486–494. https://doi.org/10.1111/papr.12297
19. Faul F, Erdfelder E, Lang AG, Buchner A (2007) G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods 39(2):175–191. https://doi.org/10.3758/bf03193146
20. Costa PT, McCrae RR (1992) Revised NEO personality inventory (NEO PI-R) and the NEO Five-Factor inventory (NEO-FFI) professional manual. PAR, Odessa, FL
21. Goldberg LR (1999) A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. In: Mervielde I, Deary I, De Fruyt F, Ostendorf F (eds) Personality psychology in Europe. Tilburg University, Tilburg, pp 7–28
22. Guay RP, Oh IS, Choi D, Mitchell MS, Mount MK, Shin K (2013) The interactive effect of conscientiousness and agreeableness on job performance dimensions in South Korea. Int J Sel Assess 21(2):233–238

23. Yun DJ, Oh J, Kim BJ, Lim JG, Bae JS, Jeong D, Joo IS, Park MS, Kim BJ (2012) Development of Korean neuropathic pain questionnaire for neuropathic pain screening and grading: A pilot study. J Korean Neurol Assoc 30(1):15–25
24. Sullivan MJL, Bishop SR, Pivik J (1995) The pain catastrophizing scale: development and validation. Psychol Assess 7:524–532. https://doi.org/10.1037/1040-3590.7.4.524
25. McWilliams LA, Kowal J, Wilson KG (2015) Development and evaluation of short forms of the pain catastrophizing scale and the pain Self-efficacy questionnaire. Eur J Pain 19(9):1342–1349. https://doi.org/10.1002/ejp.665
26. Cho S, Kim HY, Lee JH (2013) Validation of the Korean version of the pain catastrophizing scale in patients with chronic non-cancer pain. Qual Life Res 22(7):1767–1772. https://doi.org/10.1007/s11136-012-0308-2
27. McCracken LM, Vowles KE, Eccleston C (2004) Acceptance of chronic pain: component analysis and a revised assessment method. Pain 107(1–2):159–166. https://doi.org/10.1016/j.pain.2003.10.012
28. Fish RA, McGuire B, Hogan M, Morrison TG, Stewart I (2010) Validation of the chronic pain acceptance questionnaire (CPAQ) in an internet sample and development and preliminary validation of the CPAQ-8. Pain 149(3):435–443. https://doi.org/10.1016/j.pain.2009.12.016
29. Cho S, Heiby EM, McCracken LM, Moon DE, Lee JH (2012) Psychometric properties of a Korean version of the chronic pain acceptance questionnaire in chronic pain patients. Qual Life Res 21(6):1059–1064. https://doi.org/10.1007/s11136-011-0010-9
30. Zigmond AS, Snaith RP (1983) The hospital anxiety and depression scale. Acta Psychiatr Scand 67(6):361–370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x
31. Oh SM, Min KJ, Park DB (1999) A study on the standardization of the hospital anxiety and depression scale for Koreans: A comparison of normal, depressed and anxious groups. J Korean Neuropsychiatr Assoc 38(2):289–296
32. Maarbjerg S, Gozalov A, Olesen J, Bendtsen L (2014) Trigeminal neuralgia–a prospective systematic study of clinical characteristics in 158 patients. Headache 54(10):1574–1582. https://doi.org/10.1111/head.12441
33. Costa PT Jr, McCrae RR (2008) The revised NEO personality inventory (NEO-PI-R). In: Boyle GJ, Matthews G, Saklofske DH (eds) The SAGE handbook of personality theory and assessment. Personality Measurement and Testing, vol 2. Sage Publications, Inc, Los Angeles, pp 179–198
34. Weisberg YJ, Deyoung CG, Hirsh JB (2011) Gender differences in personality across the ten aspects of the big five. Front Psychol 2:178. https://doi.org/10.3389/fpsyg.2011.00178
35. Keogh E (2025) Sex, gender, and pain: evidence and knowledge gaps. Curr Opin Psychol 63:102006. https://doi.org/10.1016/j.copsyc.2025.102006
36. Gustin SM, Peck CC, Macey PM, Murray GM, Henderson LA (2013) Unraveling the effects of plasticity and pain on personality. J Pain 14(12):1642–1652. https://doi.org/10.1016/j.jpain.2013.08.005
37. Terracciano A, McCrae RR, Brant LJ, Costa PT Jr (2005) Hierarchical linear modeling analyses of the NEO-PI-R scales in the Baltimore longitudinal study of aging. Psychol Aging 20(3):493–506. https://doi.org/10.1037/0882-7974.20.3.493
38. Donnellan MB, Lucas RE (2008) Age differences in the big five across the life span: evidence from two National samples. Psychol Aging 23(3):558–566. https://doi.org/10.1037/a0012897

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.