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SELF – REPORTED DEPRESSION, ANXIETY AND EVALUATION OF OWN PAIN IN CLINICAL SAMPLE OF PATIENTS WITH DIFFERENT LOCATION OF CHRONIC PAIN

SAMOOCENJENA DEPRESIVNOST IN ANKSIOZNOST TER EVALVACIJA LASTNE BOLEČINE V KLINIČNEM VZORCU PACIENTOV Z RAZLIČNO LOKACIJO KRONIČNE BOLEČINE

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ABSTRACT

Background. Depression, anxiety and chronic pain are frequent co-occurrent disorders. Patients with these mental disorders experience more intense pain that lasts for a longer time.

Method. Questionnaire with 228 variables was applied to 109 randomly chosen patients that were treated at an outpatient clinic for treatment of chronic pain of the University Clinical Centre Ljubljana from March to June 2013. 87 patients responded to the questionnaire (79.8%). Location of pain considering diagnosis was the criterion in the discriminant analysis (soft tissue disorders; headache; symptoms not elsewhere classified; back pain) and following summative scores as predictors: level of depression and anxiety (The Zung Self-Rating Depression/Anxiety Scale), evaluation of pain and perceptions of being threatened in social relations.

Results. Average age of participants was M = 52.7 years (SD 13.9), with 70.9% female, 29.1% male participants. 63% of respondents achieved clinically important level of depression and 54% clinically important level of anxiety. On univariate level, the highest level of depression and anxiety was found for back pain and the lowest for headache. No significant difference was found in evaluation of pain and perceptions of being threatened in social relations regarding location of pain. Self-evaluation of depression has, in the framework of discriminant analysis, the largest weight for prediction of differentiation between different locations of pain.

Conclusion. Different locations of pain have different connections with mood levels. The results of research on a preliminary level indicate the need to consider mental experience in the treatment of chronic pain.

Keywords:
chronic pain, anxiety, depression, location of pain, back pain

IZVLEČEK

***Izhodišče**. Depresija in anksioznost sta pogosti sočasni duševni motnji s kronično bolečino. Bolniki s tema motnjama doživljajo intenzivnejšo bolečino, ki traja dlje časa. Obstajajo tudi socialno-kontekstualni dejavniki bolečine, kot so spremenjena socialna vloga človeka s kronično bolečino oziroma socialna izločenost.*

***Metoda**. Vprašalnike z 228 spremenljivkami smo aplicirali na 109 naključno izbranih bolnikov, ki so se zdravili v Ambulanti za zdravljenje bolečine Kliničnega centra Ljubljana od marca do junija 2013. 87 bolnikov je izpolnilo vprašalnik (79,8 %). V diskriminantni analizi je bil kriterij lokacija bolečine glede na diagnozo (motnja mehkih tkiv; glavobol in živčni pleteži; nespecifični simptomi; bolezni hrbta), kot prediktorji pa seštevne vrednosti depresivnosti (Zungova samoocenjevalna lestvica depresivnosti), anksioznosti (Zungova samoocenjevalna lestvica anksioznosti), evalvacije bolečine in zaznave lastne ogroženosti v socialnih odnosih zaradi bolečine.*

***Rezultati**. Povprečna starost udeležencev je bila 52,7 leta (SD 13,9), 70,9 % žensk in 29,1 % moških. 63 % jih je doseglo klinično pomembno raven depresivnosti in 54 % klinično pomembno raven anksioznosti. Na univariatni ravni smo ugotavljali najvišjo raven depresivnosti in anksioznosti pri lokaciji bolečine v hrbtu, najnižjo pri glavobolu. Med prediktorji diskriminantne analize ima za napoved razlikovanja med bolečinskimi lokacijami izrazito največjo težo samoocena depresivnosti. Gre za zelo visoko korelacijo (0,93). Raven depresivnosti v naturalističnem vzorcu protibolečinske ambulante najbolje napoveduje lokacijo/diagnozo bolečine. Če so udeleženci ocenjevali raven svoje depresivnosti kot visoko, so sodili v skupino z diagnozo bolečine v hrbtu. Udeleženci z diagnozo bolečine v hrbtu tudi v pomembno večjem številu še vedno prebolevajo resne stresorje iz preteklega leta kot udeleženci z drugimi lokacijami bolečine. Udeleženci z lokacijo bolečine glavobol se glede raziskovanih spremenljivk (depresivnost, anksioznost, evalvacija bolečine, zaznava lastne ogroženosti v socialnih odnosih zaradi bolečine) najbolj razlikujejo od udeležencev z drugimi tremi lokacijami bolečine; najbolj so si podobni udeleženci z lokacijo mehkih tkiv in diagnozo nespecifičnih simptomov. Udeleženci pa se glede na lokacijo bolečine niso razlikovali med seboj glede tega, kako škodljivo doživljajo bolečino in kako prizadete se počutijo zaradi bolečine v svojih socialnih odnosih.*

***Zaključek**. Različne lokacije bolečine se na različen način povezujejo z različno ravnijo razpoloženja. V raziskovanem vzorcu je ocena ravni lastne depresivnosti ekskluzivni napovedovalec lokacije bolečine. Rezultati raziskave na preliminarni ravni kažejo potrebo po upoštevanju duševnega doživljanja pri obravnavi bolnikov s kronično bolečino.*

Ključne besede:
kronična bolečina, anksioznost, depresivnost, lokacija bolečine, bolečina v hrbtu

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1 INTRODUCTION

Chronic pain is regarded as a growing public health problem; it causes individuals' suffering, affects interpersonal relations and presents a great expense in medical care (1, 2). A study, which included 15 European countries, has determined that pain of mild to serious intensity is present in 19% of residents and that it gravely influences their social and work life (3). Pain becomes chronic when it lasts for longer than the normal time of tissue healing and does not reach an adequate state of relief despite various interventions; it should last for a period of at least six months (4). 23% of interviewed people in the Slovenian study reported chronic pain (5). Chronic pain in the lower back is the most common reason for work related disability in people under the age of 45 years (6).

Increasingly better knowledge of the pain's biological basis is of the utmost importance but on its own not sufficient enough to control the pain if we aren't also acquainted with the psychosocial factors that are involved in determination of the intensity of pain and the result of treatment (7). That is why pain has been understood as a multifactorial illness with bio-psycho-social components (8). The experience of pain consists of the bodily sensation (sensory component) and the negative/aversive emotion or mood. Subjective experience of pain is formed by the combination of information from the discriminatory/thalamocortical and limbic pathway; the latter is responsible for the emotional component of pain (9). The main emotional-aversive aspects of pain are mediated through the anterior cingulate cortex, which also has a role in memory, since the transient information during the processing of pain is stored in this area (10). The other essential part of the limbic pathway, which is involved in the emotional/mood component of pain, is the central part of the amygdale. It participates in the integration of the physical and mental component of the stress response, especially when generating anxiety and fear. The serotonergic and noradrenergic neurotransmitter system presents the joint neurotransmitter system for pain, cognitive and mood pathways (11).

Depression and anxiety are common co-occurrent mental mood disorders with chronic pain: patients with these two simultaneous disorders have experienced more intense pain that lasted for a longer duration, and the presence of pain has negatively affected recognition and treatment of the co-occurrent depression (12). A high rate of co-occurrent depression (59%) and anxiety (55%) has been identified among patients at pain clinics (13). For example: along with the controlled characteristics of rheumatoid arthritis, a typically higher self-evaluation of pain has been determined amongst patients that have had simultaneous states of anxiety and depression (14). It is common for people with chronic pain to be worried and anxious, especially if their symptoms aren't clearly explainable, which is a frequent experience with chronic states of pain (15). A stronger connection of pain with anxiety, rather than depression, has been established for rheumatic, bone and joint pain; chronic pain is generally tied to a spectrum of mental disorders and not exclusively to depression (16). Important positive correlations between pain and mood disorders, especially panic disorder and posttraumatic stress disorder, have been established in an American epidemiological study in the last 12 months (17). Posttraumatic stress disorder has been discovered in 10-15% of patients with chronic pain (18).

There are also social – contextual factors of pain that are relatively poorly researched (19). For example, the social role of a person with chronic pain may be changed, there is an uncertainty about his/her contribution to the family and other people may perceive and value him differently. It has not been until relatively recently that the social influence and communication about pain have been emphasised and researched (20). Recent investigations showed that so-called social pain (perception and experience during social detachment, alienation, even the experience of personal jeopardy as a consequence of characteristic activity during the manifestation of chronic pain) may have partly the same neurobiological substrate as physical pain (anterior cingulate cortex) (21). Social processes such as social alienation and lack of support may contribute to mutual sensitisation and contribute to more intense pain and vice versa. Such social processes may be frequently experienced by chronic pain patients, e.g. rejection from the side of interpersonal relations; they may also have problems with intimate or family relations (22, 23). Craig's opinion was that pain (as a phenomenon, which is expressed on numerous levels and in various aspects) remains unrecognised, poorly evaluated, underestimated and inappropriately treated (19). He was also of the opinion that a constant tendency of underestimating the pain of others exists. Comparison of self-evaluation of pain and evaluation of pain as seen by parents and medical workers, who have been importantly involved in the process of pain relief, has shown a systematic underestimation of the patient's pain in the eyes of people involved with the suffering person's treatment. It can be rightly presumed that because of the incompatibility of the different perceptions, the expression of pain signifies something that can make the patient perceive himself/herself not only as inadequately treated but at times even endangered in social relations in everyday life situations. Pain or the perception of pain mostly can't be measured directly, since it has always been also a subjective experience. That's why it's important how the suffering person manages to communicate his/her pain, so that he/she can receive appropriate help (15), or that helpers can approach the treatment of chronic pain with an understanding of the influence of emotions and mood.

Since pain is not only a somatic problem but is always conceptualised as a subjective phenomenon or emotion/mood (9) that also influences interpersonal relations, there are additional insufficiently recognised and utilised means of intervention when it comes to pain modulation on the level of mental processes in medicine (24). It should also be stressed that the relationship between the objective – somatic and mental factors isn't a one way cause – effect affair but is, at least to a degree, also circular (mutual influence). Co-occurrent emotional states or mood disorders can be a cause but also a variously in-

tense consequence of the same pain problem. Anxiety and depression stand out when it comes to the circular connection with chronic pain in the area of mental disorders (25). In addition to emotions, an individual's experience of pain is also accompanied by social perceptions of social consequences that are part of the individual's experience of being a victim of his/her life situation. Meta-perceptions are especially important: how someone perceives that he/she is being perceived by others (significant relatives, other social environments) (26). In regard to pain perception, it's also important to not overlook how the pain has been evaluated and which functions are being attributed to it (27). Suffering "with a cause" may be more tolerable than suffering with pain of an unknown origin. Evaluative – subjective components of pain can also be as important as the somatic aspects of pain signal transmission (28). Among the relatively common sources of pain stimuli and experiences are, for example, diseases of musculoskeletal system and connective tissue, disorders of soft tissues (e.g. fibromyalgia) and headaches; there are even cases that are hard to associate with a precisely located and classified source.

In the following paper, the preliminary results will be presented (through an appropriate research plan) from a naturalistic clinical sample of patients and can be reasonably used to understand the nature of patients' suffering and to plan their treatment. The presented results are established using a statistical terminology that may be complex for a clinician, however along with the presentation of results and in the discussion, they will also be explained in applicative clinical terminology.

1.1 Problem and goals

On the basis of the previously explained/ presented, the problem of our actual research could be defined as the following question: can we predict, taking into account particular predictors, the body-source of the perceived pain (M79X: Soft tissue disorders; G43X, 44X, G 50-59: Migraine, Headache, Nerve, nerve root and plexus disorders; RXXX: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified; M480-M54X: Dorsopathies). The following variables are treated a/ as a set of predictors in multivariate discriminant analysis and b/ as single dependent variables in the framework of a univariate analysis: self – perceived depression, self – perceived anxiety, evaluation of own pain and perception of being socially menaced in different social relations because of own public and manifest expression of pain related behaviour. Secondly, we are also interested into question does significant differences could be found in particular single variables, treated as dependent ones, regarding the four possible sources of perceived pain stimuli.

Taking into account the content and statistical definition of the problem, the actual contribution also has some mutually inter-connected goals: the construction goal is supposed to be obtained through a metrically correct way of the new instruments' construction, which is needed to answer the problem questions. Two new instruments with psychological scaling of summative type (semantic differential) try to measure two variables that are, in the existent literature, almost non-elaborated (perception of being, from different points of view, socially menaced because of the manifestation of own pain) or the variables are not elaborated in the same way as conceived in the actual contribution (evaluation of own pain). The study also has a very important applicative goal: to take the first steps towards introducing the obtained findings into everyday clinical work.

We expect that the body source of the pain stimuli could be, with suitable probability, predicted on the basis of the set of four predictors (perception of own depression and anxiety, evaluation of own pain and perception that particular own social relations are menaced because of public manifestation of the own pain) on the level of at least the first one of the three possible discriminant functions. Simultaneously, we expect significant differences in each of single variables (a, b, c, d) regarding the four possible sources of pain stimuli.

2 METHODS

2.1 Participants in the research

Questionnaires have been completed by n = 109 randomly chosen patients treated in the outpatient pain clinic of Ljubljana University Medical Centre in spring 2013. N = 87 patients answered the questionnaire and returned it to the interviewer (79.8%). The study included a completely random selection from the naturalistic clinical population. Patients who consecutively visited the clinic were invited to participate in the study on days when a medical student - the interviewer was present. He/she had no influence on the ordering of patients. All patients were invited to complete the questionnaire, except patients who could not complete the questionnaire alone according to clinical cognitive impression (e.g. cognitive compromised elderly patients with relatives who communicated with medical personnel). Questionnaires were offered after the analgesic treatment. The participation was entirely voluntary and questionnaires were anonymised. The interviewer acquired medical data from medical documentation (patients' number identification, diagnosis, medications, specialists involved in treatment). Participants were able to refuse participation at any time without any consequences for treatment. Participants in the study did not receive any monetary compensation. The study was approved by the Medical Ethics Commission of the Republic of Slovenia, No. 166/07/13.

Average age of the participants was M = 52.7 years (SD = 13.9). 70.9% were female (with average age M = 54.0 years, SD = 13.2) and 29.1% were male (average age M = 49.4 years, SD = 15.8 years).

2.2 Instruments

For this paper, only part of the questionnaire has been presented, but for informational purposes the whole list

of questions is given: We applied questionnaires with 228 variables, among others questions about personal, demographic, socio-economic and socio-cultural status characteristics such as gender, age, marital status, nationality and number of children. The questionnaire included dependent variables regarding different self-evaluations of pain, level of mood (anxiety, depression), profile of five personal traits BFI – Big Five Inventory (29), self-perception of physiological response to pain and other social-cognitive characteristics of pain perception.

The following variables were exclusively included in the actual contribution/ article:

Zung's Self – rating Depression Scale (30): the instrument contains 20 questions; answers are formulated on a scale of perceived frequency from 1 (never, very rarely) to 4 (always). For clinically applicable evaluation, the summation is divided by 80 and then multiplied by 100 (with values from 25 to 49 points as the normal state, from 50 to 59 points as soft/ mild depression, from 60 to 69 as moderate depression, with 70 points or more as heavy depression). Cronbach alpha of internal consistency = 0.84.

Zung's Self – rating Anxiety Scale (31): the instrument contains 20 questions; answers are formulated on a scale of perceived frequency from 1 (never, very rarely) to 4 (always). For clinically applicable evaluation, the summation is divided by 80 and then multiplied by 100 (with values from 25 to 49 points as the normal state, from 50 to 59 points as soft/ mild anxiety, from 60 to 69 as moderate anxiety, with 70 points or more as heavy anxiety). Cronbach alpha of internal consistency = 0.86.

Perception of being menaced in different social relations (from the social environment because of manifestation of feeling of own pain): evaluation of the degree to which the perceptions of various other players menace different own social relations and characteristics of self – perception. ("To what degree do you think that your pain experience, as perceived from the side of various other people/ environment, menaces your (with single answers from 1 (does not menace at all), …, to 5 (menaces very much)): … reputation/self-confidence/self-respect/ acceptance from the side of your family/ of your friends … The whole scale contains 13 items with answers from 1 to 5, and the whole scale is treated as a summative value with relatively high internal consistency (Cronbach alpha = 0.93 with n = 50 valid cases). Higher summative score means more expressive perceptions (by the participants) that their public manifestation of pain experience/ feelings means also that their social relations and self-concepts are more strongly menaced from the side of the relevant social environment. The final number of items in the scale was chosen from the greater number of the antecedent number of items that had been formulated/ chosen according to typical personal and inter-personal life situations. Further constructional procedure strictly followed the demands of the construction of summative scale, and it represents the suitable analogy of Likert's attitude scale; for each single item its discriminative value was also identified; only those items were selected into the final form that suitably discriminated (positively, significantly ($p < 0.05$)) and highly correlated with the summative score.

Evaluation of pain, as experienced by the participants in their own actual life situation (all together 15 bipolar continuums from 1 to 7); an example: "The pain is something that is: inutile 1 2 3 4 5 6 7 utile). Internal consistency of the summative scale is high enough (Cronbach alpha = 0, 82). Higher final summative value means more negative evaluation of own pain. Being constructed as semantic differential, the scale is composed of single bipolar continuums (between two attributes/ mostly adjectives with contrasting connotative meaning). Positive respectively negative attributes were positioned at the beginning (number 1) or at the end (number 7) of the continuum randomly. Not only positive or only negative attributes are on the same side of bipolar continuums from 1 to 7. In the framework of statistical analysis, the single continuums (those with positive attributes on their left side) were recorded so they had the same sense – connotative meaning and higher final summative value meant more negative evaluation of own pain. The authors of the article are also the authors of the last two summative type scales.

Diagnostic category of pain, perceived on the side of participants regarding MKB – 10 (32): the participants were a posteriori allocated into one of four diagnostic groups. A diagnosis was, during clinical treatment, attributed to the patients by physicians – specialists from the ambulance for pain treatment of the Clinical centre in Ljubljana (1 = M79X: Soft tissue disorders; 2 =G43X, 44X, G 50-59: Migraine, headache, nerve, nerve root and plexus disorders; 3 = RXXX: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified; 4 = M480-M54X: Dorsopathies).

Approximate normality of variables' distributions on interval level of measurement, which is a precondition for the applied statistical analysis, was verified with K-S (Kolmogorov – Smirnov) test; approximate normality was assured by almost all dependent variables (predictors), with risk level of K-S coefficient suitably higher than $p = 0.05$ ($>$ or $>>$ 0.05).

2.3 Research design and statistical elaborations

From the whole study, only one very relevant research aspect is included in the actual presentation. The discriminant analysis, like the multivariate approach, was used to verify the hypothesis regarding whether the four body sources of pain (1/soft tissue disorders; 2/migraine, headache, nerve, nerve root and plexus disorders; 3/ symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified, 4/ dorsopathies) could be suitably predicted (on the level of at least one significant (the first one) from three possible discriminant functions) with the set of four predictors (perception of own anxiety, depression, of own pain and of the degree being socially menaced in different social relations and self - perceptions). We paid attention so as to approximate normal distribution of predictive variables and to demand for homogeneity of covariances, connected with high enough risk level of mentioned covariance testing

($p > or p >> 0.05$). In the framework of additional univariate analysis, the same variables were treated as single dependent variables, while possible source (location) of the pain is the independent variable. In the case of the multivariate approach (discriminant analysis), four possible pain locations were treated as classifying variables.

3 RESULTS

3.1 Sample

N = 64 patients answered all 20 items of depression questionnaire for calculation of summative score: 29.8% reached the criterion of mild, 20.4% of moderate and 12.6% of severe depression. N = 81 patients answered all 20 items of anxiety questionnaire for calculation of summative score: 34.6% reached the criterion of mild, 8.6% of moderate and 11.1% of severe anxiety. Levels of depression and anxiety in our sample showed significant and high correlation ($r (64) = 0.73$, $p < 0.001$). Experience of intense stressor in last year (yes-no) showed significant correlation with type/location of pain $x^2 (3) = 11.75$, $p = 0.008$. The question about intense stressor was formulated as: have you had any difficult experience in the last year that you still remember and that is still psychologically painful to think about? Participants have understood "difficult experience" appropriately, because stressful events have been listed as follows – painful surgical or long painful rehabilitation, financial problems, illness and death of father, family conflict, loss of several teeth, loss of job, car accident – to look into the eyes of death in the presence of children, divorce, division of property, paraplegia after accident, no stable employment, work injury, son's car accident, death of mother, death of father, death of father and simultaneous illness of husband, son's financial problems, fear of former husband, victim of violence. Most frequently, such stressors were experienced by participants with back pain (75.0%), least frequently by those with headache (21.4%). A severe stressor in the last year was experienced by 40.0% of participants with pain in the soft tissues and 42.9% of those with undefined pain.

3.2 The results of the discriminant analysis

Descriptive statistics (summative scores) for variables: level of depression, level of anxiety, evaluation of own pain and perceptions of being threatened in social relations are presented in table 1 (Table 1). Only summative scores with all items answered have been taken into account.

The univariate part of our research design was elaborated with Wilks' test of equality of group means: alternative hypotheses about differences in each single dependent variable regarding the pain location as the independent variable are confirmed in the case of perception of own depression and of own anxiety (Table 2), while the alternative hypotheses were rejected in the case of evaluation of own pain and perception of being socially menaced (because of own manifest pain status) as dependent variables. Results show that participants' perception of own depression and of own anxiety significantly differ regarding their pain diagnosis (pain's location). The highest level of depression and anxiety was self – perceived by the participants with dorsopathy diagnosis and the lowest by the participants with a headache.

Table 1. Descriptive statistics (summative scores) for level of depression, level of anxiety, perceptions of being threatened in social relations (because of pain) and pain evaluation in relation to the diagnosis of pain.

Criterion – diagnosis of pain	Predictors	n	M	SD
M79X: Soft tissue disorders	self – perceived depression	22	44.45	8.72
	self – perceived anxiety	24	39.68	8.19
	evaluation of own pain	24	49.40	18.25
	perceptions of being threatened in social relations	18	31.86	14.23
G43X, 44X, G 50-59: Migraine, Headache, Nerve, nerve root and plexus disorders	self – perceived depression	12	34.41	5.53
	self – perceived anxiety	15	36.25	6.13
	evaluation of own pain	15	39.75	24.19
	perceptions of being threatened in social relations	10	22.83	10.34
RXXX: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	self – perceived depression	9	44.55	8.26
	self – perceived anxiety	12	40.22	9.88
	evaluation of own pain	12	49.11	22.56
	perceptions of being threatened in social relations	7	31.11	15.79
M480-M54X: Dorsopathies	self – perceived depression	14	48.78	8.19
	self – perceived anxiety	21	46.14	10.15
	evaluation of own pain	21	38.35	25.88
	perceptions of being threatened in social relations	11	34.21	9.98

Note 1:
- Depression = level of depression (Zung's Self – rating Depression Scale) – summative score: higher value means higher level of depression.
- Anxiety = level of anxiety (Zung's Self – rating Anxiety Scale) – summative score: higher value means higher level of anxiety.
- Evaluation of own pain – summative score: higher value means a more negative evaluation of their own pain.
- Perceptions of being threatened in social relations - summative score; higher value means perception of more threatened social relations and self – concepts.

Note 2: variables are treated as predictors in context of discriminant analysis; in context of univariate analysis as dependent variables.

Table 2. Wilks' tests of equality of group means.

	Wilks' Lambda	F	df1	df2	P
self – perceived depression	0.704	7.434	3	53	0.000
self – perceived anxiety	0.854	3.031	3	53	0.037
evaluation of own pain	0.945	1.024	3	53	0.389
perceptions of being threatened in social relations	0.903	1.909	3	53	0.139

Note for explanations of predictors: same as for Table 1.

Test of significance for single discriminant functions showed that only the first function is statistically significant, with eigenvalue = 0.47 and with 80.6% of correspondent explained variance (Wilks' Lambda = 0.611, Chi – sq. (12) = 25.63, p = 0.01; results for the second function: Wilks' Lambda = 0.898, Chi – sq. (6) = 5.57, p = 0.47). It means that in Table 3 only the correlations between the summative scores of manifest variables and the first discriminant function will be interpreted (see first column in Table 3).

Despite of some relatively low frequencies in single cells (for example 7, 9 and 11), the multivariate demand for the homogeneity of covariances was satisfied (Box's M test = 31.47, F = 0.88, p = 0.065).

The structure matrix of correlations between manifest variables (represented with summative scores) as predictors on one side and the first and only significant discriminative function on other side is shown in Table 3, in its first column (Table 3). The highest correlation could be identified between the first discriminant function and summative score that expresses the evaluation of own depression (= 0.93). Almost the same correlation with the first canonical function was found for "evaluation of own pain" and for "perception of threat/ menacing for own social relations because of public manifestation of own pain experience" (= 0.48). It's evident that within the set of four predicting variables, the highest predictive power could be attributed to perception of own depression. From this point of view, respondents with perception of high level of own depression could also be classified into the category of patients with dorsopathy as criterion of classification (with relatively the highest probability level of allocation into one of four possible diagnostic categories).

Table 3. Structure matrix of correlations between manifest variables-predictors and canonical discriminant functions.

	Functions		
	1	2	3
perception of own depression	0.932	-0.320	0.121
perception of own anxiety	0.478	-0.755	0.165
evaluation of own pain	0.107	0.683	0.606
perceptions of being threatened in social relations	0.477	-0.059	-0.699

Note for explanations of predictors: same as for Table 1.

Only the centroids of the first and only significant discriminant function were taken into account. Values of centroids appear on dimension of real numbers with negative and positive values. Centroids could also somehow be explained with analogy of some "common denominator" of all four predictors (perceived own depression and anxiety, evaluation of own pain and of perceived degree of being menaced in different social relations because of manifestation of own pain experience). With their position on dimension of real numbers, the centroids show similarities and differences among four different criterion groups of participants, identified on the basis of their pain allocation diagnosis (body location of pain source). According to the centroids' values of the first and only significant discriminant function (Table 4), the centroid of the group of respondents with the headache expressively and distinctively appears with its negative value; this pain location also differs the most from the centroids' values of the other three criterion categories (sources, allocations of the pain). The relatively most similar were the two groups with diagnosis "pain of soft tissues" and diagnosis "nonspecific symptoms". On the positive continuum of centroid values, those with dorsopathies exceeded others.

Table 4. Discriminant functions at group centroids table.

Criterion – diagnosis of pain	Discriminant function		
	1	2	3
M79X: Soft tissue disorders	0.243	0.295	-0.020
G43X, 44X, G 50-59: Migraine, Headache, Nerve, nerve root and plexus disorders	-1.256	-0.123	-0.001
RXXX: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	0.219	0.213	0.055
M480-M54X: Dorsopathies	0.554	-0.496	-0.003

Note: Only the first discriminant function is significant ($p < 0.05$).

4 DISCUSSION

In the actual report, we were interested in the question of whether the type/ source/ allocation of the pain (soft tissues; head; nonspecific; dorsopathies) could be identified (predicted) on the basis of the chosen set of four predictors (perception of own depression, of own anxiety, of own pain and of perception of being menaced in

different social relations because of the public manifestation of own pain experience). Our research hypothesis corresponds with the mentioned problem's aspects, and it was statistically verified with the multivariate approach – discriminant analysis. Almost all statistical demands of such an approach were satisfied (approximate normal distributions of almost all predictive variables, homogeneity of covariances) and we can say that we confirmed (on the level of the first and only significant discriminant canonical function) our research alternative hypothesis.

The by far highest correlation between the first (and only significant) discriminant function and any of the four manifest variables, represented by summative scores, was found for perception of own depression (= 0.93). Perception of being menaced in social relations because of ... and perception of own anxiety correlate with the first discriminant function almost 50% less than perceived own depression does. The last variable has, within the set of four predictors, relatively the highest importance for the prediction of pain location (of body source of the pain). Insight into the table of descriptive statistics shows, in comparison to other groups, significantly lower degree of perceived own depression for/by the group with "headaches". From the centroids' aspect, negative centroid by the group 2 (headaches) expressively exceeds, while in the opposite, positive value direction, exceed the participants having the "dorsopathy problems". These two groups also differ not only significantly but also relatively the most in terms of perception of their own depression. Also, according to the experiences and results of our clinical work with the patients in the anti – pain ambulance, who participated in our study, the perception of their own depression best predicts their pain / diagnostic location. On the other side, depression is relatively the most frequent for patients with dorsopathy – with backbone and other back – pains. It is also consistent with the prospective study in which it was found that patients who suffer from severe psychological stress (and where we can expect more of reactive depression) are three times more menaced by the developing of dorsopathy and backbone pain than those who have better and more functional coping mechanisms (33). Also, in our sample the patients with a diagnosis of dorsopathy (with backbone pain included) not only had relatively the highest level of perceived depression but also reported much more frequently about a heavy stressor in the last year than any other group of patients. This could be understood as the additional confirmation that the patients with dorsopathy are simultaneously also the most vulnerable for mood disorders. A greater proportion of the same patients also tried to overcome the negative consequences of a heavy stressor in the last year (but we do not know if the depression is the consequence of these stressors or these stressors are disturbing for the patients just because of their depression). Mental disorders and backbone pain are frequently inter – connected in simultaneous moods; when 17 different states were mutually compared, very similar trends were found, regardless of cultural and economic factors. Depression (but also anxiety and alcohol misuse) was significantly more frequent among people with backbone pain (especially lumbo-sacral) than by the people without these pains (34). The results of our study are also consistent with findings that the development from acute to chronic pain in the lumbo-sacral zone is best predicted by previous traumatic events and by the characteristics of the depressive feelings (35). Relatively speaking, the highest level of depression is expected in patients with pain in various backbone areas, with dorsopathy. According to the results of some recent researches, only the emotional stress essentially contributes to the outcome of treatment on the lower dorsal area (36). We can say that in our sample the patients with headache differed from the others the most regarding their psychological mood, because we did not identify clinically important/ significant depression (and, in addition, we obtained "only" self – reported results). Most likely, the headaches experienced by these patients are not persistent and there are probably some longer temporal intervals without pain, when such patients spend their working and leisure time without pain.

We did not confirm all the hypotheses of the univariate approach, where single predictors of the discriminant analysis appeared as single dependent variables and location/ source of the pain as the independent variable. In the framework of the univariate approach, the alternative hypothesis was rejected in the case of the evaluation of own pain and in the case of perception of being menaced in social relations because of own manifest pain experience. We did not find significant differences among the groups with four different pain allocations in their evaluation of own pain and in their evaluation of how their pain is harmful for their social relations, including their self – concepts. We may underline that the results of the univariate approach confirm the results of the discriminant analysis; the latter only pays attention to the exclusive predictive value of the perception of own depression by the participants in the research. Taking into account also their centroid values, the "headaches" distinctively appear with their perception of low degree depression level. The centroid of this group/ category of patients is negatively evaluated, while all the centroids of all other groups/ categories are positive. Perception of expressively higher degree of own depression is characteristic for only the mentioned groups, relatively speaking the most for those with diagnosis of dorsopathy. We can assume that the participants who most feel they are in psychological distress most (regarding other diagnoses) feel dorsopathies/ back – pains and vice versa.

Our results are not completely concordant with the results of Rijavec, Novak (37), who found that their patients – participants in the research (150 physically healthy patients, hospitalised with a diagnosis of acute depressive episode) with somatic pain symptoms, among which "headache" was the most frequent, also had more expressed depression. The two groups of patients/participants are probably so different that a comparison perhaps isn't possible. In our study, a primary referral to a pain clinic is somatically based, however the primary referral in the compared study was depressive disorder. One Dutch study is a rare example to research the connection between depression, anxiety and different locations of pain,

which otherwise also can't be directly compared with our study (38). They researched mood disorders at location of pain in sense of migraine and other locations of pain, such as back, neck, orofacial area, abdomen, joints, breasts among 2981 participants of the study about depression and anxiety. Mood disorders have been significantly linked with all locations; however, comorbidity of migraine and other locations of pain have been importantly reduced with reduction of severity of a mood disorder. The same study determined among 614 participants, who previously had no diagnosis of depression or anxiety, that depression and anxiety's development has been significantly linked to the location of pain (head, back, neck, orofacial area, abdomen, joints), to a higher number of pain locations and to higher intensity of pain, but not to the duration of pain. Joint pains and higher number of pain locations have been proven as the highest threat of triggering depression or anxiety (39). Back pain can be variously classified depending on the originating mechanism; another study, which among other things researched depression and anxiety in connection to back pain in 464 patients, found higher grades of depression and anxiety in patients with classified pain as a central sensitisation according to the nociceptive and peripheral neuropathic mechanism of pain than estimated by clinicians. This study supports the idea that, considering the multidimensionality of pain, same location of pain is connected with different expressions of mood disorders, or, according to the results of this study, mechanism of origin might be of greater importance than the location of pain itself (40). A study in primary healthcare involving 500 patients with musculoskeletal pain with depression and without it found more psychosocial stressors and higher anxiety (which were also linked to the intensity of depression) in a subgroup of depressive patients (41). This study has similar conclusions to our study in regard to the connection between psychosocial stressors and depression; however, it did not deal with the location of pain. Regardless of the fact that studies haven't compared mood disorders in relation to various locations of pain, it's still possible to understand the diversity of these studies through the possibility of applying co-occurrence of pain and depression to combined neurobiological and psychological causes (37), but we still don't quite understand the multidimensionality of pain, especially in connection with mood disorders and location of pain, and results may differ. However, it's necessary to keep in mind that these are very different samples of patients and very different contexts in which the patients have been treated. Contexts are also different in regard to entirely probable diverse styles of referrals into subspecialised pain treatment: whether it's primarily concerning patients with a mental disorder or patients with somatic symptoms, whether it's concerning a population study or a sample of patients in treatment. However, it's completely possible that information from all the different primary researches will sooner or later help us as a source of various fragments that will form a mosaic of meta-knowledge, furthering our understanding of the greater picture of connection between location of pain and mood disorders.

Advantages and imperfections of the study: even after a precise and relatively comprehensive examination of scientific literature, we have found that there are a small number of similar studies (connection between location of pain and expression of mood disorder) on the global scale; they are especially rare in the Slovenian research space. Future attempts in a similar direction could differentiate between the various locations (sources, focuses) of pain more comprehensively and more specifically. Of course, we can also point out that the sample could be larger, as could its representativeness, which increases the ecological validity of results that come from characteristics of the research plan or increases their generalisation in the direction of the corresponding target population. At the same time, it's worth mentioning that it's possible to make appropriate conclusions even when the number of participants, as in the specific conditions of our statistical approach, is relatively low, since the homogeneity of covariances is assured in a discriminant analysis. Further studies should offer a more appropriate representativeness of sampling and form a wider multidisciplinary research team.

It seems sensible to consider the status of every patient with chronic pain also in terms of their mood status and in terms of their pattern of thinking and experience about chronic pain. Without understanding and considering psychological and social context, which can be greatly assisted through an interdisciplinary collaboration, chronic pain is, according to the professional literature. difficult to treat for medical personnel, as well as for patient (42), since he/she needs better information about the nature and possible modulation of pain for better control. Patients with chronic pain supposedly need the same amount of time to explain biological, cognitive and behavioural factors that are linked to this state. However, it's probably not necessary to research on a clinical level whether depression or pain was sooner or later developed, since mutual connection and influence between pain and mental state is of the outmost importance in the plan of pain management (43).

5 CONCLUSION

Various locations of pain are connected to mood in different ways according to the results of the study; the highest levels of depression and anxiety were discovered for back pain and the lowest for headache. Perception of own endangerment in social relations and evaluation of pain weren't found to significantly differ between locations of pain. Level of depression is, according to our results, the best predictor of location of pain among patients who have been treated at an outpatient clinic. The results of the study can also signify an additional incentive for interdisciplinary researches on the subject of pain, since it's an area that is too often restricted to separate professional circles due to the separation of professional disciplines.

CONFLICT OF INTEREST

The authors declare that no conflict of interest exists.

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ETHICAL APPROVAL

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APPENDIX

Appendix 1. Perceptions of being threatened in social relations - summative score.

To what extent do you think that your experience of pain, which is seen by other people, endangers (circle evaluation from 1 to 5)

your reputation, prestige among them:	not at all	1	2	3	4	5	very much
your self-confidence:	not at all	1	2	3	4	5	very much
your self-esteem:	not at all	1	2	3	4	5	very much
your ability to adapt:	not at all	1	2	3	4	5	very much
your self control:	not at all	1	2	3	4	5	very much
your self-regulation:	not at all	1	2	3	4	5	very much
your acceptance by:	not at all	1	2	3	4	5	very much
members of your immediate family:	not at all	1	2	3	4	5	very much
your friends:	not at all	1	2	3	4	5	very much
your colleagues at work:	not at all	1	2	3	4	5	very much
strangers in everyday situations:	not at all	1	2	3	4	5	very much
your quality of life:	not at all	1	2	3	4	5	very much
well-being of your life:	not at all	1	2	3	4	5	very much
your lifestyle:	not at all	1	2	3	4	5	very much
Other – what _____	not at all	1	2	3	4	5	very much

Appendix 2. Evaluation of pain – summative score.

You perceive your pain, which you experience in your life now, as something that is (compare left and right description – circle the number that is the closest to your experience):

useless	1	2	3	4	5	6	7	helpful
nice	1	2	3	4	5	6	7	unpleasant
rough	1	2	3	4	5	6	7	smooth
warm	1	2	3	4	5	6	7	cold
happy	1	2	3	4	5	6	7	sad
dark	1	2	3	4	5	6	7	bright
nonadopted	1	2	3	4	5	6	7	adopted
open	1	2	3	4	5	6	7	closed
pure	1	2	3	4	5	6	7	dirty
necessary	1	2	3	4	5	6	7	non-necessary
just	1	2	3	4	5	6	7	unjust
manageable	1	2	3	4	5	6	7	non-manageable
non-threatening	1	2	3	4	5	6	7	threatening
unacceptable for the environment	1	2	3	4	5	6	7	acceptable for the environment
allows for well-being	1	2	3	4	5	6	7	does not allow for well-being
unobtrusive	1	2	3	4	5	6	7	obtrusive