

Explanatory Models of Illness and Treatment Goals in Temporomandibular Disorder Pain Patients Reporting Different Levels of Pain-Related Disability

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Aims: To explore whether temporomandibular disorder (TMD) pain patients reporting different levels of pain-related disability differ in terms of illness explanations and treatment expectations. **Methods:** Consecutive TMD pain patients ($n = 399$; mean \pm SD age, 40.5 ± 12.7 years; 83% women) seeking treatment in primary care completed the Explanatory Model Scale (EMS). Patients were asked to indicate their expectations regarding the treatment. Each patient's pain-related disability level was determined using the Graded Chronic Pain Scale, with scores indicating no (0 disability points), low (1–2 disability points), or high (3–6 disability points) disability. Differences between EMS factor scores were evaluated using the Mann-Whitney U test. Differences between study groups were analyzed using logistic regression. **Results:** High-disability patients considered physical and stress factors as more important in causing and in aggravating pain and as targets of treatment compared with patients with no disability ($P = .0196$ and $P = .0251$, respectively). The great majority of patients indicated they would like to receive information, decrease pain, and increase jaw function, with no significant subtype differences noted. Compared with no-disability patients, low-disability and high-disability patients were more likely to expect increased ability to perform daily functions ($P < .0001$ in both comparisons), increased work ability ($P < .0001$ in both comparisons), and better stress management skills ($P = .0014$ and $P = .0001$, respectively). **Conclusion:** Illness explanations and goals for treatment differ in patients reporting different levels of TMD pain-related disability. *J Oral Facial Pain Headache* 2016;30:14–20. doi: 10.11607/ofph.1482

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Temporomandibular disorders (TMD) are characterized by pain in masticatory muscles, temporomandibular joints, or both, and associated limitations in jaw functions. The theories regarding the etiologic and pathophysiologic processes of TMD have varied over time. Especially earlier, theories strongly emphasized the role of physical and mechanical factors in the pathophysiologic processes of TMD. At times, theories mainly focused on stress or stress-related behaviors, such as bruxism or grinding of the teeth.^{1–3} However, according to the current understanding, TMD is a biopsychosocial pain condition that involves genetic influences, increased pain sensitivity, psychosocial distress, and an array of environmental factors.^{4–8}

As a consequence of the different etiologic concepts, treatment methods for patients with TMD vary from occlusal treatments and temporomandibular joint surgery to relaxation therapy and cognitive-behavioral methods.^{3,9,10} These diverse treatments are reported to yield good results,^{11,12} but not all patients respond favorably.^{7,13,14} Psychosocial distress is especially known to impair treatment outcomes and increase the risk of chronicity.^{7,15,16} Accordingly, the importance of recognizing these risk factors and addressing them in the treatment approach has been emphasized.^{12,17} Preliminary evidence also suggests that tailoring treatments to a patient's psychosocial state is beneficial. Patients with functional psychosocial profiles may benefit equally from self-care or usual conservative treatment, such as occlusal splints and pain

medication, whereas patients with dysfunctional psychosocial profiles may benefit from adjunctive cognitive behavioral therapy with these treatments.¹⁸

On the whole, personalized TMD pain therapy that takes into consideration a patient's psychosocial state in addition to physical factors is currently considered best practice, and rehabilitation rather than resolution is considered to be the realistic treatment goal for patients with these complex conditions.^{10,12,17} In TMD studies of individualized treatment, however, one important aspect has received very little attention: the patient's own explanatory models of illness and goals for treatment. Explanatory models of illness are defined as an individual patient's beliefs and expectancies regarding the pain, including what causes or exacerbates it and what should be done for it.^{19,20} Explanatory models of illness are specific to the person and shaped by diverse factors, such as cultural factors, past episodes of illness, and information received, and may also mirror the explanatory models of clinicians.^{20,21} To the authors' knowledge, explanatory models specifically for TMD have so far only been explored in two studies by Massoth et al,^{20,21} who developed and tested the Explanatory Model Scale (EMS; www.rdc-tmdinternational.org) to assess the relative roles played by physical factors, oral behaviors, and stress and emotional upset factors in each of the three TMD dimensions: cause, exacerbation, and treatment efficacy. According to Massoth et al,²¹ explanations of illness may influence the acceptance of different treatment strategies by the patients; for instance, patients with physical explanatory models may more readily pursue physical treatments, whereas patients with oral behavioral or stress and emotional upset-related explanatory models may be more receptive to cognitive behavioral therapy and self-control strategies. Many of the TMD patients in these two studies^{20,21} perceived physical EMS factors as most important in initially causing TMD pain, but physical factors, oral behavior, and stress and emotional upset EMS factors were all considered important in the exacerbation of pain, as well as in treatment efficacy. It was also found that patients with higher physical EMS scores were more likely to report higher pain-related disability, whereas patients with oral behavioral explanatory models were more likely to report less disability.^{20,21}

The currently advocated rehabilitation treatment strategy gives the patient an active role in the rehabilitation process and relies on a strategic partnership between the clinician and the patient, where the clinician's role is to enhance the patient's self-efficacy and perceived control. The beliefs and expectancies about the illness episode modify a patient's pain experience, and their elucidation as part of treatment planning and patient education may enhance the

therapeutic relationship with the patient. In a large sample of primary care TMD pain patients, the subcategorization of patients by TMD pain-related disability was shown to be an effective and simple screening instrument for identifying individuals with different, clinically relevant psychosocial subtypes.²² On the basis of the previously mentioned findings by Massoth et al,^{20,21} patient-perceived illness explanations could also have such an association.

The aim of the present study was to explore whether TMD pain patients reporting different levels of pain-related disability differ in terms of illness explanations and treatment expectations. The relationship of explanatory models to other relevant psychosocial variables was also analyzed. The hypothesis was that patients reporting different levels of pain-related disability would differ in terms of explanatory models and treatment goals.

Materials and Methods

Study Population

The present study was performed at the Oral Health Care unit in the Vantaa Health Centre in Vantaa, Finland. The study protocol was approved by the ethics committee of the University of Turku and by local health authorities. The characteristics of the patients' symptoms of TMD pain and psychosocial functioning have been published previously.²²

During an 18-month period, all patients contacting the Oral Health Care unit for first-onset TMD symptoms or recurrent facial pain symptoms were screened for possible TMD pain. One dentist (U.K.) with extensive experience in treating TMD pain patients (but without formal training and calibration) examined the patients to confirm the TMD diagnosis by using the Research Diagnostic Criteria for TMD (RDC/TMD) Axis I protocol.²³ Before inclusion in the study, patients gave their written informed consent. The details of the recruitment process have been described in a recent publication on the psychosocial subtypes of the same primary care patient population.²²

Questionnaire

After confirmation of the TMD diagnosis at the initial visit, participants completed a comprehensive multidimensional pain questionnaire, which included the following items from the Finnish version of the RDC/TMD questionnaire (RDC/TMD_FIN; www.rdc-tmdinternational.org): (1) RDC/TMD Axis II Graded Chronic Pain Scale scores related to characteristic pain intensity and disability based on disability score and disability days; (2) RDC/TMD Axis II depression (20 questions, with response options on a 5-point rating scale

ranging from “not at all” to “extremely”) and somatization scale scores (with pain items [12 questions, with response options on a 5-point rating scale ranging from “not at all” to “extremely”]; without pain items [seven questions, with response options on a 5-point rating scale ranging from “not at all” to “extremely”]) based on the Symptom Checklist-90 Revised. Pain-coping efficacy was assessed using subscales from the Coping Strategies Questionnaire that measure ability to control pain (response options on a 7-point rating scale ranging from “no control” to “complete control”) or the ability to decrease pain (response options on a 7-point rating scale ranging from “can’t decrease at all” to “can decrease completely”).²⁴

Patients’ explanations of illness were obtained using the Finnish version of the EMS (EMS_FIN) (www.rdc-tmdinternational.org), where patients are asked to estimate the importance of physical factors (eg, trauma, surgery, arthritis, other medical problems), oral behaviors (eg, oral habits, jaw posturing, sustained talking, yawning, tensing facial or jaw muscles, grinding, clenching), or stress and emotional upset factors (eg, problems with family, work, or school; anxiety; worry; depression) in causing their TMD pain (TMD causes dimension) and in exacerbating the pain (TMD exacerbation dimension) on a 0- to 4-point rating scale ranging from “not at all important” to “extremely important.” Using an identical scale, the patients are also asked to estimate how important it was that their treatment program included treatments directed towards eliminating or lessening the impact of these particular factors (TMD treatment efficacy dimension).

The Finnish translation of the EMS was verified by three senior orofacial pain and TMD specialists before administration and pilot-tested to ensure that the translation was acceptable and understandable to clinic patients. To ensure the validity, the EMS_FIN translation was back-translated into the source language with an independent external review according to the Guidelines for Establishing Cultural Equivalency of Instruments (www.rdc-tmdinternational.org).

Furthermore, patients were asked to indicate their goals or expectations regarding the planned treatment. Specifically, with “yes” or “no” response options, they were asked to indicate their perceived need to (1) receive information about the pain or dysfunction, (2) decrease pain, (3) improve jaw functions, (4) improve the ability to perform daily functions, (5) improve work ability, and (6) improve stress management skills.

Subtyping of Patients Based on TMD Pain-Related Disability

The Graded Chronic Pain Scale is usually graded into four hierarchical classes, but a division of patients

into two groups, functional patients and dysfunctional patients, has been used in randomized controlled trials testing the efficacy of tailoring treatments according to the level of psychosocial functioning.^{25,26} Previous studies applying that subdivision and using a variety of psychosocial measures have identified an intermediate subtype of patients with moderately compromised psychosocial adaptation.^{22,27} On the basis of these findings, three subtypes of pain-related disability were used to subtype patients in the present study, as follows: (1) no-disability group (patients with no disability points); (2) low-disability group (patients with 1–2 disability points); and (3) high-disability group (patients with 3–6 disability points).

Statistical Analyses

Categorical and continuous variables were summarized as counts (n) and proportions (%) and as medians and interquartile ranges (IQRs), respectively. Differences between EMS score medians were evaluated using the Mann-Whitney U test with Bonferroni correction. Differences between study groups were analyzed using logistic regression. The Tukey-Kramer correction was applied to adjust for multiplicity. The reliabilities of the Finnish version of the EMS factors were statistically assessed using standardized Cronbach α coefficients. The relationships of EMS factors to psychosocial variables were analyzed with Spearman rank correlation coefficients. For these analyses, EMS factors were averaged in each category to create physical, oral behavioral, and stress and emotional upset summary scores. *P* values less than .05 were considered statistically significant. All analyses were conducted using SAS System for Windows statistical software (version 9.4; SAS Institute).

Results

A total of 399 patients participated in the study. The mean \pm SD age of the patients was 40.5 \pm 12.7 years, and the majority (83%) were women. Twenty-seven percent of the patients contacted the health care unit for the first time because of TMD pain; the remainder had received treatment previously.

Of the 399 patients, 242 (61%) belonged to the no-disability group, 108 (27%) to the low-disability group, and 49 (12%) to the high-disability group.

Explanatory Models

Cronbach alpha coefficients for EMS physical (0.92), oral behavioral (0.91), and stress and emotional upset factors (0.91) indicated reliability and good internal interitem consistency for all EMS subscales in the present patient sample.

Table 1 Median (IQR) EMS Scores for TMD Summary Scores and for Causes, Exacerbation, and Treatment Efficacy Dimensions

EMS factor	Median (IQR)			
	Summary score	Causes	Exacerbation	Treatment efficacy
Physical factors	1.3 (0–3)	1 (0–3)	1 (0–3)	2 (0–3)
Oral behavioral factors	3.3 (2.3–4.0)	3 (2–4)	3 (2–4)	4 (3–4)
Stress factors	2.3 (1.0–3.3)	2 (1–3)	3 (1–4)	2 (1–3)

EMS = Explanatory Model Scale; IQR = interquartile range.

Overall, patients considered oral behaviors as more important than stress and emotional upset factors or physical factors in causing and exacerbating TMD pain, as well as in treatment efficacy. Overall, physical factors were considered the least important in all respects (Table 1). However, high-disability patients considered physical and stress and emotional upset factors as more important overall than those patients with less disability, with statistically significant differences between high-disability and no-disability patients ($P = .0196$ and $P = .0251$, respectively) (Fig 1). Specifically, high-disability patients considered physical factors as more important in causing and exacerbating their TMD pain than those with less disability, with statistically significant differences between the high-disability and no-disability groups ($P = .0125$ and $P = .0076$, respectively) (Fig 2a). No significant between-group differences were found in the importance of oral behaviors (Fig 2b). Stress and emotional upset factors were considered more important in causing TMD pain by high-disability patients compared with those with less disability, with a statistically significant difference between high-disability and no-disability patients ($P = .0065$). High-disability patients also considered stress and emotional upset problems as important targets in treatment, with a statistically significant difference between high-disability and no-disability patients ($P = .0454$) (Fig 2c).

Weak positive correlations were found between physical EMS mean scores and depression and somatization scores (with and without pain items) (Table 2). In other words, the higher the depression and somatization scores, the more patients attributed their TMD pain to physical factors. Moderate positive correlations were found between stress and emotional upset EMS summary scores and depression and somatization scores. A weak negative association was found between stress and emotional upset EMS scores and the ability to control pain (Table 2). That is, patients with stress explanations for TMD had lower self-ratings of pain-coping efficacy. No significant associations were observed between oral behavioral EMS summary scores and any of the psychosocial variables.

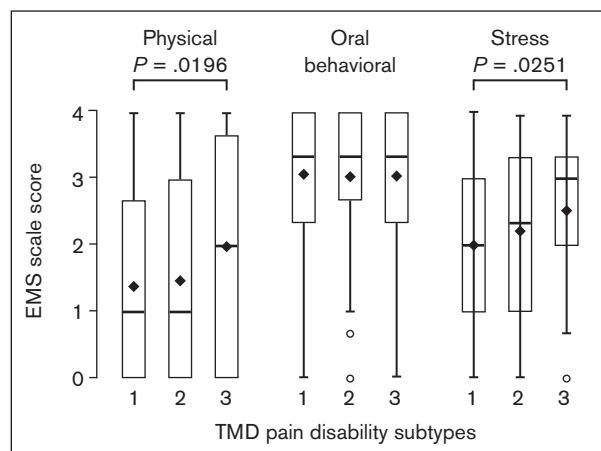


Fig 1 Boxplot of physical, oral behavioral, and stress-related Explanatory Model Scale (EMS) summary factor scores (medians, interquartile ranges, and mean values [w]) of patients with different TMD subtypes: (1) no disability, (2) low disability, (3) high disability.

Table 2 EMS Score Correlations (r_p) with Psychosocial Variables

Psychosocial variable	EMS score		
	Physical	Oral behavioral	Stress
Depression	0.12*	0.03	0.34****
Somatization with pain	0.18***	0.02	0.27****
Somatization without pain	0.16**	0.01	0.22****
Ability to control pain	-0.07	-0.06	-0.15**
Ability to decrease pain	-0.02	-0.06	-0.05

* $P < .05$, ** $P < .01$, *** $P < .001$, **** $P < .0001$.

EMS = Explanatory Model Scale.

Goals for Treatment

Table 3 depicts the percentage of patients in different TMD subtypes advocating the different goals for treatment, as well as between-group differences. The great majority of TMD pain patients (86.6% to 98.1%) indicated that they would like to receive information, decrease pain, and improve jaw function, with no significant differences between groups (Table 3). Significantly more patients in the low- and high-disability groups than the no-disability group expected

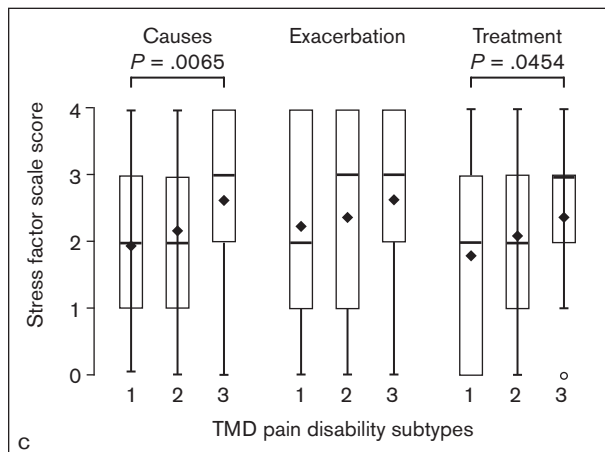
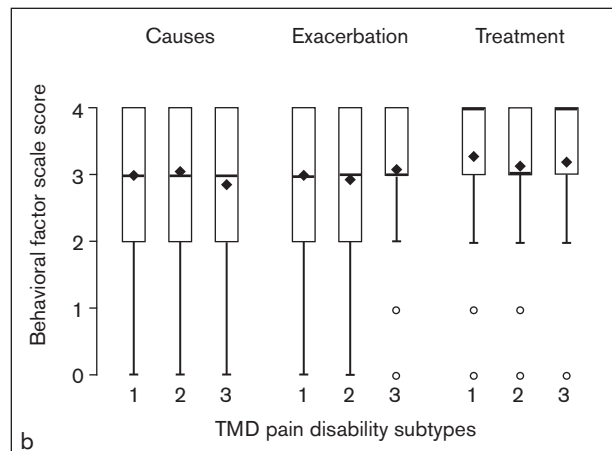
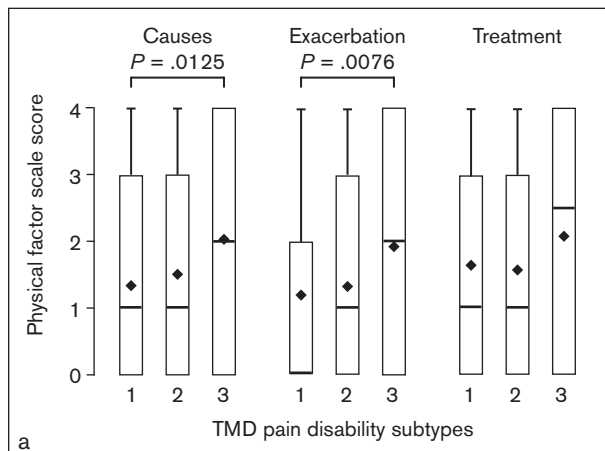


Fig 2 Boxplots of (a) physical, (b) oral behavioral, and (c) stress-related explanatory factor scores (medians, interquartile ranges, and mean values [w]) for TMD causes, exacerbation, and treatment efficacy dimensions in patients with different TMD subtypes: (1) no disability, (2) low disability, (3) high disability.

Table 3 Percentage of TMD Pain Patients with Different Treatment Goals and Differences with *P* values Between Patients with No, Low, and High Disability

Treatment goal	Frequency (%)			Group differences (<i>P</i> value)		
	No	Low	High	No vs low	No vs high	Low vs high
Receive information	90.3	94.1	93.9	NS	NS	NS
Decrease pain	90.7	98.1	95.9	NS	NS	NS
Improve jaw function	86.6	90.4	89.1	NS	NS	NS
Improve daily functions	33.2	70.0	85.1	< .0001	< .0001	NS
Improve ability to work	28.7	66.7	75.0	< .0001	< .0001	NS
Improve stress management skills	43.7	64.7	77.6	.0014	.0001	NS

NS = not significant.

to improve their ability to perform daily functions, improve their ability to work, and improve their stress management skills.

Discussion

The findings of the present study confirmed the study hypothesis that TMD pain patients reporting different levels of pain-related disability differ in terms of explan-

atory models and treatment goals. Traditionally, TMD patients, as well as treating clinicians, have endorsed explanatory models that are primarily physical or biologic in orientation.^{1,9,20,28} The present patients' perceptions of the relative roles played by physical, oral behavioral, or stress and emotional upset factors in influencing TMD pain are different from those of patients in previous studies^{20,21}; the importance given to physical factors has decreased, and that of oral behaviors increased. The patients in the present study considered physical

factors as least important in all respects, whereas the patients in previous studies^{20, 21} considered physical factors as more important, especially in causing the pain. Patients in previous studies considered physical, oral behavioral, and stress and emotional factors as equally important in causing pain, but the present patients considered oral behaviors and stress factors as more important than physical factors in exacerbating pain. Furthermore, whereas patients in previous studies considered the expected efficacy of physically, behaviorally, and psychosocially oriented treatments as equally important,^{20,21} the patients in the present study considered behaviorally oriented treatments as most important. These changes in the relative importance given to physical, oral behavioral, and stress factors may reflect differences in patient selection or cultural factors, but they may also reflect the general paradigm shift from mechanically or physically oriented models to a biopsychosocial model in TMD management.

The present study's finding that patients with high pain-related disability considered physical factors as more important in their TMD pain than those with less disability parallels the findings of previous studies where patients with high pain-related disability gave physical factors more than twice the weight given by functional patients in explaining their TMD pain.^{20,21} By contrast, the same studies found that functional patients had significantly higher scores for oral behaviors than dysfunctional patients.^{20,21} No difference in the importance of oral behaviors was noted in the present study between patients with no, low, and high disability. Whereas low- and high-disability patient groups have previously been found to have comparable scores on stress measures,^{20,21} the high-disability patients in the present sample considered stress and emotional upset factors as more important in causing their TMD pain, as well as more important in their treatment, than patients with less disability. Likewise, patients reporting higher levels of disability were found to have more general treatment goals, such as improving stress management skills and psychosocial functioning.

The present findings indicated that higher physical and stress and emotional upset EMS scores were associated with higher depression and somatization scores (with and without pain). Higher stress-related EMS scores also indicated lower self-ratings of pain-coping efficacy. The findings concerning the associations of higher physical EMS scores with higher depression and somatization scores (without pain) are in accordance with previous findings.^{20,21} Although the correlations were weak to moderate, the results suggest that patients with physical or stress and emotional upset-related illness explanations might be more psychosocially distressed than patients with oral behavioral illness explanations.

The assessment of patients' explanatory models is helpful when planning strategies for clinical care and in enhancing the therapeutic relationship between the clinician and the patient. In light of the current trends in TMD pain management that advocate rehabilitation, including the use of self-care and other cognitive behavioral therapy techniques, the findings of the present study are clinically relevant. The study indicated that oral behavioral factors are considered the most important in causing and exacerbating TMD pain, as well as for treatment efficacy, by primary care TMD pain patients. The attitudes held by these patients might increase their willingness to accept the contemporary approach to TMD pain management. As shown previously, patients with higher disability are more psychologically distressed,^{22,27,29–31} and these patients are better helped by combining cognitive behavioral therapy with traditional treatment.¹⁸ In the present study, the high-disability patients considered stress and emotional upset-related factors as important in causing their pain, as well as targets and goals of treatment—attitudes that might increase their willingness to undergo broad-based therapies. On the other hand, high-disability patients also considered physical factors as important in explaining their pain, a fact that needs to be addressed when planning the treatment.

A number of points about the current study's methodology need to be considered. First, despite having extensive experience in treating TMD pain patients, the examining primary care dentist lacked formal RDC/TMD training. Second, because of the cross-sectional study design, positive associations should not be interpreted to imply causality. The participants of the present study were primary care TMD patients, and it is not known whether patients treated in secondary or tertiary care clinics, and who usually suffer from more severe symptoms, would display similar results. It is also not known to what extent the illness explanations of the present patients, the majority of whom had experienced earlier TMD pain episodes, might differ from explanations of patients presenting with first-onset TMD symptoms. Furthermore, EMS was used as an assessment instrument because it is one of the instruments in the repertoire of the International RDC-TMD Consortium (www.rdc-tmdinternational.org), and it has been developed and tested in TMD patients.^{20,21} The use of the EMS_FIN showed good validity and reliability in this study. However, the psychometric properties of the EMS have not been thoroughly tested, and the reliability and validity of EMS need to be further addressed in future studies in other patient populations. Thus, the findings of this study should be considered preliminary, and await corroboration.

Conclusions

Most primary care TMD pain patients endorsed oral behavioral explanatory illness models and considered oral functional factors important. However, differences in illness explanations and goals for treatment were found in patients reporting different levels of pain-related disability. These findings emphasize the feasibility of pain-related disability measures as a screening instrument to identify individuals with different psychosocial subtypes and individuals endorsing different illness explanations and goals for treatment.

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