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Psychological screening of temporomandibular disorder patients

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Chapter 7

General discussion

The framework used for the studies in this thesis was the Research Diagnostic Criteria for Temporomandibular disorders (RDC/TMD). These criteria were developed to implement a system of well-defined, reliable, and valid measures for the study of TMD (Dworkin & LeResche, 1992). They allowed standardisation of diagnoses, which enabled better comparisons between TMD studies. With multicenter samples of patients the search for the identification of etiological and risk factors of TMD would improve, and more effective treatment strategies for TMD patients would result (Dworkin & Le Resche, 1992). With the RDC/TMD's dual-axis diagnostic system, the physical symptoms were collected on the axis I, while axis II was used for the assessment of psychological and behavioral factors. The International RDC/TMD Consortium Network members encouraged international collaborative research, for which the annual meetings of the International Association of Dental Research served as a meeting point. Since their publication, in 1992, the RDC/TMD have been widely used. They have also been evaluated, and suggestions for improvement and changes have been put forward. In a meeting of experts in Miami, in 2009, the findings of all international studies were evaluated, and the outlines for the - now called - Diagnostic Criteria (DC/TMD) were formulated (Schiffman et al., in press). The Miami meeting was followed by a Consortium meeting in San Diego in 2011, in which the official version of the revised Research Diagnostic Criteria (RDC/TMD v2) was determined. This thesis has resulted in the evaluation of and recommendations for parts of the RDC/TMD, as well as in development and statistically testing of new assessment tools, each concerning the psychological/behavioral axis II.

The most frequently presented TMD complaint is pain. RDC/TMD studies have focused on three aspects of TMD pain: on the etiology of pain, on factors that are in some way related to pain, and on the impact of pain on a person's life. As potential etiological factors, occlusion, trauma, gender, age, hypermobility of the joints, stress, oral parafunctions, and genetics have been studied amongst others, without any definite results (Oral et al., 2009). Since studies of morphological factors did not result in identifying a cause for TMD pain, one of the prevailing topics of discussion was whether TMD pain might be caused by overactivity of the jaw muscles. In other words, could teeth clenching or grinding, or any other extra activity besides the habitual functional activities of the jaws, like chewing, talking, and swallowing, evoke the pain that patients visit the TMD clinic for? On the basis of the study reported in chapter 2 of this thesis, in which the associations between self-reported oral parafunctions and TMD pain were examined, the answer would be 'no'. This result is in agreement with most studies using objective techniques to measure jaw muscle overactivity like, for example, electromyography. However, it differs from most studies using self-report measures, which have reported a positive association between bruxism and pain (Rao & Glaros, 1979; Glaros et al., 2005; Svensson et al., 2008; Manfredini & Lobbezoo 2010). Why our study results distinguish themselves from the other self-report studies is not easy to explain. Most of the other studies had a different study aim, based bruxism on a single question, and/or used subjects from the general population, instead of TMD patients. Hence, methodological differences may have caused the outcomes of the other self-report studies.

The different results between studies using subjective or objective measures of oral parafunctional activities can also be accounted for by both the unreliability of a person's self-

report, as well as by weaknesses of the objective methods. These objective techniques only give a momentary impression of bruxism; they measure subjects in a highly artificial situation; and finally, the cut-off criteria for what is considered a bruxism event are not always clear. If, in spite of the limitations of different research methods, we accept the findings of our study as valid, the most important question about the causes of TMD pain remains. If it is not possible to draw the clear conclusion that oral parafunctions cause pain, then what does? Does it mean that the pathophysiological model, in which sustained muscle activation leads to complaints, has to be rejected? It may be possible that this question can be clarified by comparing studies of TMD with studies of other pain disorders, in which similar types of contradictory findings were reported. For example, in a thesis about risk factors of arm-wrist-hand and neck-shoulder symptoms, the positive relationship between the amount of self-reported hours of work at a computer and pain complaints, found in one study, disappeared when these hours were objectively registered in a subsequent study (IJmker, 2008). In those studies, the only substantial risk factor for developing pain complaints was having had previous episodes of complaints. The author then tested a possible explanation for the discrepancy between the objective and the subjective assessments of work hours. He hypothesized that the sufferers of second or later pain episodes attributed their pain in hindsight to long work hours, thereby raising their work hour estimate. With a convincing study strategy, he found that this hypothesis had to be rejected. The causes of the pain thus remained a mystery. Also in TMD-pain research, an attempt was made to predict the occurrence of TMD pain with several characteristics that were present in a previous TMD-pain episode (Von Korff & Dunn, 2008). These factors, however, cannot explain why that first pain attack started. Thus, no causal factors can be determined this way. With MRI scans, changes in the gray matter in areas of the brain, that are implicated in pain, have been found in patients with chronic (TMD) pain. These changes were then thought to be the possible origins of pain (Moayed et al., 2010). However, in a review of studies involving several types of chronic pain, including facial pain, it was shown that these changes in the brain disappeared when the pain was adequately treated. They were therefore considered to be a response to, and not a cause of this pain (May, 2011). In recently published recommendations for the study of TMD (Cairns et al., 2010), it was suggested that other neurological mechanisms may possibly play a role in the development of TMD pain, like an altered central nervous system for pain processing (central sensitization), which is probably modulated by stress. Hereditary factors and female sex hormones play a role, but it is as yet unknown why and how. In a state-of-the art paper, the conclusion was therefore: “Unfortunately, the specific mechanisms that underlie TMD-related pain in the vast majority of patients with TMD remain enigmatic” (Cairns et al., 2010).

Despite this discouraging state of affairs, the assumption that overactivity of jaw muscles plays a role in the onset of TMD symptoms has not been given up, and studies about this subject are therefore continued. New projects have started to make an even more detailed examination of potential risk factors and their mutual interactions (Ohrbach et.al., 2010; see also oppera.org). The study relationship between oral parafunctions and TMD pain will also be examined with more sophisticated designs. For example, while studies trying to evoke TMD pain with experimentally induced clenching did not produce more than short-lasting

muscle pain, a new scientific model, inviting subjects to eccentric and concentric contractions of the jaw-closing muscles, managed to produce TMD-like pain, that lasted for up to a week following the experiment (Türker et al., 2010).

Likewise, a detailed study is needed about the characteristics of oral parafunctions, in particular about the specific types, intensity, frequency, and duration of parafunctions of TMD patients. On the basis of the study in chapter 2, two recommendations for future studies using self-report of oral parafunctions can be made. The first recommendation is that in studies about oral parafunctions, other oral activities besides clenching and grinding should be included. It is plausible that these other activities, like biting on pens and vacuum sucking with the tongue, are also harmful to the jaws. The outcome of our study in chapter 2 was that patients did report these other activities, and although the frequency of these activities was lower than that of bruxism, their presence may indeed play a role in the onset of symptoms.

The second recommendation is related to our finding that three different scales of parafunctions were found: the four bruxism activities, namely clenching and grinding at daytime or during the night, together composed the BRUX scale; the BITE scale, included biting activities, like nail biting or biting on pens, while the SOFT scale, included all soft tissue activities, like pushing and vacuum sucking with the tongue. The correlations between the scales were low, but within each scale the items were highly related to each other. Not reported in the study in chapter 2 are our findings that repeating the Principal Component Analysis (PCA) in other study cohorts always led to identical results, thus showing a very steady pattern. This suggests that these three scales may be controlled by different mechanisms. They should therefore be distinguished from each other while studying their relationship with TMD pain. Furthermore, if a relationship between oral parafunctions and TMD is assumed, the findings also have an impact on the treatment. The instructions to a patient, following the assessment, for example to reduce tooth clenching or stop nail biting, may demand totally different skills from a patient. Different focuses for treatment may therefore be needed for each group of parafunctions.

While the study in chapter 2 found no relationship between oral parafunctions and TMD pain, in chapter 3 it was shown that most TMD patients, when specifically asked about this, nevertheless believe that frequent bruxism may be harmful to the jaws. The subject of the study in chapter 3 was specifically directed at the TMD patients' illness beliefs (Leventhal et al., 1992), and at the patients' self-efficacy (Bandura, 1977; 1997) related to bruxism. Because the etiology of TMD pain has not been clearly established, it is generally accepted that intrusive and irreversible treatments for TMD-pain patients should be avoided and that reversible (splint) treatments and pain-management techniques are recommended. These latter include awareness training and counselling, increasing physical and functional activities, and skills training, such as relaxation exercises and biofeedback of the masticatory muscles (Dworkin et al., 1994). If compliance with this type of therapy is required, it is necessary that patients' illness beliefs are in agreement with the underlying assumptions of the treatment. Furthermore, patients' self-efficacy beliefs should reflect confidence in their capability to reduce their oral parafunctional activities.

The finding in chapter 3 was that most TMD patients' beliefs were in agreement with the underlying assumptions of the therapy, and that patients had high self-efficacy beliefs and

were optimistic about their capability of reducing oral parafunctions. Their appraisal of change also seemed to be proportional to the frequency of their parafunctional activities. On the basis of this study, it can be concluded that including questions about illness beliefs and self-efficacy in the RDC/TMD axis II questionnaire may improve the possibility of discovering these patients' beliefs before the treatment starts. For example, if a patient is a heavy bruxer, but believes that changing the habit is beyond his/her capacities, that aspect should get special attention when the clinician discusses the treatment strategy. A better compliance of TMD patients with the therapy will be the expected outcome.

A factor that may play a role in the onset, or in the maintenance of TMD pain, is the ethnic background of patients. The study reported in chapter 4 was the first one in which the relationship between TMD and ethnic factors was examined, while at the same time controlling for socioeconomic factors. Contrary to what is often suggested, namely that non-native inhabitants report more pain than native Dutch patients, no differences in TMD-pain intensity were found. However, non-native non-western patients reported more difficulties in coping with the pain than native Dutch and non-native western TMD patients. These results are in agreement with studies comparing African Americans with Non Hispanic white patients suffering from pain at other body locations than the jaws (Kerns et al., 2011). In the studies reported in this review, it was concluded that African Americans had more passive coping strategies, like catastrophizing, praying, and hoping, than their non-Hispanic white counterparts, who had more active coping strategies and felt more in control of their pain. It was therefore suggested that assessment of ethnic background might be a first step in helping ethnic minorities to develop more effective coping skills. Although the study in chapter 4 did not address the pain-coping styles of the patients, it is possible that these coping styles play a role in relation to the ethnic background of TMD patients. Patients from the non-native non-western subgroup were also more depressed and had more non-specific physical symptoms than both natives and non-native western patients. Even though these patients reported more often not having work, and had lower levels of education and income, these factors did not statistically interact with ethnic background. Together, these findings led to the conclusion that ethnic background is related to the psychological factors, and that including a question about ethnic background in the Axis II questionnaire is relevant and important. However, in chapter 4, not only the pros, but also the cons for the use of ethnic factors were discussed, including the risk of using classifications that were made for political decision making and not for research purposes. On the other hand, assessing ethnic background data can also lead to positive results. Since one of our findings was that non-native non-western patients were underrepresented in the clinic, it may help to improve the chances that these TMD patients will find their way to a necessary treatment. Furthermore, discussing pain coping techniques with the non-native non-western patients may open the way to teach them better methods to manage their pain complaints.

The translation and cultural adaptation of the demographic questions of the RDC/TMD Axis II has also thrown light on the need to newly discuss the intentions of the RDC/TMD to compare of international studies with respect to ethnic factors. If, as was the case in our study, ethnic background and TMD axis II factors do have a significant relationship with each other, how can a country like The Netherlands, with its own specific

ethnic groups, be compared with a country like the USA, hosting totally different ethnic groups? This should be an issue for future versions of the RDC/TMD.

While no quality of life questionnaire was included in the original RDC/TMD axis II questionnaire, at the International RDC/TMD Consortium Network meeting in Miami, in 2009, it was suggested that it should be added. The most probable candidate is the Oral Health Impact Profile (OHIP) (Slade & Spencer, 1994). While the RDC/TMD axis II questions of pain-related disability are specifically aimed at the impact of TMD pain, the OHIP relates to the impact of many oral conditions on the physical, psychological, and social functioning of a person. It therefore represents a much wider construct, and may be a useful addition to the axis II questionnaire. The studies reported in chapters 5 and 6 were contributions to these plans. In chapter 5, the translation procedure of the OHIP-49 is described (see the OHIP-NL in the Appendix). No special problems were encountered during the translation process, and it was shown that the Dutch version of the OHIP functioned well with a group of denture and implantology patients.

The original, 49-item OHIP version is the questionnaire which contains most information, so for specific research questions this would be the preferred version. However, for practical purposes, a shorter version of the questionnaire would be desirable. In the second study, described in chapter 6, it was shown that a 14-item OHIP version (Slade, 1997), had good psychometric properties in a group of TMD patients, while a 5-item version (John et al., 2006) performed reasonably well, but missed the high standards set. The 14-item version was therefore the preferred one. The OHIP studies described in this thesis were the necessary first steps, making the use of this well-known questionnaire in Dutch speaking populations possible. The knowledge that the abbreviated 14-item OHIP performs comparably well, opens up the possibility to enquire after oral-health related quality of life (OHRQoL) without burdening the patient with a lot of extra time-consuming questions.

Certain issues about the development and uses of the OHIP still remain. The first 14-item version, which was used in the study, was developed by Slade in 1997. Since that time, several other short OHIP versions have been developed, each composed of a different selection of the original 49 questions. Although adding and deleting items on statistical grounds may lead to a better performance in other countries, or in specific patient groups, it may also give rise to misunderstanding when studies using these different versions of 14-item OHIPs are being compared. While all carrying the same name, they're all different. In our study it was shown that by staying with the first original OHIP-14 version, the data came out satisfactory. The OHIP-NL14 met all the necessary reliability and validity criteria. Our recommendation for the RDC/TMD axis II is therefore, to use Slade's original 14 OHIP items, so as to keep OHIP study outcomes comparable.

Another issue is whether the OHIP is actually related to quality of life. This broad construct is hard to define. Consequently, it has been conceptualized in several different terms. Attempts to relate the subjective appraisal of quality of life to objective conditions, has not led to clear results. The conclusion was therefore, that quality of life is a purely subjective experience and varies largely between individuals (Moons et al., 2006). The authors also stated that by "focusing on health-related quality of life, investigators may substantially overestimate the impact of health-related factors and conversely, may seriously undervalue

the effect of nonmedical phenomena”. While the OHIP performs well in indicating the impact of oral conditions on different levels of a person’s life, and changes in scores also follow changes in oral health conditions, the impact these oral conditions have on a person’s quality of life in general, may be of a lesser magnitude.

The studies in this thesis have focussed on issues that are central to TMD, i.e. pain and pain-related complaints. Thereby, it was noted several times that the Graded Chronic Pain (GCP) classification, used in the RDC/TMD guidelines, suffers from some shortcomings. The GCP classification was an attempt to melt the pain and disability factor into one formula, mirroring a medical classification model (Turk & Rudy, 1987 and 1988; Von Korff et al., 1990). It serves its purpose well, namely to offer an easy-to-use ordinal measure of global pain severity. However, in the classification, the two constituent parts, namely pain intensity and pain-related disability, are combined in a way that leads to unnecessary loss of important information. In our studies, we showed that by studying these two parts separately, they behaved differently in relation to other relevant variables. We therefore suggest to use a classification in which the variables pain intensity and pain-related disability are used separately.

In this thesis, it was shown that it is important to also offer the patient the opportunity to evaluate the factors that we - as professionals - think are important. In the future, more questions directed at the patient’s opinions and expectations would be fruitful. If more information about what patients find important about TMD, is collected with the RDC/TMD questionnaires, both diagnosis and treatment of TMD are expected to improve.

To the opinion of the author of this thesis, it is no longer a question if psychological factors should be assessed when TMD patients report at a TMD-clinic, but rather how this should be accomplished. The RDC/TMD have offered the best approach to this subject so far, including the requirement to anchor the guidelines with scientific research. The studies in this thesis have focussed on different aspects of the psychological/ behavioral axis of the RDC/TMD and this has resulted in the formulation of several recommendations. It has been striking to see that, although the axis II has gained in importance over the past years, and psychological factors are considered to be perhaps even more important than physical factors, this is not reflected in the number of psychologists present at the International RDC/TMD Consortium Network meetings. My final recommendation would therefore be to increase the involvement of psychologists in the studies of and research meetings of the RDC/TMD.

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Appendix I. The OHIP-NL49 en OHIP-NL14.

(The questions with the grey background belong to the OHIP-NL14).

Wilt u bij elk van de onderstaande klachten en problemen nagaan hoe vaak u er gedurende de afgelopen maand last van hebt gehad, en wilt u dan het antwoord omcirkelen dat het meest van toepassing is.

	Nooit	zelden	af en toe tamelijk vaak	erg vaak	
1. Hebt u moeite gehad met het kauwen van bepaald voedsel vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
2. Hebt u moeilijkheden gehad met het uitspreken van bepaalde woorden vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
3. Hebt u een tand of kies opgemerkt die er niet goed uitzag?	1	2	3	4	5
4. Hebt u het gevoel gehad dat uw uiterlijk is beïnvloed door problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
5. Hebt u het gevoel gehad dat u een slechte adem had vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
6. Hebt u het gevoel gehad dat uw smaakvermogen is afgenomen vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
7. Zijn er etensresten tussen uw tanden of onder uw gebitsprothese blijven zitten?	1	2	3	4	5
8. Hebt u het gevoel gehad dat uw spijsvertering slechter is geworden vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
9. Hebt u het gevoel gehad dat uw gebitsprothese niet goed paste?	1	2	3	4	5
10. Hebt u pijn in uw mond gehad?	1	2	3	4	5
11. Hebt u een pijnlijke kaak gehad?	1	2	3	4	5
12. Hebt u hoofdpijn gehad vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
13. Hebt u gevoelige tanden of kiezen gehad, bijvoorbeeld door heet of koud eten of drinken?	1	2	3	4	5
14. Hebt u kiespijn gehad?	1	2	3	4	5
15. Hebt u pijnlijk tandvlees gehad?	1	2	3	4	5

16.Hebt u moeite gehad om bepaald voedsel te eten vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
17.Hebt u pijnlijke plekken in uw mond gehad?	1	2	3	4	5
18.Hebt u een ongemakkelijk zittende gebitsprothese gehad?	1	2	3	4	5
19.Hebt u zich zorgen gemaakt over tandheelkundige problemen?	1	2	3	4	5
20.Hebt u zich onzeker gevoeld vanwege uw gebit, uw mond of gebitsprothese?	1	2	3	4	5
21.Hebt u zich ellendig gevoeld door tandheelkundige problemen?	1	2	3	4	5
22.Hebt u zich ongemakkelijk gevoeld over het uiterlijk van uw gebit, mond of gebitsprothese?	1	2	3	4	5
23.Hebt u zich gespannen gevoeld vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
24.Is uw spraak onduidelijk geweest vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
25.Hebt men sommige woorden van u verkeerd begrepen vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
26.Hebt u het gevoel gehad dat er minder smaak zat aan uw voedsel vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
27.Hebt u uw tanden niet goed kunnen poetsen vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
28.Hebt u het eten van bepaald voedsel moeten vermijden vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
29.Is de samenstelling van uw voeding onbevredigend geweest vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
30.Hebt u wel eens problemen gehad met uw gebitsprothese waardoor u niet kon eten?	1	2	3	4	5
31.Hebt u vermeden om te glimlachen vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
32.Hebt u maaltijden moeten onderbreken vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5

33. Is uw slaap onderbroken geweest vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
34. Bent u van streek geweest vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
35. Hebt u moeite gehad om zich te ontspannen vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
36. Hebt u zich gedeprimeerd gevoeld vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
37. Is uw concentratie beïnvloed geweest door problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
38. Hebt u zich een beetje opgelaten gevoeld vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
39. Hebt u vermeden om uit te gaan vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
40. Bent u minder tolerant geweest tegenover uw echtgenoot, partner of familie vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
41. Hebt u moeite gehad in het omgaan met andere mensen vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
42. Bent u wat prikkelbaar geweest tegen andere mensen vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
43. Hebt u moeite gehad met het uitvoeren van uw dagelijkse bezigheden vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
44. Hebt u het gevoel gehad dat uw gezondheid in het algemeen er op achteruit is gegaan vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
45. Hebt u enig financieel verlies geleden vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
46. Hebt u niet zoveel kunnen genieten van het gezelschap van andere mensen vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
47. Hebt u het gevoel gehad dat het leven in het algemeen minder bevredigend was door problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5
48. Hebt u totaal niet kunnen functioneren vanwege problemen met uw gebit, mond of gebitsprothese?	1	2	3	4	5

49. Hebt u niet naar uw volle vermogen kunnen werken vanwege problemen met uw gebit, mond of gebitsprothese? 1 2 3 4 5