

**Relationship of TMD diagnosis and self-reported bio-
psychosocial status of patients attending the TMD clinic.**



*A mini-thesis submitted in partial fulfilment of the requirements for the degree of
Master of Science in Restorative Dentistry*

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Relationship of TMD diagnosis and self-reported bio-psychosocial status
of patients attending the TMD clinic

KEYWORDS

Temporomandibular disorders

Diagnostic criteria for temporomandibular disorders

Psychosocial model

Social habits

Depression

Anxiety.



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LIST OF ABBREVIATIONS

5-HT: 5-hydroxytryptamine

CPI: Characteristic Pain Intensity

DC/TMD: Diagnostic Criteria for Temporomandibular Disorders

DD: Disc Displacement

DJD: Degenerative Joint Disease

EAA: Excitatory Amino Acid

GAD-7: Generalized Anxiety Disorder no.7 (Anxiety Questionnaire)

GCPS V2: Graded Chronic Pain Scale Version 2.

HPA: Hypothalamic-Pituitary-Adrenocortical

OPPERA: Orofacial Pain Prospective Evaluation and Risk Assessment

OR: Odds Ratio

PHQ-4: Patient Health Questionnaire 4 (Distress Questionnaire)

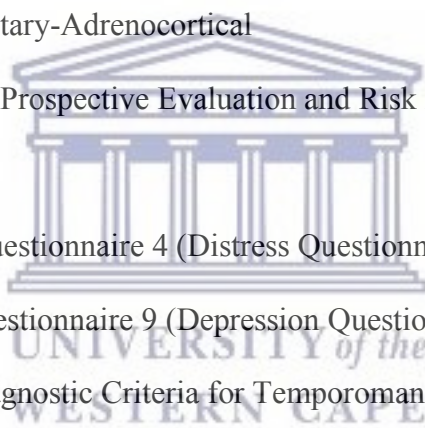
PHQ9: Patient Health Questionnaire 9 (Depression Questionnaire)

RDC/TMD: Research Diagnostic Criteria for Temporomandibular Disorders

TMD: Temporomandibular Disorder

TMJ: Temporomandibular Joint

UWC: University of the Western Cape.



ABSTRACT

Relationship of TMD diagnosis and self-reported bio-psychosocial status of patients attending the TMD clinic

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Background: This study aimed to investigate a possible relationship between the diagnosis of TMD and biographical, psychological and social status of patients.

Materials and Method: All records of patients who attended the TMD clinic in the Mitchells Plain Oral Health Centre in the period from January 2015 to July 2018, and who were examined according to the DC/TMD protocol, were collected. All diagnostic observations, as well as their biographical, psychological and social data were recorded. Statistical analysis was performed by means of comparisons and association analysis among data to evaluate if there were any statistically relevant associations or differences.

Results: Seventy-two patients folders were collected, ten folders were excluded due to missing critical data. Another ten patients were contacted to complete noncritical data in the patient folder. Hundred and eighty-three TMD diagnostic observations were recorded from these 62 patients. The mean age of the population was 39.69 SD \pm 18.91 years. Most patients were females (85.79%). Fifty-three % of patients were healthy, 20.77 % reported having one medical condition and 26.23% reported having two or more medical conditions. GAD-7 scores were as follows: 37% fell into the category of no anxiety, 24% into mild anxiety, 20% into moderate anxiety and 19% into

severe anxiety. PHQ-9 scores were as follows: 37% fell into the category of mild depression, 17 % into no depression, 15% into moderate depression, 12% into moderately severe depression and 19% into severe depression. PHQ-4 scores were as follows: no distress was the higher percentage of 33.33%, mild distress accounted for 20%, moderate distress 26% and severe distress 21%. GCPS v.2 scores were as follows: 40.98% were categorized as having moderately limiting pain, 38.34% as severely limiting pain, 11.47% as high intensity pain without disability and 4.91% as low intensity pain without disability. Myalgia represented the highest prevalence of 31.15%, followed by arthralgia with 25.68%, followed by disc displacement with 20.22%, followed by headache attributed to TMD with 18.58% and degenerative joint diseases accounted for only 4.37%. There were no statistically significant differences between the diagnosis and GAD-7 scores ($P=0.941$), PHQ-4 scores ($P= 0.828$), PHQ-9 scores ($P= 0.996$) and GCPS scores ($P=0.849$). Spearman's rank correlation statistics showed no relationship between the type of diagnosis and biographic data, psychological status and social life affected by TMD.

Conclusion: There were significant associations between age and number of medical conditions, between social life affected with TMD pain and psychological status and between the different psychological instrument scores. The null-hypotheses of this study could not be rejected.

November 2018

DECLARATION

I, the undersigned, Dr Omer Ahmed, hereby declare that the work contained in this dissertation titled: “Relationship of TMD diagnosis and self-reported bio-psychosocial status of patients attending the TMD clinic” is my original work and has not been previously in its entirety or in any part submitted at any university for any degree or examination.

Dr. Omer Ahmed



November, 2018



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I wish to express my sincere gratitude and appreciation to my supervisor **Professor Greta Geerts** for her effective encouragement and invaluable support.

I greatly appreciate **Prof Geerts** for her patience, understanding, very helpful input, remarks and suggestions which have certainly added wonderful value and enriched my work.

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- *Nurse staff at Mitchells Plain Oral Health Centre*

My sincere thanks and high appreciation are also due to Mrs Afrika for her valuable assistance during my study.



DEDICATION

I would like to dedicate this thesis to the sake of Allah, my creator and my master, to the Prophet ‘Mohammad’ (Peace be upon him) my role model and influencer.

I would like to dedicate this thesis to my parents; *Mr abdelrahim siddig* and *Mrs Soaad Hamdi*, for their unconditional love and endless support all the way throughout my journey.

To my wife; *Dr Mona Elmubarak*, and My daughter *Farah* for their understanding, endless patience and encouragement when it was most required. May Allah bless them all.

Thank you



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CHAPTER 1: INTRODUCTION

Before 1978, there was a misunderstanding of the definition of temporomandibular disorders (TMDs). The general perception was that all symptoms in the head, face, and jaw regions without identifiable cause constituted a TMD. Since then, this understanding has changed, due to substantial contributions in the study of etiologic factors, pathophysiology, diagnosis and management of TMDs (Scrivani *et al.*, 2008). Currently, TMDs are defined as different conditions involving the temporomandibular joint (TMJ), the muscles of mastication and the associated structures (ligaments, connective tissues), that present as pain, limitation in the joint opening and joint noises (Fernandez-De-Las-Penas and Svensson, 2016).

1.1. Epidemiology

Many studies suggest that the prevalence of TMDs is higher than 5% of the population (Liu and Steinkeler, 2013). While some studies showed prevalence rate ranging between 3% and 15 % in the western population, and the incidence rate between 2% to 4% (Fernandez-De-Las-Penas and Svensson, 2016). The age distribution of TMD patients is quite wide in range. However, the peak age for TMD symptoms to appear ranges between 20 to 40 years of age. Also, TMD symptoms are more prevalent in women than in men (Liu and Steinkeler, 2013).

1.2. Clinical features

Patients with TMDs most frequently present with pain, limited or asymmetric mandibular motion, and TMJ sounds. The pain or discomfort is often localized to the jaw, TMJ, and muscles of mastication. Commonly associated symptoms include ear pain and stuffiness, tinnitus, dizziness, neck pain, and headache. In some cases, the

onset is acute and symptoms are mild and self-limiting (Fernandez-De-Las-Penas and Svensson, 2016). In other patients, a chronic TMD develops, with persistent pain and physical, behavioural, psychological, and psychosocial symptoms similar to those of patients with chronic pain syndromes in other areas of the body (e.g., arthritis, low back pain, chronic headache, fibromyalgia, and chronic regional pain syndrome), all requiring a coordinated interdisciplinary diagnostic and treatment approach (Poveda Roda *et al.*, 2008),(Scrivani *et al.*, 2008). Other clinical features associated with TMD could include parafunctional habits such as the presence of tooth clenching (Poveda Roda *et al.*, 2008).



CHAPTER 2: LITERATURE REVIEW

2.1. Pathophysiology of TMDs

The TMJ can be affected by diseases that affect other joints in the body such as developmental, inflammatory, traumatic, congenital and neoplastic diseases (Scrivani *et al.*, 2008). Although the aetiology and the pathophysiology of TMD are still unclear, there is evidence of multiple factors acting at the same time (Liu and Steinkeler, 2013).

2.1.1. Sensitization mechanisms

Fernandez-De-Las-Penas and Svensson, (2016) mention that there is a clear scientific evidence of the presence of peripheral and central sensitivity mechanisms in the aetiology of TMD. *Peripheral sensitization* is related to an increased responsiveness and reduced threshold of peripheral nociceptors to stimulation of their receptive fields. It is characterized by an increased spontaneous activity, a decreased response threshold to noxious stimuli, increased responsiveness to the same noxious stimuli, and/or increased receptive field sizes. *Central sensitization* is defined as an increased response to pain stimulation mediated by amplification of signalling to the central nervous system and can occur through two main mechanisms: an increased excitation (sensitization) or decreased pain inhibition (descending facilitation) (Fernandez-De-Las-Penas and Svensson, 2016).

2.1.2. Comorbidity

The pain from TMDs is found to be associated with physical symptoms of other chronic pain disorders and comorbidities, such as generalized muscle and joint pain. However, this association is not widely studied. Bonato *et al.* (2017) tried to evaluate the prevalence of comorbid pain in joints, specifically in the knees, hips, ankles,

shoulders, wrists and elbows, in individuals with and without TMD. They found that individuals with TMD are 5.5 times more likely to present with other joint pain compared to those without the disorder. Also, TMD patients were associated with a higher number of other locations with pain. There was a significant association between the presence of pain at other locations, muscle ($P < 0.001$) and joint disorders ($P < 0.001$). Advanced age, in TMD participants, showed to be a covariate factor for pain at other locations. Individuals with TMD showed a high prevalence of pain in other joints of the body when compared with individuals without the disorder, and knee pain was the most prevalent pain complaint (Bonato *et al.*, 2017). In Orofacial Pain: Prospective Evaluation and Risk Assessment (OPPERA) case-control study, the general health and comorbidity were reported (Slade *et al.*, 2013b). They found that the incident of TMD increase in presence of regional pain conditions such as headache, irritable bowel syndrome, low back pain and genital pain syndrome. These conditions were a significant predictor of TMD symptoms. Respiratory conditions and neurosensory conditions were also found to be related to TMD incidence (Slade *et al.*, 2013b).

2.1.3. Sleep disorders

There is some evidence suggesting the possibility that sleep disturbance may directly contribute to central sensitization and pain amplification in patients with TMD. The literature has mainly focused on possible relationships between sleep bruxism and TMD. However, sleep bruxism is not associated with poor sleep quality (Camparis *et al.*, 2006).

Psychological distress can affect the quality of sleep as observed by Riley *et al.* (2001). They observed 50 % of patients with TMD symptoms had poor sleep quality associated with psychological distress and worse pain symptoms (Riley *et al.*, 2001).

Similarly, Edwards *et al.* (2009) showed that individuals with TMD diagnosed with primary insomnia, sleep apnoea, or sleep bruxism exhibited increased anxiety symptoms, increased symptoms of depression, and increased pain severity. The fact that primary insomnia was associated with generalized pressure hyperalgesia suggests that primary insomnia may either share a common substrate underlying central hypersensitivity and/or play a causal role in the development of hyperalgesia in patients with TMD pain (Edwards *et al.*, 2009).

2.1.4. Immunologic factors

It has long been known that stressful conditions may lead to a suppression of immune functions, for example reducing the ability to recover from infection. There is evidence demonstrating that the nervous, endocrine and immune systems are interconnected (Jones *et al.*, 1997). However, altered basal and stress-induced hypothalamic-pituitary-adrenocortical (HPA) activity may exist in TMD. It is known that the HPA axis is the major centrally regulated endocrine system responsible for rapid and strong responses to stress and that stress activates this axis and sympathetic nervous system. Disruption in these systems potentiates the release of cortisol and other chemical mediators, increasing and promoting pain (Jones *et al.*, 1997). In fact, a higher imbalance in the HPA axis may be related to worse adaptation responses to stress (Fernandez-De-Las-Penas and Svensson, 2016).

2.1.5. Neurotransmitters / neuropeptides

There is evidence supporting a relevant role for different neuropeptides in TMD pain. Glutamate, the endogenous agonist for excitatory amino acid (EAA) receptors, seems to play an important role since it may modulate nociceptive processing inputs from deep craniofacial tissues and cause sensitization (Gerdle *et al.*, 2014). The concentration of glutamate in the masseter muscle of patients with TMD pain was

significantly higher than the concentration in healthy controls in agreement with some studies on patients with chronic trapezius myalgia (Castrinoti *et al.*, 2010).

Studies also showed that serotonergic mechanisms may play role in myofascial pain. Elevated levels of serotonin in a patient with TMD pain and correlation between muscles 5-HT level and clinical perception of pain as well as pressure pain thresholds have been shown (Gerdle *et al.*, 2014). Other mediators such as bradykinin, prostaglandins, leukotrienes, cytokines, substance P and calcitonin gene-related peptide have also been implicated in TMD pain but their overall significance to clinical pain and sensitization has not yet been established in either micro-dialyses studies or intervention studies (Gerdle *et al.*, 2014).

2.1.6. Genetics

Genetic factors play a role in the aetiology of persistent pain conditions, assumed by modulating underlying processes such as nociceptive sensitivity, psychological well-being, inflammation, and autonomic response (Smith *et al.*, 2011). The OPPERA findings provided evidence supporting previously-reported associations between TMD and two genes: HTR2A and COMT. Other genes were revealed as potential new genetic risk factors for TMD, which include NR3C1, CAMK4, CHRM2, IFRD1, and GRK5. These genes potentially represent important markers of risk for TMD and they identify potential targets for therapeutic intervention (Smith *et al.*, 2011). In addition, in a more recent study investigating the role of 23 genes, the same authors reported that no genetic markers predicted TMD onset. Nonetheless, several genetic risk factors for clinical, psychological, and sensory phenotypes associated with TMD onset were observed. These factors revealed that TMD is a complex disease where the use of intermediate phenotypes may reveal new associated genetic pathways (Smith *et al.*, 2013).

2.2. Psychosocial factors

The current perspective regarding TMD is now multidimensional, with an appreciation that a combination of physical, psychological and social factors may contribute to the overall presentation of this disorder – hence the preference for a biopsychosocial integrated approach (Suvinen *et al.*, 2005).

There is strong evidence suggesting that psychosocial factors play a major role in the pain experience. In case-control studies, compared with pain-free control, patients with chronic pain conditions showed elevation on measures of psychosocial distress, environmental stress, catastrophizing and somatic awareness. These psychosocial variables are associated with poorer pain-related adjustment among patients with chronic pain (Fillingim *et al.*, 2011).

Su *et al.* (2017) assessed whether psychological and socio-demographic factors, including somatization, depression, stress, anxiety, daytime sleepiness, optimism, gender and age, are associated with pain intensity and pain-related disability in patients with TMDs. They found that depression was significantly associated with pain-related disability ($P = 0.003$). Among the psychological and socio-demographic factors in this study, somatization was the best predictor of pain intensity, while depression was the best predictor of pain-related disability (Su *et al.*, 2017).

2.3. TMD diagnosis

The biopsychosocial model for TMD diagnosis is based on a consensus among leading researchers and clinicians internationally. Probably the most widely studied measure of these variables is the Research Diagnostic Criteria for TMD (RCD/TMD), followed by the DC/TMD, developed at the University of Washington by Dworkin and LeResche (1992). The protocol for DC/TMD consists of axis I and axis II instruments.

Axis I instruments deal with physical assessment using reliable and operationalized diagnostic criteria based on TMD clinical signs and symptoms. Axis II instruments assess the psychosocial status and pain related disabilities (behavioural factors). The aims of these two axes are to provide a physical diagnosis and to identify a possible association between TMD symptoms/diagnosis and other conditions (Ohrbach and Dworkin, 2016).

Multicentre studies showed that, for most common TMD conditions, a diagnosis made according to the RDC/TMD protocol exhibited sufficient reliability and validity for routine clinical use. In 2001, the national institute of dental and craniofacial research in the USA, recognized the need for revision and assessment of the dual axis RDC/TMD. Briefly, the reference standard diagnoses for the pain-related disorders were established by consensus between 2 TMD and Orofacial pain experts at 3 study sites using a comprehensive history, physical examination, and panoramic radiograph. The reference standard diagnoses for TMJ intra-articular disorders were established by board-certified radiologists using bilateral TMJ magnetic resonance imaging and computed tomography and were blind to the patient's clinical situation (Schiffman and Ohrbach, 2016).

These authors recommended that a panel of international experts in TMD and other pain conditions be convened to develop an expert-based Diagnostic Criteria for Temporomandibular Disorder DC/ TMD assessment protocol that could be assessed against the credible reference standard developed in the Validation Project. The goal was to develop validated DC/TMD that would have widespread use in the clinical setting as well as in research. Through several steps, the DC/TMD was developed as a new version of RDC/TMD. The new version has a more comprehensive classification

structure and related diagnostic criteria in addition to the refinement of axis I and II algorithms (Schiffman *et al.*, 2014).

2.3.1. Axis I physical assessment

The axis I pain screener is simple, reliable, and valid self-report instrument used to assess for the presence of any pain related TMD, with a sensitivity and specificity ≥ 0.95 . The DC/TMD axis I instruments (TMD pain screener, symptoms questionnaire, examination form, demographics) provide the necessary history of the symptoms as well as a validated examination form for rendering a specific diagnosis in conjunction with the new DC/TMD pain related diagnostic algorithms (Schiffman *et al.*, 2014).

2.3.2. Axis II psychosocial assessment

The axis II psychosocial assessment is composed of several simple reporting instruments for detection of pain-related psychosocial and behavioural functioning: 1. The patient health questionnaire, for detecting psychosocial distress due to anxiety and depression; 2. Generalized anxiety disorder, for detection of anxiety; 3. The graded chronic pain scale, to assess pain intensity and pain-related disability and this instrument consist of two short instruments for characteristics of pain intensity and for pain disability rating. That is based on the number of days that pain interferes activity and on the extent of interference with social, work, or usual daily activities; 4. Pain drawing of the head jaws and body, to report locations of all pain complaints. The instrument assesses global limitations across mastication, jaw mobility, verbal and emotional expressions; 5. Oral behavioural checklist, this to assess the frequency of oral parafunctional behaviours. (Schiffman *et al.*, 2014)

2.4. TMD classification

Peck *et al.* (2014), identified the need for expanding the classification of TMD to

include uncommon but clinically important disorders. They aimed to develop a consensus-based classification system and associated criteria that have clinical and research utility for less common TMDs.

A working group [members of the International RDC/TMD Consortium Network of the International Association for Dental Research, members of the Orofacial Pain Special Interest Group of the International Association for the Study of Pain, and members from other professional societies], reviewed disorders for inclusion based on clinical significance, the availability of acceptable diagnostic criteria, and the ability to operationalize and study the criteria. The disorders were derived from the literature when possible and based on expert opinion as necessary (Peck *et al.*, 2014).

The TMD taxonomy offers an integrated approach to clinical diagnosis and provides a framework for further research. Thirty-seven conditions were included in the expanded taxonomy and were placed into the following four categories: Temporomandibular joint disorders, Masticatory muscle disorders, Headache disorders, and Disorders affecting associated structures (Peck *et al.*, 2014).

Many studies have been done regarding the role of the psychosocial model in TMDs. It has been suggested that a better understanding of psychosocial factors affecting TMD diagnosis, will help to improve the treatment efficacy and disease control together with the humanization of the relation between health providers and patients. Most of the current literature is centred in Canada and North America. The participants are confined to specific ethnic groups; white, African American and small percentage of other ethnic groups. There are no data in the literature from South Africa or in particular, in Western Cape. Highlighting TMD related biopsychosocial factors of the South African population may provide valuable information that can be used to develop specific and more holistic, multidisciplinary treatment planning.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Aim and objectives

3.1.1. Study aim

The aim of this study was to investigate the relationships between different TMD diagnoses and biographical, psychological and social status of TMD patients.

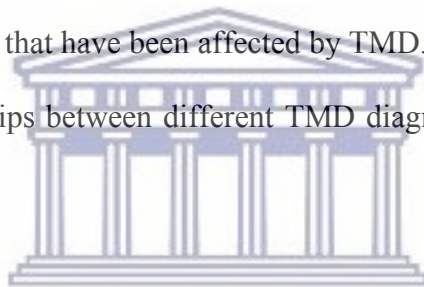
3.1.2. Study objectives

To determine the biographical conditions of patients diagnosed with TMDs.

To identify TMD patients' psychological status.

To identify social habits that have been affected by TMD.

To determine relationships between different TMD diagnosis and bio-psycho-social status of patients.



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3.2. Null hypothesis

There is no association between TMD diagnosis and biographical status of patients attending the TMD clinic.

There is no association between TMD diagnosis and psychological status of patients attending the TMD clinic.

There is no association between TMD diagnosis and social factors of patients attending the TMD clinic.

3.3. Material and Methods

3.3.1. Study design

This is a cross-sectional, analytic, record-based study of a group of patients diagnosed with TMD.

3.3.2. Study setting

University of Western Cape, Mitchells Plain Oral Health Centre, Cape Town, South Africa.

3.3.3. Study participants

Existing records of all patients who reported to the TMD clinic in the Mitchells Plain Oral Health Centre between January 2015 and July 2017 and who were diagnosed with a TMD condition using the DC/TMD protocol, were collected. Missing information in the patient folder was managed according to the DC/TMD self-reported instrument scoring manual (Ohrbach and Kinbke, 2017): Missing information was categorized as critical such as the Diagnosis, GAD_7 scores, PHQ-9 scores, and non-critical such as Medical History and Demographic information. The inability to find critical data necessitated exclusion of the patient folder from further analysis. Non critical data were completed by contacting the patient telephonically.

3.4. Confirmation of diagnosis

Patients were included based on a positive result of the TMD “Pain Screener” questionnaire (see Appendix 1) that is completed at the first appointment by the patient. The TMD pain screener form consists of three questions, each one was scored. Patients were included when the score exceeded “three”. Furthermore, the diagnosis was confirmed from the “Examination Form” (see Appendix 2).

3.5. Grouping

Patients were classified into five groups according to their diagnosis: 1. Myalgia; 2. Arthralgia; 3. Headache related to TMD; 4. Disc Displacements (DDs); 5. Degenerative Joint Disease (DJD). This grouping process was done in a way that is not mutually exclusive. That means this classification allows each patient to belong to

more than one group according to his/her diagnosis. For this reason, the term “Diagnostic observation” is used.

3.6. Determination of the biographic condition

To identify the biographic data such as patient’s age, gender, medical history and social history of the TMD patients, the patient file as well as axis I instruments were used.

3.7. The patient’s psychological status

The following three instruments from axis II were used to identify the psychological mood of the patient:

- 3.7.1. *Anxiety*: The 7-item Generalized Anxiety Disorder (GAD-7) questionnaire was used to assess the patient’s anxious mood and behaviour over the last 2 weeks before the examination. Higher scores indicate a more severe anxiety disorder. The sum score of GAD-7 can be classified into four categories: no anxiety, mild anxiety, moderate anxiety and severe anxiety. (Appendix 3)
- 3.7.2. *Distress*: Psychological distress during daily life over the last 2 weeks was measured using a 4-item questionnaire (PHQ-4). This questionnaire comprised of two 2-item subscales, anxiety and depression, and it is intended to be an ultra-brief screener for distress as the composite construct of anxiety and depression. A total sum score was computed. Scores of 3, 6, and 9 represent cut-off points for mild, moderate, and severe distress, respectively. (Appendix 4)
- 3.7.3. *Depression*: The 9-item Patient Health Questionnaire (PHQ-9) was used to assess patients’ depressed mood over the last 2 weeks. Higher sum scores indicate more severe depression. The sum score of PHQ-9 can be classified

into five categories: no depression, mild depression, moderate depression, moderate-to-severe depression and severe depression. (Appendix 5)

3.8. Social habits affected by TMD

To determine the effect of TMD diagnosis on the social habits of patients, the Graded Chronic Pain Scale (GCPS) version 2.0 instrument was used to collect information on pain-related disability. (Appendix 6) This instrument consists of three items related to pain intensity (at the time of examination and within the last 30 days), 4 items on social functioning and one item of days of pain within the last 6 months.

Characteristic Pain Intensity (CPI), Interference Score, Disability points for the number of days with interference, Disability points for the interference score and the total Disability Points computed using the Scoring Manual for Self-Report Instruments (Ohrbach and Kinbke, 2017). According to the final score obtained, the chronic pain scale was interpreted as None, Low intensity pain without disability, High intensity pain without disability, Moderately limiting and Severely limiting pain.

3.9. Data collection and statistical analysis

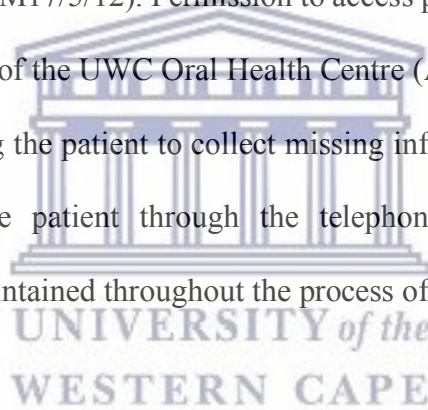
All data were collected from the patient folder by one reviewer. Diagnosis, biographical data, and scoring results from axis II instruments were collected and recorded on a data collection sheet using MS Excel. Collection of non-critical missing data was done by contacting the patients through the telephone. Consent was taken from the patient prior to collect the missing data. A witness was present during this task and she acted as interpreter in case of language difficulties. Descriptive results were tabulated using frequencies, means and standard deviations. Statistical analysis was performed by means of comparisons and association analyses among data to

evaluate if there were any statistically relevant associations or differences. A Chi-square test and Pearson's chi test with a P value < 0.05 was considered to be significantly different. A one way ANOVA was used to determinate if there was a difference between the variables. Spearman's rank-order correlation test was used for correlation between the TMD diagnoses and the other variables. Fisher's exact test was also used, with a P value ≤ 0.05 considered to be statistically significant.

3.10. Ethical consideration

This is record-based study. Approval to conduct this study was obtained from the Biomedical Research Ethics Committee of the University of the Western Cape (Registration number: BM17/5/12). Permission to access patient records was obtained from the Dean/Director of the UWC Oral Health Centre (Appendix 7).

In the case of contacting the patient to collect missing information, informed consent was obtained from the patient through the telephone. Patient anonymity and confidentiality were maintained throughout the process of research.



CHAPTER 4: RESULTS

4.1. Introduction

Seventy-two patients attended the TMD clinic between January 2015 and July 2018 and were examined according to the DC/TMD protocol. Their information was retrieved from the patients' files. A total of 10 patients whose records were missing critical information were excluded from the study. Data of 62 patient folders were included.

The analysis of the results was based on specific diagnoses. Since patients may have more than one diagnosis, the number of TMD diagnoses, also referred to as “diagnostic observations”, is higher than the number of participants. From this group of 62 patients, a total of 183 TMD diagnostic observations were made.

Table 4. 1: Demographic characteristics (N=183)

Variable	% (n)
Mean age (SD)	39.69 years (\pm 18.91)
Female	85.79% (157)
Male	14.21% (26)
Marital status	
Single, Divorced, Widowed	72.67% (133)
Married	25.68% (47)
Unknown	1.69% (3.0)
Occupation	
Full time employed	22.40% (41)
Unemployed	34.97% (64)
Students	25.13% (46)
Pensioners, Disabled	17.87% (32)
Number of medical conditions per patient	
No medical condition	53.01% (97)
Only one condition	20.77% (38)
2 or more conditions	26.23% (48)

4.2. Demographic characteristics related to TMD diagnostic observations

Table 4.1 reports the general demographics based on the 183 TMD diagnostic observations included in this study. Mean age of females was 41.40 and males 29.38 years of age.

Table 4.2 reports the mean age and number of medical conditions related to the 183 TMD diagnostic observations.

Table 4.2: Mean age with medical condition.

Medical condition	n	Mean age (years)	Std Err	[95% confidence interval]	
None	97	27.06	1.30	24.49	29.63
One	38	50.63	2.72	45.25	56.01
Two or more	48	56.56	1.52	53.55	59.57

Std Err = standard error

Figure 4.1 shows a box plot of the relationship of age and number of medical conditions.

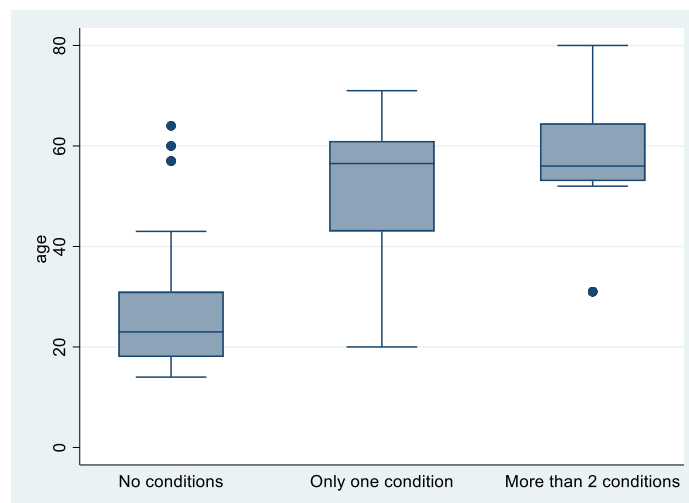


Figure 4.1: Relationship between the number of medical conditions and age in years.

Table 4.3 demonstrates a comparison between the number of diagnostic observations from male and female participants in relation to the number of medical conditions at the time of examination.

Table 4. 3: Number of TMD diagnostic observations according to the number of medical conditions and gender.

Gender	TMD observations	Medical conditions			Total
		0	1	2	
Female	Number	74	38	45	157
	%	47.13	24.20	28.66	100.00
	% of total	76.29	100.00	93.75	85.79
Male	Number	23	0	3	26
	%	88.46	0.00	11.54	100.00
	% of total	23.71	0.00	6.25	14.21
Total	Number	97	38	48	183
	% of total	53.01	20.77	26.23	100.00
	Total %	100.00	100.00	100.00	100.00

The % of TMD diagnoses from females without medical conditions was statistically significantly lower than that from for males (47.13% and 88.46% respectively) (P=0.00). Post hoc analysis involved pairwise comparisons using the z test of two proportions with a Bonferroni correction. The proportion of cases classified as having one medical condition compared to no medical conditions was statistically significantly lower in males compared to females, $p < 0.05$. The proportion of cases classified as having two or more medical conditions compared to one condition was statistically significantly lower in males compared to females $p < 0.05$.

The number of medical conditions did not differ among the 5 different TMD diagnostic groups (Pearson's chi-square 0.611 and Fisher's exact 0.705).

Spearman's rank-order correlation was used to assess the relationship between Age, Gender and the Number of Medical Conditions. The analysis showed the relationship to be monotonic, as assessed by visual inspection of a scatterplot. There was a strong correlation between the age of cases and the number of medical conditions ($r_s=0.66$) (Fig 4.2). Gender was found to be weakly correlated to the number of medical conditions ($r_s=0.25$) and there was a very weak correlation between age and gender ($r_s=0.17$).

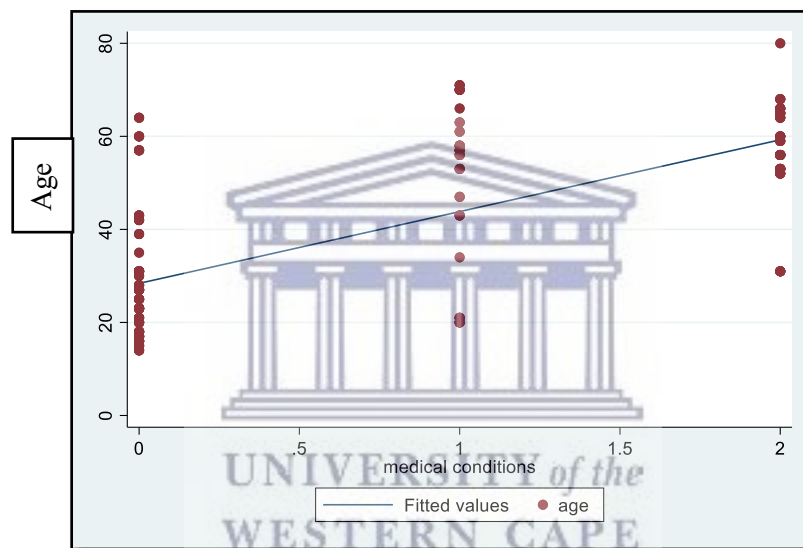


Figure 4.2: Scatterplot showing the strong correlation between the age and number of medical conditions.

4.3. Psychological status related to TMD diagnostic observations

The instrument “General Anxiety Disorder number 7” (GAD_7) scores were analysed to determine anxious mood related to TMD diagnostic observations (Figure 4.3). The majority of cases (n=68, 37%) fell into the category of No Anxiety; Forty-four (24%) into Mild Anxiety; Thirty-six (20%) into Moderate Anxiety and thirty-five (19%) into severe anxiety.

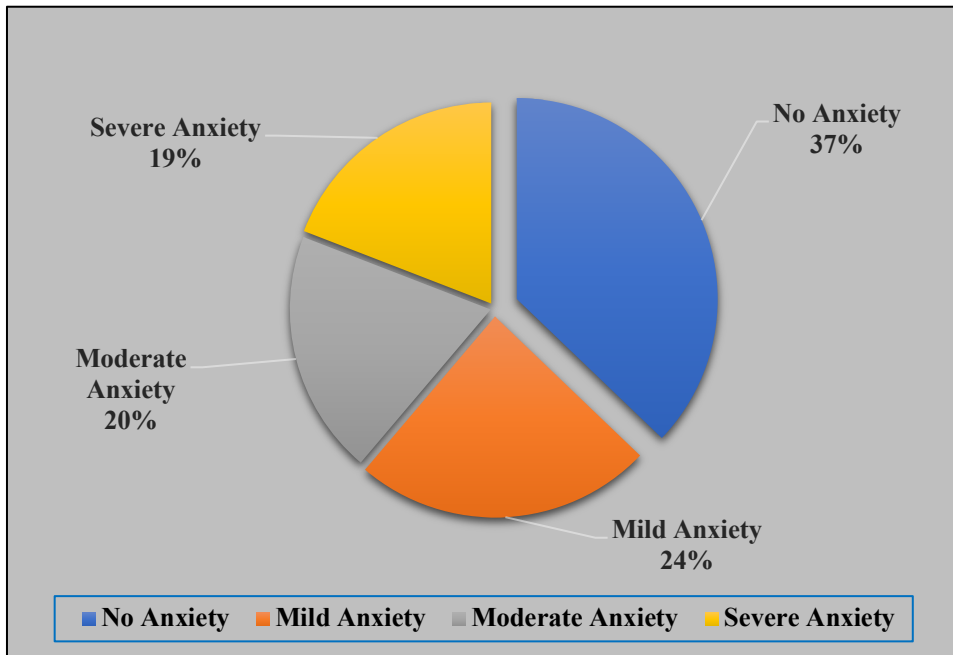


Figure 4. 3: TMD diagnostic observations and Anxiety mood.

Scores from the instrument “Patient Health Questionnaire number 4” (PHQ_4) which represent the distress mood of the participants are shown in figure 4.4. Cases with no distress were the higher percentage of 33% (n=61). Mild distress accounted for 20% (n=36), moderate distress 26% (n=48) and severe distress 21% (n=38) of the cases. (Fig.4. 4.)

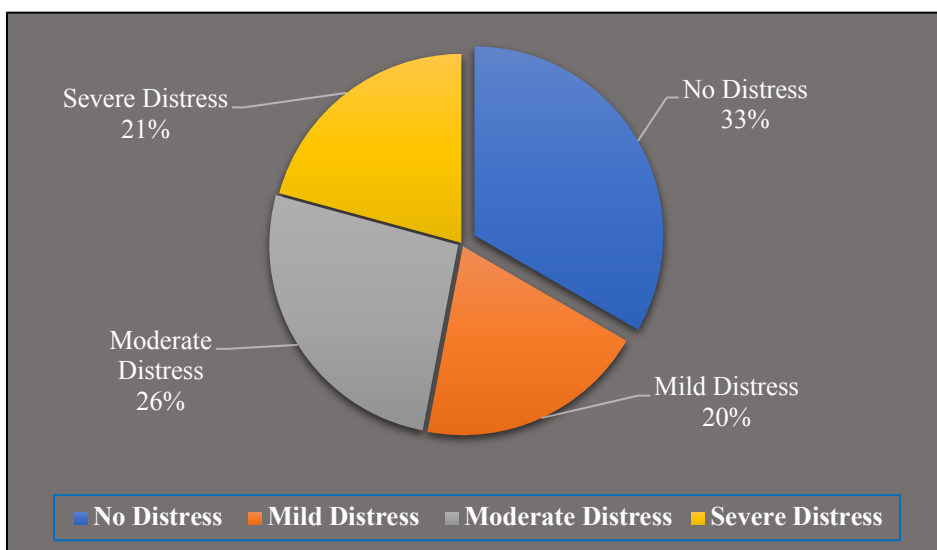


Figure 4. 4: TMD diagnostic observations and Distress Mood.

The instrument “Patient health questionnaire number 9 (PHQ_9)” scores were used to determine the depression mood related to diagnostic observations (Fig. 4.5). The higher frequency (37%) of cases was related to ‘mild depression’ (n=67). Only 17 % of the cases were related to ‘no depression’ (n=32), 15% to ‘moderate depression’ (n=28), 12% to ‘moderately severe depression’ (n=22) and 19% to ‘severe depression’ (n=34).

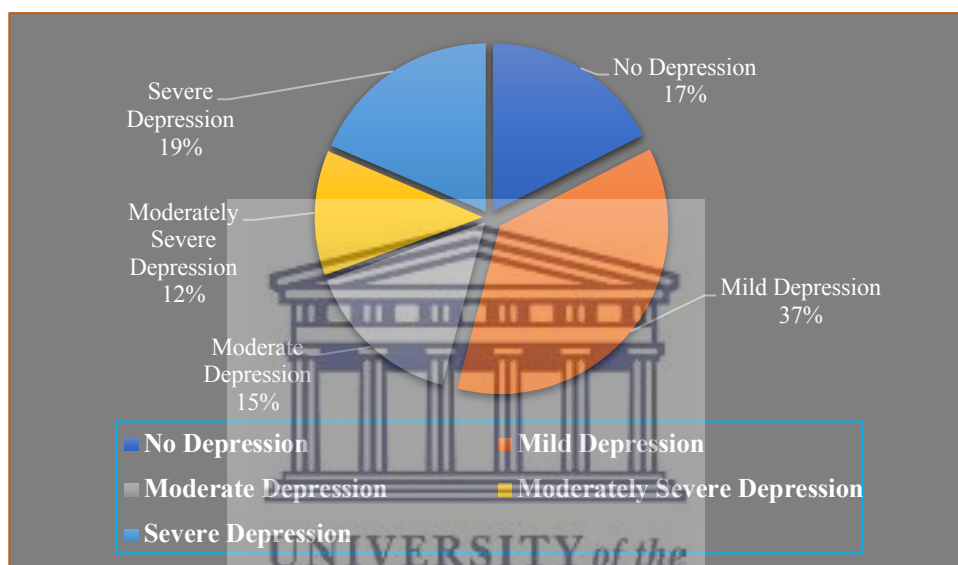


Figure 4. 5: Depression mood related to diagnostic observations.

Spearman’s rank-order correlation was used to assess the relationship between the three different instruments. The analysis showed the relationship to be monotonic, as assessed by visual inspection of a scatterplot. There was a strong correlation between PHQ-4 and PHQ-9 ($r_s = 0.75$). Also, very strong correlations were found between GAD-7 and PHQ-4 and PHQ-9 ($r_s > 0.80$).

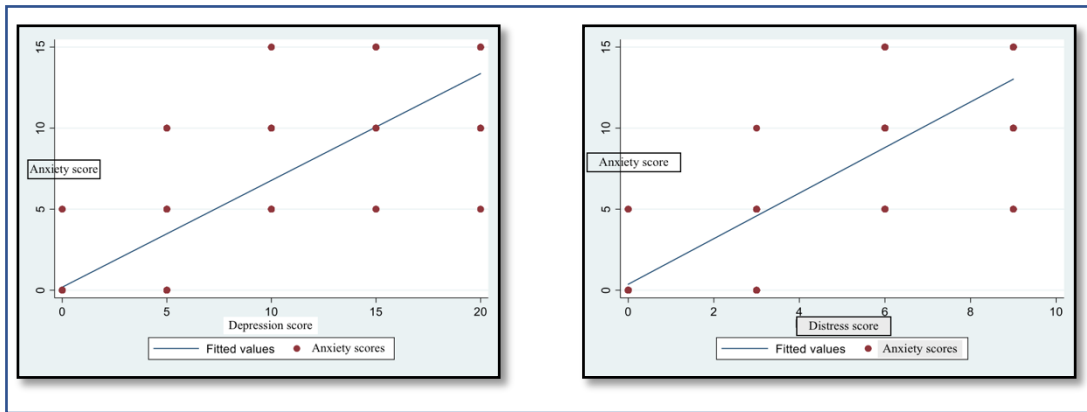


Figure 4. 6: Scatterplots showing the very strong correlations between Anxiety mood, Depression and Distress mood of the diagnostic observations.

4.4. Social habits affected by TMD

The “Graded Chronic Pain Scale version 0.2” instrument was used to determine the social habits affected by TMD pain. The highest number of diagnostic observations (n=75, 40.98%) was associated with a Moderately Limiting Pain score, followed by Severely Limiting Pain (n=72, 39.34%), 11.47% for High Intensity Pain Without Disability, 4.91% for Low Intensity Pain Without Disability and only 3.27% for cases with No Pain. (Fig. 4.7)

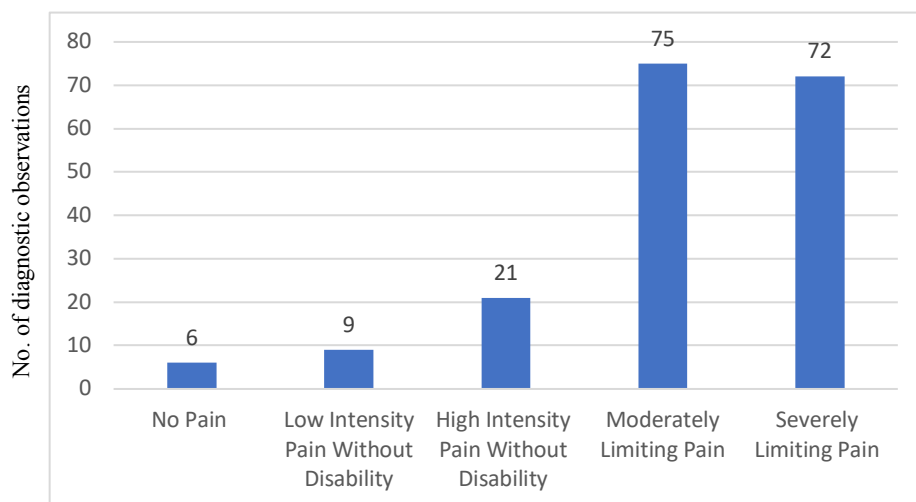


Figure 4. 7: Frequency of Chronic Pain Grade Results

Spearman's rank-order correlation was used to assess the relationship between the chronic pain grade instrument score and psychological mood instrument scores. The analysis showed that there were weak correlations between the affected social habits and psychological mood of the diagnostic observations, but there were statistically significant differences ($P < 0.05$). Also, the test showed a weak correlation to the number of medical conditions ($r_s = 0.21$) ($P=0.003$). (Fig 4.8)

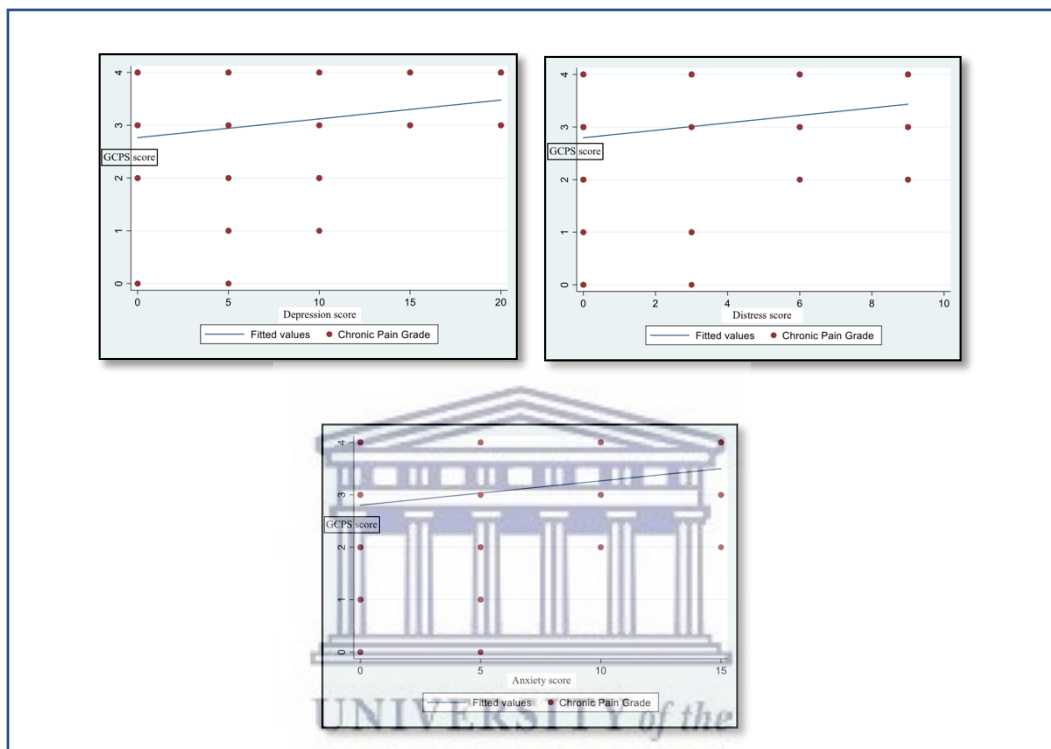


Figure 4. 8: Relationship between psychological factors and social habits

4.5. TMD Diagnosis and bio-psychosocial status of the cases.

Among the 183 TMD diagnostic observations, the diagnosis of Myalgia represented the highest prevalence of 31.15% (n=57), followed by Arthralgia with 25.68% (n=47), followed by the Disc Displacements with/without reduction or locking with 20.22% (n=37), followed by Headache attributed to TMD with 18.58% (n=34). Degenerative Joint Diseases accounted for only 4.37% (n=8). (Fig. 4.9)

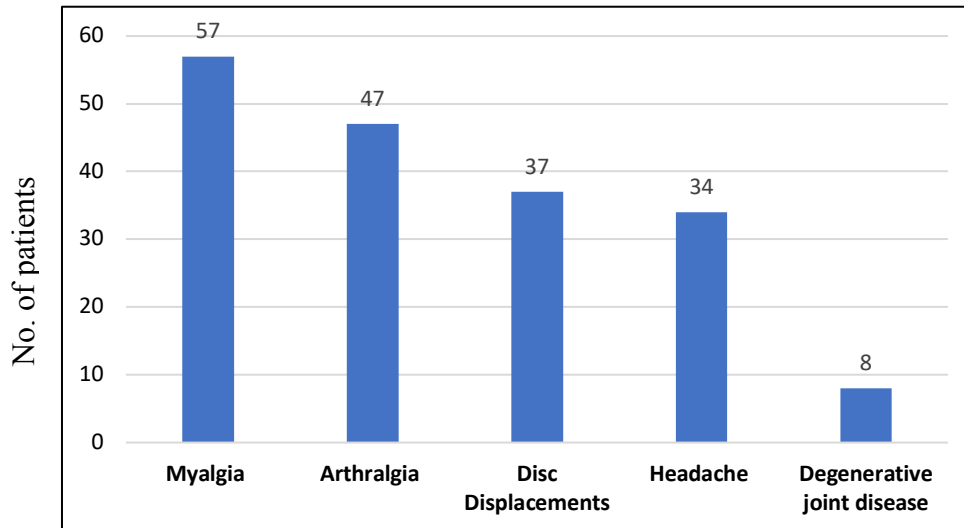


Figure 4. 9: Frequency of TMD diagnosis.

To determine if diagnoses differed according to age, a one-way ANOVA was conducted. The cases were classified into the 5 groups according to the diagnosis. The data were presented as a mean and standard deviation. The youngest mean based on diagnosis was seen in cases diagnosed as Disc Displacements 37.08 years (SD= 19.3), followed by Arthralgia, 38.53 (18.1), Headache 39.62 (19.1), Myalgia, 41.86 (19.5) and Degenerative Joint Diseases, 43.5 (19.1). A boxplot was developed, showing the absence of outliers, and the data were not normally distributed for each group as assessed by the Shapiro-Wilk test ($p < 0.05$). There was no statistically significant difference in age among the different diagnostic groups. ($p = 0.748$) (Fig 4.10)

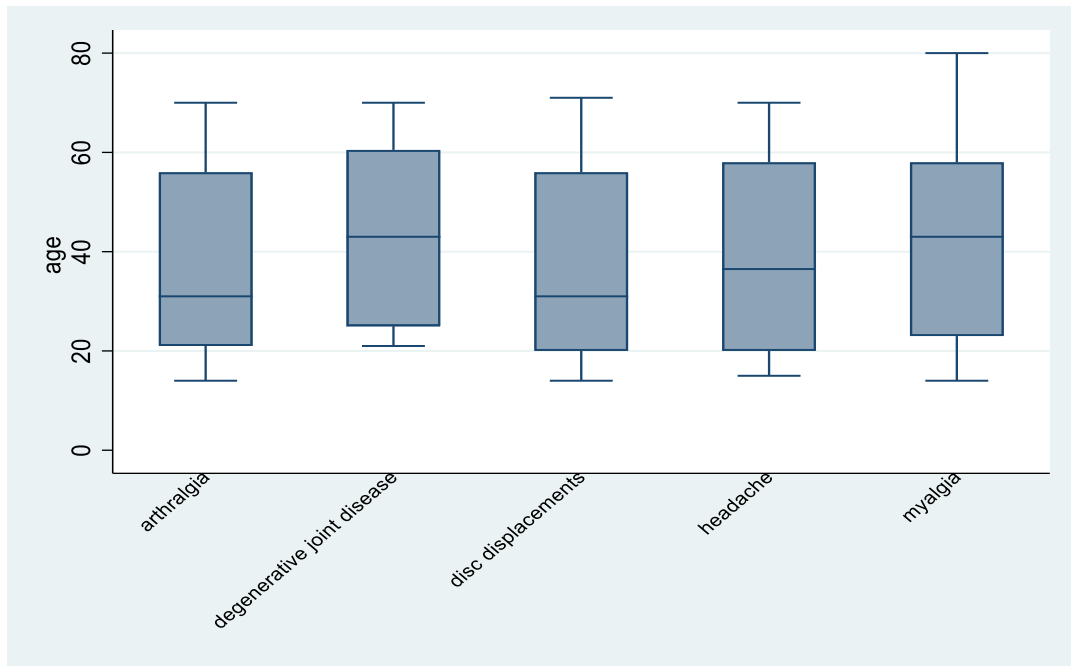


Figure 4. 10: Distribution of age according to each TMD diagnosis.

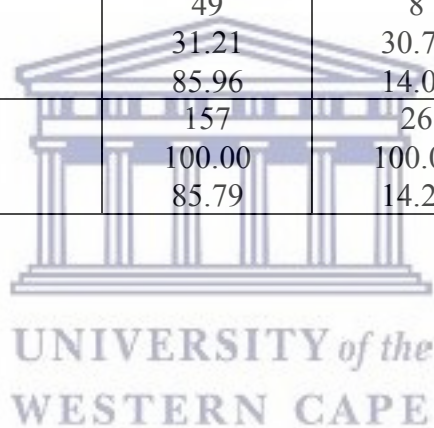
Table 4.4 demonstrates the distribution of gender according to the different TMD diagnoses. A chi-square test of homogeneity was performed. The results demonstrated no significant differences ($p=0.537$).

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Chi-square test was performed to highlight if there were significant differences between the number of co-morbid medical conditions and the different TMD diagnosis, and the result was not significant ($p=0.611$).

Table 4. 4: Distribution participants' gender according to different TMD diagnosis.

TMD Diagnosis	Gender		Total
	Female	Male	
Arthralgia	39	8	47
	24.84	30.77	25.68
	82.98	17.02	100.00
Degenerative Joint Disease	6	2	8
	3.82	7.69	4.37
	75.00	25.00	100.00
Disc Displacements	31	6	37
	19.75	23.08	20.22
	83.78	16.22	100.00
TMD Headache	32	2	34
	20.38	7.69	18.57
	94.12	5.88	100.00
Myalgia	49	8	57
	31.21	30.77	31.15
	85.96	14.04	100.00
Total	157	26	183
	100.00	100.00	100.00
	85.79	14.21	100.00



Key
Frequency
Column Percentage
Row Percentage

Table 4. 5 summarizes the correlation between the different TMD diagnoses and psychosocial, social variables and the number of medical conditions.

Table 4. 5: Correlation between the TMD diagnosis and DC/TMD axis II instruments.

Variables	TMD Diagnostic Groups					
	Arthralgia	Degenerative Joint Disease	Disc Displacements	Headache	Myalgia	P value
No of Medical conditions	N (%)	N (%)	N (%)	N (%)	N (%)	0.705
0	26 (14.2)	3 (1.6)	21 (11.5)	19 (10.4)	28 (15.3)	
1	9 (4.9)	4 (2.2)	5 (2.7)	6 (3.3)	14 (7.6)	
2 or more	12 (6.5)	1 (0.6)	11 (6.0)	9 (4.9)	15 (8.2)	
Anxiety Mood						0.962
No anxiety	18 (9.8)	5 (2.7)	15 (8.2)	10 (5.5)	20 (10.9)	
Mild anxiety	11 (6.0)	2 (1.1)	7 (3.8)	9 (4.9)	15 (8.20)	
Moderate Anxiety	9 (4.9)	0 (0.0)	9 (4.9)	7 (3.8)	11 (6.0)	
Severe Anxiety	9 (4.9)	1 (0.6)	6 (3.3)	8 (4.4)	11 (6.0)	
Distress Mood						0.852
No Distress	16 (8.7)	5 (2.7)	13 (7.1)	9 (4.9)	18 (9.8)	
Mild	10 (5.5)	2 (1.1)	6 (3.3)	5 (2.7)	13 (7.1)	
Moderate	12 (6.6)	0 (0.0)	10 (5.5)	12 (6.6)	14 (7.7)	
Severe	9 (4.9)	1 (0.6)	8 (4.4)	8 (4.4)	12 (6.6)	
Depression mood						0.999
No Depression	9 (4.9)	3 (1.6)	6 (3.3)	5 (2.7)	9 (4.9)	
Mild Depression	17 (9.3)	3 (1.6)	15 (8.2)	11 (6.0)	21 (11.5)	
Moderate Depression	7 (3.8)	1 (0.6)	4 (2.2)	6 (3.3)	10 (5.5)	
Moderately severe	5 (2.7)	0 (0.0)	5 (2.7)	5 (2.7)	7 (3.8)	
Severe Depression	9 (4.9)	1 (0.6)	7 (3.8)	7 (3.8)	10 (5.5)	
Pain Related disability						0.897
No pain	0 (0.0)	1 (0.6)	2 (1.1)	0 (0.0)	3 (1.6)	
Low intensity Without Disability	2 (1.1)	0 (0.0)	2 (1.1)	1 (0.6)	4 (2.2)	
High intensity without disability	6 (3.3)	0 (0.0)	5 (2.7)	4 (2.2)	6 (3.3)	
Moderately limiting pain	20 (10.9)	2 (1.1)	15 (8.2)	15 (8.2)	23 (11.6)	
Severely limiting pain	19 (10.4)	5 (2.7)	13 (7.1)	14 (7.7)	21 (11.5)	

CHAPTER 5: DISCUSSION

This is a cross-sectional study conducted at the University of the Western Cape, Mitchells Plain Oral Health Centre in the city of Cape Town. Its aim was to investigate a possible relationship between the diagnosis of TMD and biographical, psychological and social status of patients. The participants were patients diagnosed using Axis I and II instruments of DC/TMD protocol. Data extracted from patient folders were assessed in term of completion of information, missing data were subjected to specific role stated in the “Scoring Manual for Self-Report Instruments” (Ohrbach and Kinbbe, 2017). Patient’s folders with missing of critical data were excluded from the study. Non-critical data such as sociodemographic data and medical history were collected from patients by contacting them telephonically.

Among the sixty-two patients included in this study, ten patients were contacted to complete the missing data in the patient folder. Consent was taken through the telephone by explaining the purpose and the aims of the study. The nurse in the TMD clinic was a witness while taking the consent through the telephone. There was no objection by any patient to participate in the study and to provide the missing information. In case of language challenges, the nurse in the clinic helped to explain and collect information.

5.1. Biographical correlation of TMD Diagnosis

The first null-hypothesis “*There is no association between TMD diagnosis and biographical status of patients attending the TMD clinic*” failed to be rejected.

The sample was similar to the samples reported in the literature, the majority of participants in this study were single, divorced or widowed and were unemployed (Saram Progiante *et al.*, 2015). The social and demographic characteristics of this study (Table 4. 1) were similar to those reported in prevalence studies in the literature that used the RDC/TMD with larger samples ($N > 100$), in both TMD patients and general populations, granting external validity to these results (Saram Progiante *et al.*, 2015). As in most other TMD studies, female participants were the majority and they were older than male participants (Slade *et al.*, 2013a),(Su *et al.*, 2017). The mean age of all participants was 39 years. These results are similar to those reported in the literature, where the women-to-men ratio ranges from 2:1 to 5:1 and the average age ranges from 23 to 46 years.



In public based studies, it was found that gender is a risk factor for developing TMDs, with two times higher risk for women when compared with men (Bueno *et al.*, 2018). However, it is not yet clear what aspects of women's biology, psychology or social roles predispose them of having more TMD than men. The differences between the genders might be related to hormonal factors (Vilanova *et al.*, 2015), cultural and social factors, higher levels of work stress for women (Theorell *et al.*, 2015), differences in pain sensitivity, as well as health-seeking behaviours (Schmid-Schwab *et al.*, 2013).

The 183 diagnostic observations were classified into five groups as follows: Arthralgia group, Degenerative Joint Disease group, Disc Displacements Group, TMD Headache Group, and Myalgia group. This study wanted to establish if there is a relationship between gender and frequency of certain diagnostic observations. A chi-square test of

homogeneity was run, and the results were statistically insignificant ($P = 0.537$). The results from the current study were different from a study by Blanco-Hungria *et al.* (2016). They analysed the prevalence of each of the different clinical subtypes of TMDs and their distribution according to gender. They included 1603 patients in their study. They found that female participants had more muscle disorders, arthralgia/arthrosis/ osteoarthrosis and disc displacements than men (7.9% to 3.4%, 44% to 10% and 46% to 9% respectively) (Blanco-Hungria *et al.*, 2016). The difference in sample size could be one of the reasons behind this discrepancy in the results. Recent systematic review and meta-analysis concluded that women had a higher prevalence of TMD in all RDC/TMD diagnostic groups (Bueno *et al.*, 2018). The meta-analysis yielded the following results: (a) The odds ratio (OR) = 2.24 for global TMD (The three groups combined), (b) OR = 2.09 for muscles disorders group, (c) OR = 1.6 for disc displacements group and (d) OR = 2.08 for arthralgia/ arthrosis/ osteoarthrosis group (Bueno *et al.*, 2018). The difference between this study and the current one is that the systematic review included only the population-based studies (Participants were not TMD patients).

In general, the females were older than males. The mean age of female was 41.4 years and the mean age of the males was 29.3 years. There is no statistically significant difference in mean age among the different diagnostic groups. It was impossible to compare this results since there was no study that presents such information.

The frequency of axis I instrument results were as follow; (a) Myalgia group was 31.15%, (b) Disc displacements group was 20.22%, (c) Arthralgia and degenerative joint disease groups were 25.6% and 4.37% respectively, and (d) headache attributed

to TMD group was 18.58%, see (figure 4. 9). These results could be compared to those obtained from other studies. Also, the prevalence of the RDC/TMD group classification in TMD patient populations has varied among studies featuring large populations ($N > 100$): (a) 13.6% to 50.2% for muscles disorders group, (b) 22.0% to 43.3% for disc displacements group, (c) 13% to 33.2% for arthralgia group (Yap *et al.*, 2003),(Winocur *et al.*, 2009),(Manfredini *et al.*, 2012). It must be emphasized that a single patient may have more than one diagnosis. In a systematic review, the only meta-analysis for RDC/TMD Axis I prevalence in patient populations was reported to be 45.3% for muscle disorders group, 41.1% for disc displacements group, and 30.1% for arthralgia group (Manfredini *et al.*, 2011) These data confirm that the RDC/TMD Axis I classification is reproducible worldwide with moderate agreement (Look *et al.*, 2010). In some studies, the term “myofascial pain groups” were used covering the Myalgia and the Headache attributed to TMD groups (Saram Progiante *et al.*, 2015). More than half of the patients in the present study were healthy. Twenty % of the participants had one medical condition; 26% had two or more medical conditions. The conditions were hypertension, angina, cardiac arrhythmia, diabetes, asthma, thyroid dysfunction, and osteoarthritis. As would be expected, it was found that, with increasing age, the number of medical conditions also increased. This relationship was significant. Gender also played a role in the number of medical conditions in the present study: female participants were found to be having significantly more medical conditions when compared with male participants. A recent study done in Korea comprehensively assessed the association between chronic diseases, ophthalmologic and otolaryngologic disorders, and TMD among 17,575 participants. Eleven point seventy-five % reported experiencing one or more TMD symptom(s). Compared to individuals without chronic disease, the OR for TMD prevalence was 1.46 in

individuals with asthma, 1.44 in migraine, 1.51 in osteoarthritis, 1.49 in thyroid dysfunction, and 1.51 in depressive symptoms. (Song *et al.*, 2018). A recent study on TMD symptoms in knee arthritis patients and non-arthritic controls reported that arthritic patients were more likely to experience TMDs and limited range of motion (Zhang *et al.*, 2017). However, osteoarthritic change of the TMJ and TMD symptoms do not always coincide (Al-Juhani *et al.*, 2015). Hypothyroidism is frequently accompanied by various musculoskeletal symptoms ranging from myalgia and joint pain to myopathy and osteoarthritis (McLean and Podell, 1995), and it can be carefully suspected that TMDs may also occur as a musculoskeletal manifestation of thyroid dysfunction.

These conditions were reported by the patients of the present study but could not be further analysed because of the small sample size.

5.2. Psychosocial correlation of TMD diagnosis

The second null-hypothesis “*There is no association between TMD diagnosis and psychological status of patients attending the TMD clinic*” and the third null-hypothesis “*There is no association between TMD diagnosis and social factors of patients attending the TMD clinic*” were both failed to be rejected.

The axis II instruments of the DC/TMD protocol were used to score depressive and anxious states, distress, and impact of pain on social activities. The finding of comorbidity between depression and anxiety is well recognized both in primary care and chronic pain patients.

Regarding depressive mood, 37% of the 183 diagnostic observations were related to Mild depression, 27% to moderate to moderately severe depression and 19% for Severe depression.

Regarding anxious mood, 24% of the 183 diagnostic observations were related to 'mild anxiety', 20% to 'moderate anxiety' and 19% to 'severe anxiety'. The highest % of observations was related to 'no signs of anxiety' (37%).

Regarding level of distress, was 20% of the diagnostic observations were related to 'mild distress', 26% to 'moderate distress' and 21% to severe distress. Again, the highest % of observations was related to 'no signs of Distress' (33%). A study by Su *et al.* (2017) assessed the association between sociodemographic factors and psychological factors in TMD patients. They examined a total of 320 patients. According to depression, the distribution was as follows: 48.7% of patients had no depression; 29.0% had mild depression; 18% had moderate and moderate to severe depression and only 4% scored severe depression. According to anxiety, the distribution was as follows: 58.4 % of patients had no anxiety, 21.5% had mild anxiety, 12.8% had moderate anxiety and only 7.1% had severe anxiety (Su *et al.*, 2017). Another study by Reiter *et al.* (2015), examined the extent of depression, anxiety, somatization, and comorbidity between depression and anxiety in patients with TMDs. The study included 207 Israeli TMD patients. The Depression accounts for 44% for level 1, 33.3% for level 2 and 22.7% for level 3 depression. The anxiety was 45.9% for level 1, 29.5 for level 2 and 24.6% for level3 anxiety (Reiter *et al.*, 2015). The results from this two studies are somehow different from the current study, in which the frequencies of the depression mood was higher than the results of Su *et al.* and slightly lower than the result of Reiter *et al.* This is could possibly be due to low sample size of the current study compared to the other two studies and the different scoring system by Reiter *et al.* bearing in mind that the 183 diagnostic observations come from only 62 patients included in the study.

The scores from the Graded Chronic Pain Scale was interpreted to describe how social life was affected by TMD pain. The result showed that the higher % of diagnostic observations were associated with moderately limiting pain (40.98%), followed by 39.34% associated with severely limiting pain, 11.47% with high intensity pain without disability and only 4.91% with low intensity pain without disability. These results were not consistent with the results from Reiter *et al.* as they found that the higher % account for high intensity pain without disability (46.4%), followed by 29.0% for low intensity pain without disability and moderately limiting pain account for only 10.1% (Reiter *et al.*, 2015). Su *et al.* (2017) measured the pain intensity separately from the disability levels. Their results showed, out of 320 participants, 48.8% for had low pain intensity and 51.3% for high pain intensity, 73.8% showed no disability and 26.2% showed moderate to severe disability. However, these results cannot be compared to the current results because they split the GCPS instrument and scored the pain intensity section separately from the disability section. In the current study, we analysed the total score. However, it indicated an insignificant association between the TMD symptoms and pain related disability scale.

The association between social and psychological variables of the diagnostic observations found to be statistically significant ($P < 0.05$). However, Spearman's correlation statistics revealed that there were weak to very weak correlations between the results from Graded chronic pain scale and the depressive, anxious, and distress moods. These results are not consistent with other studies. Studies indicate that the added morbidity of depression and anxiety with chronic pain is strongly associated with more severe pain, and greater disability (Bair *et al.*, 2008). Su *et al.* found that depression was the best predictor of pain-related disability. Higher pain-related

disability was associated with more severe depression. Patients with mild depression, moderate depression, moderate-to-severe depression, and severe depression had about a 1.6, 8.9, 8.1 and 13.7 times higher odds of suffering moderate-to-severe pain-related intensity relative to no depression (Su *et al.*, 2017).

Nevertheless, it should always be kept in mind that using the DC/ TMD protocol, assessment of depression, somatization, and anxiety is performed by using self-report questionnaires. Also, these instruments were not initially intended for reaching a psychiatric diagnosis of depression, anxiety, or somatization, but to assess psychological distress levels (Dworkin *et al.*, 2002). The process of self-answering a questionnaire may affect the validity of self-report data; social context, ethnicity, culture, personal characteristics, intelligence level, and other factors might affect the validity of self-report data. In addition, the comparison between studies that used different diagnostic instruments with different sensitivity and specificity is problematic and may account for differences reported (Reiter *et al.*, 2015).

The correlation between the diagnostic groups and social and psychological variables showed to be non-significant in this study since the P value was 0.962 for anxiety scores, 0.852 for distress scores, 0.999 for depression scores, and 0.897 for pain related disability scores, see (Table 4. 5). These results are not consistent with the other studies. Since most of the studies found some degree of association between TMDs and psychosocial variables (Yap *et al.*, 2003),(Reiter *et al.*, 2015),(Saram Progiante *et al.*, 2015),(Su *et al.*, 2017). A recent study in Brazil aimed to investigate if anxiety and malocclusion are associated with the prevalence of TMDs in adolescents. They concluded that anxiety is strongly associated with TMDs, presence of Class II or III is associated with higher prevalence of myofascial pain in adolescent. Their explanation

for the relation between TMD pain and anxiety was due to the fact that anxiety exacerbates the masticatory muscle tension by clenching and grinding (De Paiva Bertoli *et al.*, 2018). Furthermore, in a recent systematic review by De LA Torre Canales *et al.* they concluded that psychological disorders and psychosocial impairment are highly prevalent in TMD patients. Severe-to- moderate somatization and depression are commonly reported by TMD patients, while most patients presented low disability/low-intensity pain or low disability/high-intensity pain (De La Torre Canales *et al.*, 2018).

A possible explanation of this discrepancy between the current results and the other studies could be due to demographic, ethnic or socioeconomic characteristics of the patients. The low sample size could also affect such results, and this was the first limitation of this study.

Secondly, incomplete entries in patient folders was a major challenge in the conduction of record-based studies and this could lead to exclusion of large numbers of the sample. Another suggested aetiological factors of TMDs such as the genetic factors, sensitization mechanisms, immunological factors, and neurotransmitters/ neuropeptides role were not included in this study. Further research in the same population considering these variables could provide more explanation on causal relationship to TMDs in the South African population. However, a multi-centre study using standardized protocol is needed to assess a large number of TMD patients with different ethnic, demographic and socioeconomic characteristics.

CHAPTER 6: CONCLUSION

Within the limitations of this study, the findings failed to reject the three null hypotheses proposed in the methodology were.

There was no association between TMD diagnosis and biographical status of patients attending the TMD clinic. However, there was a significant association between gender of patients and the number of medical conditions. Female patients with TMDs were found to have more medical conditions when compared to males. Age was also found to play a role: with increasing age the number of medical conditions increased for this group of TMD patients.

There was no association between TMD diagnosis and psychological status of patients attending the TMD clinic. Otherwise, a strong correlation was found in-between the scores of anxiety, depression, and distress instruments.

And finally, there was no association between TMD diagnosis and social factors of patients attending the TMD clinic. The social life affected by TMD pain intensity or pain related disability were found to be not related to the type of diagnosis. However, there was a weak to very weak correlation between the social variables and psychological variables. Further Research needed using other DC/TMD instruments and including a large number of the participants.

APPENDICES

Appendix 1

TMD-PAIN SCREENER

1. In the last 30 days, how long did any pain last in your jaw or temple area on either side?
 - a. No pain
 - b. Pain comes and goes
 - c. Pain is always present

2. In the last 30 days, have you had pain or stiffness in your jaw on awakening?
 - a. No
 - b. Yes

3. In the last 30 days, did the following activities change any pain (that is, make it better or make it worse) in your jaw or temple area on either side?
 - A. Chewing hard or tough food
 - a. No
 - b. Yes

 - B. Opening your mouth or moving your jaw forward or to the side
 - a. No
 - b. Yes

 - C. Jaw habits such as holding teeth together, clenching, grinding, or chewing gum
 - a. No
 - b. Yes

 - D. Other jaw activities such as talking, kissing, or yawning
 - a. No
 - b. Yes



Appendix 2

DC/TMD Examination Form		Date filled out (mm-dd-yyyy)									
Patient _____ Examiner _____		<table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td> </tr> </table>									
1a. Location of Pain: Last 30 days (Select all that apply)											
RIGHT PAIN		LEFT PAIN									
<input type="radio"/> None <input type="radio"/> Temporalis <input type="radio"/> Other m muscles <input type="radio"/> Non-mast structures <input type="radio"/> Masseter <input type="radio"/> TMJ		<input type="radio"/> None <input type="radio"/> Temporalis <input type="radio"/> Other m muscles <input type="radio"/> Non-mast structures <input type="radio"/> Masseter <input type="radio"/> TMJ									
1b. Location of Headache: Last 30 days (Select all that apply)											
<input type="radio"/> None <input type="radio"/> Temporal <input type="radio"/> Other		<input type="radio"/> None <input type="radio"/> Temporal <input type="radio"/> Other									
2. Incisal Relationships											
Reference tooth <input type="radio"/> FDI #11 <input type="radio"/> FDI #21 <input type="radio"/> Other											
Horizontal Incisal Overjet <input type="radio"/> If negative	<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm			Vertical Incisal Overlap <input type="radio"/> If negative	<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm			Midline Deviation <input type="radio"/> Right <input type="radio"/> Left <input type="radio"/> N/A	<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm		
3. Opening Pattern (Supplemental; Select all that apply)											
<input type="radio"/> Straight <input type="radio"/> Corrected deviation		Uncorrected Deviation									
		<input type="radio"/> Right <input type="radio"/> Left									
4. Opening Movements											
A. Pain Free Opening											
<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm			RIGHT SIDE	LEFT SIDE							
	Pain Familiar Pain Familiar Headache	Pain Familiar Pain Familiar Headache									
B. Maximum Unassisted Opening	Temporalis <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Masseter <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y TMJ <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Other M Musc <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Non-mast <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y	Temporalis <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Masseter <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y TMJ <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Other M Musc <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Non-mast <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y									
<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm											
C. Maximum Assisted Opening	Temporalis <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Masseter <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y TMJ <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Other M Musc <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Non-mast <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y	Temporalis <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Masseter <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y TMJ <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Other M Musc <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Non-mast <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y									
<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm											
D. Terminated?	<input type="radio"/> N <input type="radio"/> Y										
5. Lateral and Protrusive Movements											
RIGHT SIDE											
Pain Familiar Pain Familiar Headache											
A. Right Lateral	Temporalis <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Masseter <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y TMJ <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Other M Musc <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Non-mast <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y	LEFT SIDE									
<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm				Pain Familiar Pain Familiar Headache							
		Temporalis <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Masseter <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y TMJ <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Other M Musc <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Non-mast <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y									
B. Left Lateral	Temporalis <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Masseter <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y TMJ <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Other M Musc <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Non-mast <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y	<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm									
C. Protrusion	Temporalis <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Masseter <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y TMJ <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Other M Musc <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y Non-mast <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> Y	<table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table> mm									
<input type="radio"/> If negative											

Appendix 2

6. TMJ Noises During Open & Close Movements												
RIGHT TMJ						LEFT TMJ						
	<u>Examiner</u>		<u>Patient</u>	<u>Pain w/ Click</u>	<u>Familiar Pain</u>		<u>Examiner</u>		<u>Patient</u>	<u>Pain w/ Click</u>	<u>Familiar Pain</u>	
Click	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	Click	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	
Creptus	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	Creptus	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	
7. TMJ Noises During Lateral & Protrusive Movements												
RIGHT TMJ						LEFT TMJ						
	<u>Examiner</u>	<u>Patient</u>	<u>Pain w/ Click</u>	<u>Familiar Pain</u>		<u>Examiner</u>	<u>Patient</u>	<u>Pain w/ Click</u>	<u>Familiar Pain</u>			
Click	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	Click	<input type="radio"/> N	<input checked="" type="radio"/> Y			
Creptus	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	Creptus	<input type="radio"/> N	<input checked="" type="radio"/> Y			
8. Joint Locking												
RIGHT TMJ						LEFT TMJ						
	<u>Locking</u>	<u>Reduction</u>				<u>Locking</u>	<u>Reduction</u>					
While Opening	<input type="radio"/> N	<input checked="" type="radio"/> Y	<u>Patient</u>	<u>Examiner</u>	<input type="radio"/> N	<input checked="" type="radio"/> Y	<u>Patient</u>	<u>Examiner</u>	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Wide Open Position	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
9. Muscle & TMJ Pain with Palpation												
RIGHT SIDE						LEFT SIDE						
(1 kg)	<u>Pain</u>	<u>Familiar Pain</u>	<u>Familiar Headache</u>	<u>Referred Pain</u>		(1 kg)	<u>Pain</u>	<u>Familiar Pain</u>	<u>Familiar Headache</u>	<u>Referred Pain</u>		
Temporalis (posterior)	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Temporalis (middle)	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Temporalis (anterior)	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Masseter (origin)	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Masseter (body)	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Masseter (insertion)	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
TMJ		<u>Pain</u>	<u>Familiar Pain</u>	<u>Referred Pain</u>			<u>Pain</u>	<u>Familiar Pain</u>	<u>Referred Pain</u>			
Lateral pole (0.5 kg)	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Around lateral pole (1 kg)	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
10. Supplemental Muscle Pain with Palpation												
RIGHT SIDE						LEFT SIDE						
(0.5 kg)	<u>Pain</u>	<u>Familiar Pain</u>	<u>Familiar Pain</u>	<u>Referred Pain</u>		(0.5 kg)	<u>Pain</u>	<u>Familiar Pain</u>	<u>Familiar Pain</u>	<u>Referred Pain</u>		
Posterior mandibular region	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Submandibular region	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Lateral pterygoid area	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
Temporalis tendon	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> Y		
11. Diagnoses												
Pain Disorders			Right TMJ Disorders			Left TMJ Disorders						
<input type="radio"/> None	<input type="radio"/> None	<input type="radio"/> None	<input type="radio"/> None	<input type="radio"/> None	<input type="radio"/> None	<input type="radio"/> None	<input type="radio"/> None	<input type="radio"/> None				
<input type="radio"/> Myalgia	<input type="radio"/> Disc displacement (select one)	<input type="radio"/> Disc displacement (select one)	<input type="radio"/> Disc displacement (select one)	<input type="radio"/> Disc displacement (select one)	<input type="radio"/> Disc displacement (select one)	<input type="radio"/> Disc displacement (select one)	<input type="radio"/> Disc displacement (select one)	<input type="radio"/> Disc displacement (select one)				
<input type="radio"/> Myofascial pain with referral	<input type="radio"/> ...with reduction	<input type="radio"/> ...with reduction	<input type="radio"/> ...with reduction	<input type="radio"/> ...with reduction	<input type="radio"/> ...with reduction	<input type="radio"/> ...with reduction	<input type="radio"/> ...with reduction	<input type="radio"/> ...with reduction				
<input type="radio"/> Right Arthralgia	<input type="radio"/> ...with reduction, with intermittent locking	<input type="radio"/> ...with reduction, with intermittent locking	<input type="radio"/> ...with reduction, with intermittent locking	<input type="radio"/> ...with reduction, with intermittent locking	<input type="radio"/> ...with reduction, with intermittent locking	<input type="radio"/> ...with reduction, with intermittent locking	<input type="radio"/> ...with reduction, with intermittent locking	<input type="radio"/> ...with reduction, with intermittent locking				
<input type="radio"/> Left Arthralgia	<input type="radio"/> ... without reduction, with limited opening	<input type="radio"/> ... without reduction, with limited opening	<input type="radio"/> ... without reduction, with limited opening	<input type="radio"/> ... without reduction, with limited opening	<input type="radio"/> ... without reduction, with limited opening	<input type="radio"/> ... without reduction, with limited opening	<input type="radio"/> ... without reduction, with limited opening	<input type="radio"/> ... without reduction, with limited opening				
<input type="radio"/> Headache attributed to TMD	<input type="radio"/> ... without reduction, without limited opening	<input type="radio"/> ... without reduction, without limited opening	<input type="radio"/> ... without reduction, without limited opening	<input type="radio"/> ... without reduction, without limited opening	<input type="radio"/> ... without reduction, without limited opening	<input type="radio"/> ... without reduction, without limited opening	<input type="radio"/> ... without reduction, without limited opening	<input type="radio"/> ... without reduction, without limited opening				
	<input type="radio"/> Degenerative joint disease	<input type="radio"/> Degenerative joint disease	<input type="radio"/> Degenerative joint disease	<input type="radio"/> Degenerative joint disease	<input type="radio"/> Degenerative joint disease	<input type="radio"/> Degenerative joint disease	<input type="radio"/> Degenerative joint disease	<input type="radio"/> Degenerative joint disease				
	<input type="radio"/> Dislocation	<input type="radio"/> Dislocation	<input type="radio"/> Dislocation	<input type="radio"/> Dislocation	<input type="radio"/> Dislocation	<input type="radio"/> Dislocation	<input type="radio"/> Dislocation	<input type="radio"/> Dislocation				
12. Comments												
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GAD - 7

Over the last 2 weeks, how often have you been bothered by the following problems?
Place a check mark in the box to indicate your answer.

	Not at all	Several days	More than half the days	Nearly every day
	0	1	2	3
1. Feeling nervous, anxious or on edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Not being able to stop or control worrying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Worrying too much about different things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Trouble relaxing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Being so restless that it is hard to sit still	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Becoming easily annoyed or irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Feeling afraid as if something awful might happen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TOTAL SCORE =				

If you checked off <u>any</u> problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?			
Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Patient Health Questionnaire - 4

Over the last 2 weeks, how often have you been bothered by the following problems?
Please place a check mark in the box to indicate your answer.

	Not at all 0	Several days 1	More than half the days 2	Nearly every day 3
1. Feeling nervous, anxious or on edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Not being able to stop or control worrying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Little interest or pleasure in doing things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Feeling down, depressed, or hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TOTAL SCORE =

If you checked off <u>any</u> problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?			
Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

UNIVERSITY of the
WESTERN CAPE

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Patient Health Questionnaire - 9

Over the last 2 weeks, how often have you been bothered by the following problems?
Please place a check mark in the box to indicate your answer.

	Not at all 0	Several days 1	More than half the days 2	Nearly every day 3
1. Little interest or pleasure in doing things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Feeling down, depressed, or hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Trouble falling or staying asleep, or sleeping too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Feeling tired or having little energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Poor appetite or overeating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Trouble concentrating on things, such as reading the newspaper or watching television	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Thinking that you would be better off dead or of hurting yourself in some way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TOTAL SCORE =				

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?			
Not difficult at all	Somewhat difficult	Very Difficult	Extremely difficult
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Appendix 6

Graded Chronic Pain Scale Version 2.0

1. On how many days in the **last 6 months** have you had facial pain? _____ Days

2. How would you rate your facial pain **RIGHT NOW**? Use a scale from 0 to 10, where 0 is "no pain" and 10 is "pain as bad as could be".

No pain												Pain as bad as could be
0	1	2	3	4	5	6	7	8	9	10		

3. In the **LAST 30 DAYS**, how would you rate your **WORST** facial pain? Use the same scale, where 0 is "no pain" and 10 is "pain as bad as could be".

No pain												Pain as bad as could be
0	1	2	3	4	5	6	7	8	9	10		

4. In the **LAST 30 DAYS, ON AVERAGE**, how would you rate your facial pain? Use the same scale, where 0 is "no pain" and 10 is "pain as bad as could be". [That is, *your usual pain* at times you were in pain.]

No pain												Pain as bad as could be
0	1	2	3	4	5	6	7	8	9	10		

5. In the **LAST 30 DAYS**, how many days did your facial pain keep you from doing your **USUAL ACTIVITIES** like work, school, or housework? (every day = 30 days) _____ Days

6. In the **LAST 30 DAYS**, how much has facial pain interfered with your **DAILY ACTIVITIES**? Use a 0-10 scale, where 0 is "no interference: and 10 is "unable to carry on any activities".

No interference												Unable to carry on any activities
0	1	2	3	4	5	6	7	8	9	10		

7. In the **LAST 30 DAYS**, how much has facial pain interfered with your **RECREATIONAL, SOCIAL AND FAMILY ACTIVITIES**? Use the same scale, where 0 is "no interference: and 10 is "unable to carry on any activities".

No interference												Unable to carry on any activities
0	1	2	3	4	5	6	7	8	9	10		

8. In the **LAST 30 DAYS**, how much has facial pain interfered with your **ABILITY TO WORK**, including housework? Use the same scale, where 0 is "no interference: and 10 is "unable to carry on any activities".

No interference												Unable to carry on any activities
0	1	2	3	4	5	6	7	8	9	10		

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Appendix 7

Prof. YI Osman,
Dean of Faculty of Dentistry
University of the Western Cape
Private Bag X17
Bellville
7535

Date: 04/07/2017

REQUEST FOR PERMISSION TO ACCESS PATIENT RECORDS

I am a registered MSc student in the Department of Restorative Dentistry at the University of Western Cape. My supervisor is Professor Greta Geerts.

The proposed topic of my research is: Relationship of TMD diagnosis and self-reported Bio-psychosocial status of patients attending the TMD clinic.

The objectives of my study are:

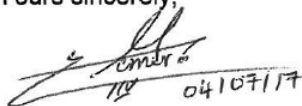
- (A) To determine the biographical conditions of patients diagnosed as TMD patient.
- (B) To identify the TMD patient's psychological status.
- (C) To identify the social habits that have been affected by TMD.
- (D) To determine the relationship between the TMD diagnosis and bio-psycho-social status of the patient.

I hereby seek your permission to access the patient records in Mitchells Plain oral health center.

Should you require any further information, please do not hesitate to contact me or my supervisor.

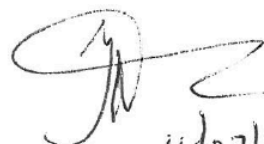
Your permission will be greatly appreciated.

Yours sincerely,


Name: Omer Ahmed
Email: 3698613@myuwc.ac.za
Cell: 0716418895

cc
- Prof. Geerts

Permission granted provided: -
① No files leave the premises
② Anonymity is ensured.


4/07/2017

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