



# Temporomandibular Disorder Symptoms and their Association with Anxiety and Depression Among University Students



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## Abstract

The aim of the study was to assess the presence of anxiety and depression among the University students, and its impact on temporomandibular disorders (TMD). 145 Bachelor of Dental Science students (Year 1-Year 4; 40% male and 60% female) at Charles Sturt University (CSU) were participated in the study. Each participant completed questionnaires on the Depression, Anxiety and Stress Scales (DASS), the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD), the Tampa scale for Kinesiophobia (TSK) and the Pain Catastrophizing Scale (PCS). Statistical analysis was carried out using SPSS version 22.0. A total of 46% students reported symptoms of TMD. Among them, 59 (40.7%) students reported presence of jaw click, 54 (37.2%) reported presence of joint pain and 26 (17.9%) reported difficulty in opening mouth. Results indicated that students who reported jaw pain ( $p=.004$ ) or difficulty in opening mouth ( $p=.016$ ) experienced headache symptoms. Students who reported the TMD symptoms of jaw click (69.5%), jaw pain (63%) and difficulty in opening (61.5%) were all female students. Female students experiencing jaw click was found to be significant ( $p=.000$ ). Students who reported a high DASS score (indicating depression and anxiety) are significantly correlated with self-assessed TMD symptoms (jaw click,  $p=.054$ ; jaw pain,  $p=.002$  and difficulty upon opening,  $p=.028$ , respectively). This study found a significant correlation between the presence of anxiety and depression among university students and its subsequent impact on temporomandibular disorders. This leads to a recommendation for counselling and support services being made more widely available.

**Keywords:** Temporomandibular disorder; Anxiety; Depression; University student

**Abbreviations:** TMD: Temporomandibular Disorders; DASS: Depression, Anxiety and Stress Scales; RDC/TMD: Research Diagnostic Criteria for Temporomandibular Disorders; TSK: Tampa Scale for Kinesiophobia; PCS: Pain Catastrophizing Scale; CSU: Charles Sturt University

## Introduction

Depression and anxiety are found to be a serious public health problem among young adults [1,2]. Chronic orofacial muscle pain imposes significant personal and economic burdens on at least 5% of the general population [2,3]. The temporomandibular joint (TMJ) is situated bilaterally on the lateral surfaces of the skull, the TMJ is a synovial articulation of the temporal bone and the mandible. Temporomandibular disorders (TMDs) are often detected by general dental practitioners when patients present with pain in the TMJ region, and orofacial area. Patients suffering TMD often have chronic pain, and at times severe pain leading to poor quality of life. TMD is a common complaint that medical and dental practitioners are presented with, the most prevalent symptom of a temporomandibular disorder (TMD) being pain [4,5].

Temporomandibular Disorders (TMD) are characterised by regional pain, and limitations of jaw movement are a major symptom. The incidence of TMD symptoms has been found to be up to 40% in the general population [6]. There are several different and specific symptoms of TMD, ranging from pain, limitation of the joint, bruxism or tooth grinding, inflammation alone of the joint and clicking noises [7]. The most common physical sign of TMD is clicking, locking or popping of the joint upon opening and closing, or chewing. As there is a large range of movement of the mandible in the TMJ, the clicking movement often heard can be non-pathologic with research finding a high prevalence of joint sounds in the general population [8-10].

The direct connection between anxiety and depression leading to symptoms of TMD has been a much-debated topic in

the field of orofacial research. Despite a large amount of research indicating a high incidence of exposure to stress related symptoms being associated with TMD [11-14], there are also several study results indicating no significant correlations [12,14-17]. Most of the collective literature, however, indicates there is a direct connection to psychological distress as a definite risk factor for developing TMD [1,4,11,14-18].

In previous studies the risk of developing depression, anxiety and stress in correlation with university studies was found to be high [1]. It has also been found that there is a high incidence of exposure to stress related self-reported symptoms and associated TMD [2]. As university students are under constant pressure throughout the semester and have increased stress levels in exam periods leading to anxiety and depression, it is predicted that university students will also have associated signs and symptoms of TMD.

There are limited studies in this field, and no other current studies in Australia, rural Australia. This study will therefore potentially create a baseline for further research. The students sampled are full time students who are accessible for surveys at CSU. The aim of the study is to determine the prevalence of signs and symptoms of TMD disorders among university students associated with psychological stress, anxiety, depression, parafunction and headaches. It was predicted that there would be a positive correlation between university students exhibiting symptoms of stress, depression and anxiety from everyday life and adjunctive tertiary studies, and associated TMD. The parallel increase of temporomandibular disorders and symptoms of anxiety and depression could suggest a possible relationship between anxiety and temporomandibular disorders. Therefore, the effect of anxiety and depression in triggering temporomandibular disorder symptoms would be probable.

The aim of the following study was to assess the presence of anxiety and depression among the students in the Bachelor of Dental Science students at Charles Sturt University and its subsequent impact on temporomandibular disorders.

**Methods**

The study was conducted surveying years 1-4 of the Bachelor of Dental Science students (N=145) at the Charles Sturt University, Orange Campus. Voluntary written informed consent was obtained from the participants before their recruitment into the study.

**Ethics approval**

This study received ethics approval from the Human Ethics Committee of the Charles Sturt University.

**Questionnaires**

The Depression, Anxiety and Stress Scales (DASS) which is a reliable and well-validated scale [19] that measures the cognitive and affective dimensions of psychological distress. It has three scales (depression, anxiety and stress) and 42 items. Symptoms

in the past week are rated from 0 (“not at all”) to 3 (“most of the time”). The total scores for each scale consist of the sum of the items.

The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) [20] history questionnaire was used to verify the presence or absence of symptoms of TMD. Presence of headache of any type in temporal region question was part of RDC/TMD history questionnaire.

Tampa Scale for Kinesiophobia for Temporomandibular Disorders (TSK/TMD): The TSK-TMD is an 18-item self-report questionnaire that assesses fear of movement. Each item is scored on a four-point ordinal scale, ranging from ‘strongly disagree’ (score = 1) to ‘strongly agree’ (score = 4). Four of the items are negatively worded and reversely scored (items 4, 8, 12 and 16). Ratings are summed to yield a total score where higher values reflect greater fear of movement (18-72 points) [21]. The Pain and Catastrophizing Scale: The Pain Catastrophizing Scale was introduced in 1995 [22]. It is a self-report measure, consisting of 13 items scored from 0 to 4, resulting in a total possible score of 52. The higher the score, the more catastrophizing thoughts are present. Previous studies have shown a cut off more than 30 points to be associated with clinical relevance. This measure has been found to have good psychometric properties, including high test-retest reliability and high internal consistency (Chronbach’s alpha = 0.87-0.95).

**Statistical analysis**

Analysis of the data was undertaken using the Statistical Package for the Social Sciences (SPSS), version 23.0 for Windows (SPSS, Chicago, IL). P values were calculated using the Chi-square tests and the statistical significance was set at 0.05. Variables in the analysis are age, gender, clicking of the jaw, difficulty in opening, pain in the jaw and psychological variables.

**Results**

Table 1 showed characteristics of the participants in terms of age and gender. Group 1 students were ≤22 years of age and comprised 79 (54.5%) students and Group 2 students were ≥23 years of age and comprised 66 (45.4%) students. According to Gender, 58 (40%) were male students and 87 (60%) were female students (Table 1). This table showed a higher percentage of students were aged 22 or less, with a higher percentage of female students.

**Table 1:** Characteristics of the participants (Age and Gender).

	Variables	No of Student’s	%
Age (Years)	22 year or less	79	54.5
	23 years or more	66	45.5
Gender	Male	58	40
	Female	87	60

In the four cohorts of surveyed, approximately 200 students, 145 students returned completed survey questionnaires. Among

145 students, 59 (40.7%) reported presence of jaw click, 54 (37.2%) reported presence of joint pain and 26 (17.9%) reported difficulty in opening mouth (Table 2). In the cohort of students there is a higher percentage of students with no presence of a jaw click, joint pain or difficulty in opening their mouth. Difficulty in opening the mouth has a low percentage of presence amongst the students surveyed.

**Table 2:** Prevalence of temporomandibular disorders among university students.

TMD Symptoms		No of Student's	%
Joint click	No click	86	59.3
	Presence of jaw click	59	40.7
Joint pain	No pain	91	62.8
	Presence of joint pain	54	37.2
Difficulty in opening mouth	No difficulty	119	82.1
	Difficulty in opening mouth	26	17.9

Survey results were analysed to assess the association between self-reported TMD symptoms and age, gender, headache and psychological variables (Table 3). Female students reported a higher incidence of TMD symptoms (Jaw click 69.5%, jaw pain 63% and difficulty in opening 61.5%, respectively). Students who reported jaw pain ( $p=.004$ ) or difficulty in opening mouth ( $p=.016$ ) showed significant relation with students who experienced headache symptoms. Significant relation was also found with students who showed a high DASS score (indicating depression and anxiety) and self-assessed TMD symptoms (jaw click,  $p=.054$ ; jaw pain,  $p=.002$  and difficulty in opening,  $p=.028$ , respectively).

**Table 3:** Association between self-reported TMD symptoms and age, gender, headache and psychological variables.

Presence of TMD Symptoms							
Variables	Jaw Click (%)		Jaw Pain (%)		Diff in Mouth Open (%)		
	No	Yes	No	Yes	No	Yes	
Age	22	52.3	57.6	54.9	45.1	51.3	69.2
	23	47.7	42.4	53.7	46.3	48.7	30.8
Gender	Male	46.5	30.5	41.8	37	40.3	38.5
	Female	53.5	69.5	58.2	63	59.7	61.5
Headache	Yes	26.7	35.6	22	44.4	26.1	50
	No	73.3	64.4	78	55.6	73.9	50
PCS	Lower	51.2	52.5	53.8	48.1	51.3	53.8
	Higher	48.8	42	48.4	42.6	47.1	42.3
TSK	Lower	51.2	52.5	53.8	48.1	51.3	53.8
	Higher	48.8	47.5	46.2	51.9	48.7	46.2
DASS	Lower	57	40.7	60.4	33.3	54.6	30.8
	Higher	43	59.3	39.6	66.7	45.4	69.2

## Discussion

In our study, significant correlations were found with students who reported presence of TMD symptoms of jaw click, jaw pain and difficulty in opening and DASS surveys indicating a significant correlation with depression and anxiety and TMD symptoms. There is a higher percentage of females reporting TMD symptoms with a significant number of females experiencing jaw click.

The symptoms associated with TMD are often ignored or confused with headache, odontogenic pain or sinus pain. In many cases most individuals are not aware of TMD and its associated pain and discomfort.

The students were asked a series of questions in the TMD check list to determine the presence of TMD. There are several different and specific symptoms of TMD, ranging from pain, limitation of the joint, bruxism or tooth grinding, inflammation alone of the joint and clicking noises [7]. The most common physical sign of TMD is clicking, locking or popping of the joint upon opening and closing, or chewing. As there is a large range of movement of the mandible in the TMJ, the clicking movement often heard can be non-pathologic with research finding a high prevalence of joint sounds in the population [8-10].

An important point to be noted in this study was large percentage of female students. Previous TMD research has found that females more frequently experience TMD symptoms as a result of higher emotional distress [23]. In this study there is a higher percentage of females reporting TMD symptoms with a significant result for females experiencing jaw click. A similar result was reported in the research by Akhter et al investigating university students in Japan noted female subjects who reported stress and bruxism had a higher risk of developing TMJ sounds [16]. This indicates that with a higher number of female students in the dental science course, the likelihood of experience of TMD may be high as a result of depression and anxiety amongst females.

Another significant finding in our study indicate that those students who reported jaw pain or difficulty on opening also experience symptoms of headaches. Similar results were found by the study by Akhter et al. showed that students who experience headaches were more likely to also be experiencing TMD pain [16].

Regarding the study aim, significant correlations were found with those students who noted TMD symptoms jaw click, jaw pain and difficulty in opening and a high score in the DASS surveys indicating a significant correlation with depression and anxiety and TMD symptoms. Anxiety and depression are a known psychological burden individual may experience at some point throughout their lives. Although it is often transient and minor, anxiety and depression may also be a chronic mental illness and the health implications of this are widely studied. University students are often under great amounts of stress, particularly in exam periods [6]. With the known knowledge of the link between anxiety and depression and TMD, research has now been conducted

word wide to investigate these correlations in the population group of university of students. An example of this is the research completed by Grychowska et al linking high emotional burden and excitability experienced in university students and the following predisposition it has on muscular disorders [13].

Often it is speculated that the chosen degree being studied may carry 'stress' and commitment, and with differing workloads may carry a higher emotional burden. A study by Bahrani et al. [11] found that students in dental degrees were found to be significantly more at risk for TMD than non-dental students [11]. The research by Wahid et al however found no significant difference in the individual's chosen discipline. Several studies have also investigated the degree of TMD, and discomfort experienced by students, ranging from mild to severe. Wahlid et al. [18] established in a cohort of students that 44.3% experienced mild TMD symptoms as opposed to only 3.6% experiencing severe pain [18]. A limitation in this study regarding the chosen discipline is that only students from Dental cohorts were included in the surveys. In future a wider range of students from differing degrees may give insight into the differing study loads. Another addition to future research in this area may be the variant of year group regarding higher DASS scores and TMD, with the more senior students possibly experience higher stress levels as a result of higher academic and clinical demands. As the surveys were also conducted in the beginning of the year, several months prior to exam periods, students may also have not yet been experiencing higher levels of stress and anxiety leading to lower DASS scores and TMD symptoms.

### Conclusion

With the significant correlation found indicating a presence of anxiety and depression among university students and its subsequent impact on temporomandibular disorders, findings from this study give a greater insight into students' mental health and wellbeing. This is evident from the DASS survey results. These results show that although a minority, some students are experiencing significant anxiety and depression. Depression and anxiety are a serious and at times debilitating illness. These results suggest that information for counselling and support services should be more widely available to students and that there should be recognition by the University that some students may require additional support and special considerations. As there is also a significant correlation found with high DASS scores and TMD, this can be used as a driver for the provision of education for students in stress management and relaxation techniques and exercises for relief of TMD and additional treatment when required.

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### Conflict of Interest

There is no economic interest, or any conflict of interest exists.

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