ACTA ODONTOLOGICA SCANDINAVICA
2023, VOL. 81, NO. 6, 456–463
https://doi.org/10.1080/00016357.2023.2172076

Taylor & Francis
Taylor & Francis Group

ORIGINAL ARTICLE

Psychological distress and coping orientations in young adults: their associations with temporomandibular disorder symptoms

Adrian Ujin Yap[a,b,c] and Carolina Marpaung[c]

[a]Department of Dentistry, Ng Teng Fong General Hospital and Faculty of Dentistry, National University Health System, Singapore; [b]National Dental Research Institute Singapore, National Dental Centre Singapore and Duke-NUS Medical School, Singapore Health Services, Singapore; [c]Department of Prosthodontics, Faculty of Dentistry, Universitas Trisakti, Jakarta, Indonesia

ABSTRACT

Objectives: The relationships between Temporomandibular disorder (TMD) symptoms, psychological distress and coping, together with the psychological risk factors for TMDs were investigated in young adults.

Material and methods: The quintessential five TMD symptoms (5Ts) of the DC/TMD were used to screen for TMDs. Participants were categorized into 5Ts-negative/positive groups and 5Ts-positive individuals were divided into those with pain-related (PT), intra-articular (IT) and combined (CT) TMD symptoms. Psychological distress and coping were examined using the Depression, Anxiety, Stress Scales-21 and brief-COPE inventory. Statistical evaluations were performed using non-parametric and regression analyses ($\alpha = 0.05$).

Results: Of the 455 participants (mean age 22.5 ± 1.2 years) appraised, 41.1% were 5Ts-negative and 58.9% were 5Ts-positive (17.6% PT, 19.8% IT and 21.5% CT). Significant differences in negative affectivity, anxiety and stress were observed. However, the variances in coping styles/strategies were largely insignificant. For both 5Ts groups, dysfunctional coping was moderately correlated to negative affectivity/emotions ($r_s = 0.40$–0.52).

Conclusions: Asian young adults with CT and PT had significantly higher levels of negative affectivity, anxiety and stress than their counterparts with IT and/or NT. Negative affectivity/emotions were associated with the use of dysfunctional coping strategies and anxiety was the main psychological risk factor for TMD symptoms.

STATEMENT OF CLINICAL RELEVANCE

As psychological distress is associated with the frequent use of dysfunctional coping strategies, clinicians are urged to assess negative emotions and coping behaviours when supporting individuals with TMDs.

ARTICLE HISTORY
Received 2 December 2022
Revised 13 December 2022
Accepted 13 January 2023

KEYWORDS
Temporomandibular joint disorders; symptoms; anxiety; stress; coping

Introduction

Temporomandibular disorders (TMDs) are a varied group of musculoskeletal conditions involving the Temporomandibular joints (TMJs), masticatory musculature and supporting structures [1,2]. They pose a significant and increasingly prevalent problem affecting 5 to 16% of the general population. Moreover, up to 75% of the general population have TMD symptoms which can be classified as pain-related (TMJ/masticatory muscle pain and headache) and/or intra-articular (TMJ noises, closed and open locking) as with TMD diagnoses [2–4]. TMDs are two to four times more common in women, particularly those aged between 20 and 40 years old [4,5]. They were found to impair general and oral health-related quality of life in both clinical and non-clinical samples [6–9]. Negative emotions, such as depression, anxiety and stress, are implicated in the multifaceted aetiology of TMDs that adheres to the 'biopsychosocial model of illness'. Individuals with TMD pain usually have higher levels of psychological distress and lower psychological well-being than those with intra-articular or no TMDs [9–12].

Coping with pain, functional disability and psychological distress serves an important role in musculoskeletal conditions including TMDs [13–17]. Coping is the 'predictable cognitive and behavioral efforts' to manage internal and external (situational) demands or reduce negative emotions and conflicts resulting from stressors [14]. Coping strategies can be considered functional or dysfunctional [18–20]. Functional coping styles, which are further divided into problem-focused (taking proactive steps to change or deal with stressors) and emotion-focused (regulating emotional responses to stress) strategies, have been associated with more positive outcomes including high self-esteem, optimism and resilience. Conversely, dysfunctional coping styles have questionable value in removing stressors and reducing stress and are related to more negative outcomes such as

CONTACT Carolina Marpaung carolina@trisakti.ac.id Department of Prosthodontics, Faculty of Dentistry, Universitas Trisakti, Jl Kyai Tapa no 260, Jakarta 1140, Indonesia

low self-esteem, low optimism and greater psychological distress [20,21].

Prior research indicated that TMD patients who used less functional and more dysfunctional coping styles were at greater risk for painful TMDs [14]. Additionally, patients with masticatory muscle pain were found to have higher levels of psychological distress and minor use of humour as a coping strategy when compared to controls and those with intra-articular TMDs [15,16]. Significant associations between coping styles and depression as well as activity interference were also reported in TMD patients [17]. Nevertheless, such investigations remain sporadic and the relation of TMDs to coping strategies has not been explored in non-clinical populations.

Therefore, the purpose of this study was to examine the associations between pain-related and intra-articular TMD symptoms with psychological distress and coping orientations in young adults. The correlates of negative emotions, problem-focused, emotion-focused and dysfunctional coping in individuals with and without TMD symptoms were also established together with the psychological risk factors for TMD symptoms. The research hypotheses were: (a) individuals with pain-related and intra-articular TMD symptoms have disparate levels of psychological distress and dissimilar coping strategies, (b) negative affectivity, depression, anxiety and stress are correlated to coping styles and impartial to the presence of TMD symptoms and (c) negative emotions and the use of dysfunctional coping styles increase the prospect of TMD symptoms.

Material and methods

Study design and sample

The observational study was authorized by the Institutional Review Board at the School of Dentistry, Universitas Trisakti, Indonesia (reference number: 013/S3/KEPK/FKG/9/2021). Potential participants were recruited in person and *via* public internet postings from a large private university located in the capital city.

A non-probabilistic voluntary sampling technique was employed. The inclusion criteria were persons aged 18 to 24 years old and proficient in English. Individuals undergoing professional care for debilitating psychological and/or physical disorders and those with prior orofacial trauma/surgery were excluded. A sample size of at least 363 participants was determined using an online calculator (https://www.calculator.net/sample-size-calculator.html). This was derived based on a 60% occurrence of TMD symptoms among Indonesian young adults conveyed in an earlier study,[9] 95% confidence level, 5% margin of error and enrolment of 20,638 students. Study details were provided to all potential participants and involvement in the research was voluntary with no payments or other rewards offered. Informed consent was attained from all participants before administrating an electronic survey consisting of demographic data, the quintessential five TMD symptoms (5Ts) of the Diagnostic Criteria for TMDs (DC/TMD), Depression, Anxiety, Stress-Scales-21 (DASS-21) and brief-COPE (Coping Orientation to Problems Experienced) inventory (BCI) [18,22,23].

Study measures

TMD symptoms were appraised with the 5Ts which presented high diagnostic accuracy for detecting DC/TMD-defined pain-related and/or intra-articular TMD conditions with sensitivities of up to 99.2% and specificities of 100% [22]. It originated from the DC/TMD Symptom Questionnaire and contains two pain-related (orofacial pain and headache) and three intra-articular (TMJ sounds, closed and open locking) items that were appraised over 30 days. Participants were deemed '5Ts-negative' (no TMD symptoms [NT]) should they answer 'no' to all five questions and '5Ts-positive' (with TMD symptoms [WT]) if they answered 'yes' to any of the five items. The '5Ts-positive' participants were further categorized into those with pain-related (PT), intra-articular (IT) and combined (CT) TMD symptoms.

Negative affectivity (tendency to experience poor self-concept and negative emotions) and the negative emotional states of depression, anxiety and stress were evaluated with the DASS-21 [23–25]. The DASS-21 has good psychometric properties and exhibits a bifactor structure comprising a general factor for negative affectivity (total DASS) and the three emotional subscales [24,25]. Each subscale contains seven items that are scored using a four-point Likert scale ranging from 'did not apply to me at all' = 0 points to 'applied to me very much or most of the time' = 3 points. While total DASS scores (the sum of all three subscales) extend from 0 to 63 points, subscale scores vary between 0 and 21 points. Greater total DASS and subscale scores indicate higher levels of psychological distress. The cut-off values for interpreting the three subscales (normal to extremely severe) are provided in the DASS manual [22].

Coping styles and strategies were examined with the BCI which consists of twenty-eight items indicating the degree to which participants employ 14 coping strategies in response to daily life stresses [18]. Items are scored on a four-point Likert scale ranging from 'I haven't been doing this at all' = 1 point to 'I've been doing this a lot' = 4 points. The 14 coping strategies are clustered into three coping styles, namely problem-focused coping (active coping, instrumental support and planning), emotion-focused (acceptance, emotional support, humour, positive reframing and religion) and dysfunctional coping (behavioural disengagement, denial, self-distraction, self-blame, substance use and venting) [18–20]. While scores for 14 coping strategies were obtained by adding their two stipulated questions, adjusted scores for the different coping styles were calculated by totalling their item scores and dividing this by the number of questions involved. Both scores refer to habitual coping orientations with higher scores indicating more extensive use of particular coping strategies or styles.

Statistical analyses

The Statistical Package for the Social Sciences software version 27.0 (IBM Corporation, Armonk, New York, USA) was employed for statistical analysis with the significance level set at 0.05. Qualitative data were reported as frequencies with percentages and evaluated with the Chi-square test. Quantitative data were presented as means/medians with standard deviations (SD)/interquartile ranges (IQR) and assessed for normality with the Shapiro–Wilk's test. As quantitative data followed a non-normal distribution, the Kruskal–Wallis and Mann–Whitney U tests were applied together with Spearman's rank-order correlation. Correlation coefficients (r_s) of 0.1, 0.4 and 0.7 served as cut-points for weak, moderate and strong associations between the various variables [26]. Univariate and multivariate logistic regression analyses were conducted to establish the risk factors for the presence of TMD symptoms. A step-wise variable selection process was applied with a threshold of $p < .10$ for eradicating insignificant ones. Findings were displayed as odds ratios (ORs) with 95% confidence intervals (95% CIs).

Results

A total of 482 young adults responded to the call for study participation, of which 27 met the exclusion criteria. The final sample ($n = 455$) had a mean age of 22.5 ± 1.2 years and was comprised of 85.5% women. Of these, 41.1% were 5Ts-negative (no TMD symptoms) and 58.9% were 5Ts-positive (with TMD symptoms). For the 5Ts-positive group, 17.6%, 19.8% and 21.5% had pain-related (PT), intra-articular (IT) and combined (CT) TMD symptoms, respectively. No significant differences in age and gender were observed among the various research groupings (Table 1).

Tables 2 and 3 present the mean/median DASS-21 and BCI scores for the NT, PT, IT and MT groups. Significant differences in negative affectivity (CT, PT > NT; CT > IT), anxiety (CT, PT > IT, NT) and stress (CT, PT > NT; CT > IT) were observed (Table 2). However, the variances in coping style scores, specifically problem-focused (PC), emotion-focused (EC) and dysfunctional (DC) coping, were insignificant. For all four TMD groups, PC was more extensively used than EC and EC than DC correspondingly. When specific methods were compared, no significant differences in coping strategy scores were discerned except for self-distraction (PT, CT, NT > IT).

Table 4 shows the correlations between DASS-21 and coping style scores for the 5Ts-negative and 5Ts-positive groups. While dysfunctional coping was moderately correlated to negative affectivity, depression, anxiety, stress and PC for the 5Ts-negative group ($r_s = 0.44$–0.52), it was moderately associated only with the DASS-21 constructs for the 5Ts-positive group ($r_s = 0.40$–0.48). For both groups, the correlation between PC and EC was strong ($r_s = 0.73$) as were the associations between negative affectivity and the three emotional subscales ($r_s = 0.81$–0.96). The outcomes of univariate and multivariate regression analyses are displayed in Table 5. Though negative affectivity, anxiety and stress were associated with the presence of TMD symptoms with univariate analysis, only anxiety remained a risk factor in the multivariate model (OR = 1.10; 95% CI =1.04–1.17).

Discussion

This is the first study to investigate the relation of TMD symptoms with psychological distress and coping in a non-clinical community sample of young adults. The correlates of negative affectivity/emotions and coping styles as well as the psychological predictors of TMD symptoms were also determined. The few prior studies in this area of research were conducted primarily on TMD patients and involved rather modest sample sizes (<120) considering the variety of TMD subtypes [14–17]. While young adults embodied the majority of TMD patients, University students were selected for our study as they are exposed to a multitude of stressors and are at risk of mental health problems [27,28]. All three research hypotheses were partly supported as participants with PT and CT presented substantially higher levels of psychological distress, negative emotions were correlated to dysfunctional coping style, and anxiety predicted the presence of TMD symptoms. The prevalence of TMD symptoms (58.9%) observed in this study was consistent with the findings of other TMD epidemiological research (up to 75%) [4].

Psychological distress

Depression, anxiety and stress had been shown to contribute to TMDs in cohort, case-control and cross-sectional studies [10–12,29–32]. Whilst stress is the emotional and physical response to adverse or demanding circumstances, anxiety is the reaction to 'real or imaginary' stress and is characterized by persistent feelings of tension and apprehension. Stress

Table 1. Demographic characteristics of the study cohort.

		Age			Gender		
Variables	n (%)	Mean (SD)	Median (IQR)	p Value[a]	Male n (%)	Female n (%)	p Value[b]
Total	455 (100)	22.5 (1.2)	22.0 (2)	–	66 (14.5)	389 (85.5)	–
TMD symptoms							
5Ts-negative	187 (41.1)	22.5 (1.3)	22.0 (2)	.635	34 (18.2)	153 (81.8)	**.043**
5Ts-positive	268 (58.9)	22.5 (1.2)	22.0 (2)		32 (11.9)	236 (88.1)	
No TMD (NT)	187 (41.1)	22.5 (1.3)	22.0 (2)	.251	34 (18.2)	153 (81.8)	.278
Pain-related TMD (PT)	80 (17.6)	22.6 (1.2)	23.0 (2)		8 (10.0)	72 (90.0)	
Intra-articular TMD (IT)	90 (19.8)	22.5 (1.3)	22.0 (2)		12 (13.3)	78 (86.7)	
Combined TMD (CT)	98 (21.5)	22.3 (1.2)	22.0 (2)		12 (12.2)	86 (87.8)	

Notes: SD: standard deviation; IQR: interquartile range. Results of [a]Kruskal–Wallis/Mann–Whitney U tests and [b]Chi-square test. Bold indicates $p < .05$.

Table 2. Mean/median Depression, Anxiety, Stress Scales-21 (DASS-21) scores for the various groups.

Variables	No TMD (NT)	Pain-related TMD (PT)	Intra-articular TMD (DT)	Combined TMD (CT)	*p* Value[a] *Post-hoc*
Negative affectivity (total DASS)					
Mean (SD)	13.1 (10.2)	15.8 (9.6)	13.3 (9.5)	17.1 (10.1)	**.001**
Median (IQR)	12.0 (14)	15.0 (13)	13.0 (12)	16.0 (13)	MT, PT > NT MT > IT
Depression					
Mean (SD)	3.1 (3.5)	3.4 (3.4)	3.1 (3.2)	3.7 (3.8)	.336
Median (IQR)	2.0 (5)	2.0 (5)	2.0 (4)	3.0 (4)	
Anxiety					
Mean (SD)	4.1 (3.3)	5.2 (3.3)	4.2 (3.5)	6.0 (3.5)	**<.001**
Median (IQR)	4.0 (5)	5.0 (4)	3.5 (5)	5.5 (4)	MT, PT > IT, NT
Stress					
Mean (SD)	5.9 (4.4)	7.1 (4.1)	6.1 (4.2)	7.4 (4.0)	**.005**
Median (IQR)	6.0 (5)	7.0 (5)	6.0 (7)	7.0 (5)	MT, PT > NT MT > IT

Notes: SD: standard deviation; IQR: interquartile range. Results of [a]Kruskal–Wallis/Mann–Whitney U tests. Bold indicates $p < .05$.

and anxiety when chronic could lead to depression (persistent feelings of low mood and despondency) in susceptible individuals [31–33]. Physiological systems implicated in the three inter-related negative emotional states include the hypothalamic-pituitary-adrenal (HPA) axis, the autonomic nervous as well as the neurotransmission systems [33]. In our study, individuals with TMD pain (PT and CT) presented considerably higher levels of negative affectivity, anxiety and stress than the NT group and more anxiety than the IT group. Moreover, those with CT also had significantly greater negative affectivity and stress than the IT group. TMD pain, without and with TMJ dysfunction, was thus associated with greater psychological distress verifying the outcomes of prior research [9–11]. Although the relation between anxiety/stress and TMD pain had been simply explained by masticatory muscle hyperactivity, central sensitization (increased reactivity of the nociceptive system) and emotion-mediated nociception modulation could also be involved [34].

Findings also corroborated those of other studies suggesting the greater role of anxiety and stress in TMDs than depression among young people in the community [32,35,36]. While mild-to-moderate anxiety (4–7 points) and normal-to-mild (0–9 points) stress were experienced by the PT and CT groups, depression scores were within the normal range (0–4 points) [23]. Conversely, depression emerged as the more significant psychological factor in TMD patients, with up to 60.1% having moderate-to-severe depression [30,31]. The comorbidity may be underpinned by chronic pain and studies have established the shared neurological pathways, neurotransmitters and brain structure involvement between depression and chronic pain syndromes [37,38]. Additionally, depression and chronic pain exacerbate each other and cause structural and functional brain changes [37]. It was also posited that depression increases proinflammatory cytokine levels in the brain resulting in heightened pain sensitivity [38]. Notwithstanding, the precise role of depression, anxiety and stress in the onset, course and prognosis of pain-related and intra-articular TMDs still requires further clarification. Furthermore, the possible influence of gene-to-gene interactions on chronic pain and psychological distress needs to be explored [39].

Coping styles and strategies

Besides coping with pain and/or dysfunction, people with chronic musculoskeletal disorders and TMDs often have to deal with concomitant psychosocial impairments [30,31,40]. Martinez-Calderon et al. in their umbrella review, urged clinicians to evaluate negative emotions, cognitive responses and coping behaviours when supporting people living with musculoskeletal conditions [40]. Keefe et al. examined the influence of age on the frequency of use of coping strategies in patients with chronic pain and determined that few age-related variances exist [41]. Therefore, the current findings could also apply to older adults. No statistically significant differences in PC, EC and DC styles were discerned among the four TMD groupings. For all groups, functional coping styles (PC and EC) were more extensively used than dysfunctional ones and PC strategies were the main coping methods employed. Except for self-distraction, no substantial differences in discrete coping strategies were observed. Individuals with IT were found to use self-distraction less frequently than their peers with PT, CT and NT. Self-distraction, which entails the diversion of attention, may not be realistic nor practical as intra-articular symptoms like TMJ sounds and locking are experienced physically/repetitively and are challenging to ignore. Contrariwise, the few studies available indicated that TMD patients, particularly those with painful TMDs, utilized more dysfunctional and less functional coping strategies [14–16]. This phenomenon might be mediated by negative emotions considering the high prevalence and level of psychological distress among TMD patients and its association with coping styles/strategies [17,30,31,42]. An effort was thus made to distinguish participants without and with TMD symptoms during the correlational analysis.

Correlations and regression analyses

Irrespective of the presence of TMD symptoms, moderately strong correlations were observed between dysfunctional coping and the negative emotions of depression, anxiety and stress (r_s = 0.40–0.52). For both 5Ts-negative and 5Ts-positive groups, the strongest association (r_s = 0.52/0.48)

Table 3. Mean/median Brief-COPE Inventory scores for the various groups.

Variables	No TMD (NT)	Pain-related TMD (PT)	Intra-articular TMD (IT)	Combined TMD (CT)	*p* Value[a] *Post-hoc*
Coping styles					
Problem-focused coping (PC)					
Adjusted mean (SD)	6.0 (1.1)	6.1 (0.8)	5.7 (1.2)	5.9 (1.2)	0.107
Adjusted median (IQR)	6.0 (1.3)	6.0 (0.9)	5.7 (1.7)	6.0 (1.7)	
Emotion-focused coping (EC)					
Adjusted mean (SD)	5.6 (1.0)	5.8 (0.8)	5.5 (1.0)	5.6 (1.0)	0.581
Adjusted median (IQR)	5.6 (1.4)	5.8 (1.2)	5.4 (1.4)	5.6 (1.2)	
Dysfunctional coping (DC)					
Adjusted mean (SD)	3.9 (0.8)	4.1 (0.6)	3.9 (0.7)	4.0 (0.7)	0.065
Adjusted median (IQR)	3.8 (1.2)	4.0 (0.8)	3.8 (1.0)	4.0 (1.0)	
p Value[b]	**<.001**	**<.001**	**<.001**	**<.001**	
Post-hoc	PC > EC > DC	PC > EC > DC	PC > EC > DC	PC > EC > DC	
Coping strategies					
1. Active coping					
Mean (SD)	5.8 (1.3)	6.1 (1.1)	5.7 (1.3)	5.9 (1.2)	0.218
Median (IQR)	6.0 (2.0)	6.0 (1.0)	6.0 (1.0)	6.0 (2.0)	
2. Instrumental support					
Mean (SD)	6.1 (1.5)	6.0 (1.4)	5.5 (1.7)	5.8 (1.7)	0.071
Median (IQR)	6.0 (2.0)	6.0 (2.0)	6.0 (3.0)	6.0 (3.0)	
3. Planning					
Mean (SD)	6.1 (1.3)	6.0 (1.1)	5.8 (1.5)	6.0 (1.5)	0.640
Median (IQR)	6.0 (2.0)	6.0 (2.0)	6.0 (2.0)	6.0 (2.0)	
4. Acceptance					
Mean (SD)	6.0 (1.4)	5.9 (1.1)	5.9 (1.4)	6.2 (1.3)	0.426
Median (IQR)	6.0 (2.0)	6.0 (1.0)	6.0 (2.0)	6.0 (2.0)	
5, Emotional support					
Mean (SD)	5.7 (1.5)	5.9 (1.5)	5.4 (1.7)	5.4 (1.7)	0.161
Median (IQR)	6.0 (3.0)	6.0 (3.0)	5.0 (3.0)	6.0 (2.0)	
6. Humour					
Mean (SD)	3.8 (1.5)	4.2 (1.7)	4.0 (1.5)	4.0 (1.7)	0.525
Median (IQR)	4.0 (3.0)	4.0 (2.0)	4.0 (2.0)	4.0 (2.0)	
7. Positive reframing					
Mean (SD)	6.3 (1.5)	6.4 (1.1)	6.1 (1.6)	6.0 (1.5)	0.323
Median (IQR)	6.0 (3.0)	6.0 (1.0)	6.0 (3.0)	6.0 (2.0)	
8. Religion					
Mean (SD)	6.3 (1.7)	6.5 (1.4)	6.3 (1.6)	6.2 (1.8)	0.899
Median (IQR)	6.0 (3.0)	6.0 (2.0)	6.0 (3.0)	6.5 (3.0)	
9. Behavioural disengagement					
Mean (SD)	2.8 (1.1)	3.2 (1.3)	2.8 (1.2)	2.7 (0.9)	0.143
Median (IQR)	2.0 (2.0)	3.0 (2.0)	2.0 (2.0)	2.0 (2.0)	
10. Denial					
Mean (SD)	3.1 (1.2)	3.0 (1.1)	2.9 (1.2)	3.0 (1.2)	0.739
Median (IQR)	3.0 (2.0)	3.0 (2.0)	2.0 (1.0)	3.0 (2.0)	
11. Self-distraction					
Mean (SD)	6.2 (1.3)	6.5 (1.1)	5.9 (1.3)	6.3 (1.3)	**0.024**
Median (IQR)	6.0 (2.0)	6.5 (1.0)	6.0 (2.0)	6.0 (2.0)	PT, MT, NT > IT
12. Self-blame					
Mean (SD)	4.9 (1.4)	5.2 (1.3)	4.8 (1.5)	5.2 (1.5)	0.130
Median (IQR)	5.0 (2.0)	5.0 (2.0)	5.0 (2.0)	5.0 (2.0)	
13. Substance use					
Mean (SD)	2.2 (0.8)	2.3 (0.8)	2.4 (1.2)	2.4 (1.1)	0.294
Median (IQR)	2.0 (0)	2.0 (0)	2.0 (0)	2.0 (0)	
14. Venting					
Mean (SD)	4.4 (1.5)	4.6 (1.4)	4.4 (1.4)	4.7 (1.4)	0.332
Median (IQR)	4.0 (2.0)	4.0 (2.0)	4.0 (1.0)	5.0 (2.0)	

Notes: SD: standard deviation; IQR: Interquartile range. Results of [a]Kruskal–Wallis/Mann–Whitney U tests and [b]Wilcoxon signed-rank test. Bold indicates $p < .05$.

was observed with negative affectivity (total DASS) which also specifies general psychological distress [43]. The evaluation of general psychological distress is judicious as depression and anxiety often co-exist and are related to stress and pain [44]. This could also explain the higher correlation coefficients obtained between dysfunctional coping and total DASS. Moreover, the strong correlations between negative affectivity and the three emotional subscales ($r_s = 0.81$–0.96) lend further support to the bifactor structure of the DASS-21 [25]. Given the relationships between negative emotions and dysfunctional coping, it is plausible that TMD patients with their greater severity of psychological distress may employ more dysfunctional coping strategies [11,17,30]. Correlations between the two functional coping styles, namely PC and EC, were strong ($r_s = 0.73$). However, associations between DC and PC/EC were weak, particularly for the 5Ts-positive group ($r_s = 0.30/0.29$) alluding to the dichotomized coping behaviours in young adults with TMDs [45].

Negative affectivity, anxiety and stress were related to TMD symptoms in the univariate model. As with across groups comparisons, coping styles were not associated with TMD symptoms even though dysfunctional coping was moderately correlated to negative emotions. This phenomenon could be explained by the greater contribution of

Table 4. Correlations between DASS-21 and coping strategy scores for the 5Ts-negative and positive groups.

Variables	Negative affectivity	Depression	Anxiety	Stress	Problem-focused coping	Emotion-focused coping
5Ts-negative (no TMD symptoms)						
Negative affectivity	–	–	–	–	–	–
Depression	0.87**	–	–	–	–	–
Anxiety	0.88**	0.63**	–	–	–	–
Stress	0.96**	0.77**	079**	–	–	–
Problem–focused coping	0.06	−0.04	0.11	0.08	–	–
Emotion-focused coping	0.01	−0.08	0.08	−0.01	0.73**	–
Dysfunctional coping	0.52**	0.44**	0.48**	0.48**	0.45**	0.37**
5Ts-positive (with TMD symptoms)						
Negative affectivity	–	–	–	–	–	–
Depression	0.81**	–	–	–	–	–
Anxiety	0.89**	0.58**	–	–	–	–
Stress	0.93**	0.66**	0.78**	–	–	–
Problem-focused coping	−0.01	−0.14*	0.08	0.06	–	–
Emotion-focused coping	−0.04	−0.11	0.03	−0.01	0.73**	–
Dysfunctional coping	0.48**	0.45**	0.40**	0.46**	0.30**	0.29**

Notes: Results of Spearman's correlation. *$p < .05$, **$p < .01$ and *** $p < .001$.

Table 5. Risk factors for the presence of TMD symptoms (5Ts-positive).

Variables	Univariate Odds ratio (95% CI)	*p* Value[a]	Multivariate Odds ratio (95% CI)	*p* Value[b]
Gender				
Male	Reference		Reference	
Female	1.64 (0.87–2.77)	.065		
Emotional distress				
Negative affectivity	1.02 (1.00–1.04)	**.015**		
Depression	1.03 (0.97–1.09)	.311		
Anxiety	1.10 (1.04–1.17)	**.001**	1.10 (1.04–1.17)	**.001**
Stress	1.05 (1.01–1.10)	**.021**		
Coping strategies				
Problem-focused	0.91 (0.77–1.08)	.275		
Emotion-focused	0.98 (0.81–1.19)	.820		
Dysfunctional	1.03 (0.98–1.07)	.221		

Notes: Results of [a]univariate and [b]multivariate logistic regression analyses. Bold indicates $p < .05$.

psychological distress to TMDs than coping styles per se and the significant, albeit weak, association between psychological distress and TMD symptoms in non-clinical community samples [9]. After adjusting for possible confounding variables with the multivariate analysis, anxiety was the main psychological predictor of TMD symptoms as in other Asian studies [32,35]. More recently, a moderately strong negative correlation between psychological distress and well-being was observed and positive psychological interventions (PPIs) that promote positive functioning were proposed for helping individuals alleviate the physical/psychological symptoms and disabilities accompanying TMDs [9]. In addition to mindfulness meditation and cognitive-behavioural therapy, PPIs also incorporate the use of acceptance and other functional coping strategies and were shown to be effective in enhancing psychological well-being and quality of life whilst reducing depression and pain symptoms [46,47].

Study limitations

The limitations of this observational research include the following. First, the cross-sectional design utilized cannot demonstrate causal relations between the physical and psychological variables. Casual inferences can only be established with longitudinal cohort and nested case-control studies [48]. Second, the study sample involved just young adults and consisted of more female participants. The latter may be attributed to the greater propensity of women to take part in online surveys and the voluntary sampling method employed [49]. The research could be extended to incorporate middle-aged/old adults and more men to verify age and gender influences on the outcomes. It also needs to be repeated in other racial/ethnic groups as well as TMD patients who have higher levels of psychosocial impairments [30,31]. Third, TMD symptoms were appraised without physical examinations, adjunctive diagnostic imaging and definitive TMD diagnosis. Though the latter could be considered for future work, the sample size will need to be moderated for viability. Finally, the study measures were all self-reported and subjected to various information partialities encompassing recall, social desirability, confirmation and other biases [50].

Conclusion

In the cohort of young adults examined, 39.1% experienced TMD pain (PT and CT) and 19.8% reported TMJ dysfunction (IT). Young adults with TMD pain had significantly higher levels of negative affectivity, anxiety and stress than their peers with no and/or intra-articular TMD complaints. Even so, no substantial variances in coping styles and strategies were observed except for self-distraction. Negative affectivity and emotions were associated with the frequent use of dysfunctional coping strategies. Among the three negative emotional states, anxiety appears to be the main risk factor for TMD symptoms in community young adults. Clinicians are encouraged to screen for psychological distress and dysfunctional coping when caring for young people with TMDs, particularly when chronic pain is involved. PPIs encompassing the use of functional coping strategies could help mollify TMD-related physical and psychosocial impairments.

Acknowledgments

The authors would like to thank Hanin I, Pragustine Y and Fitryanur A for their assistance with the data collection.

Author contributions

Adrian Ujin Yap contributed to conceptualization; data curation; formal analysis; investigation; methodology; project administration; resources; supervision; validation; visualization; writing the original draft. Carolina Marpaung contributed to conceptualization; data curation; formal analysis; investigation; methodology; project administration; resources; software; supervision; validation; and review and editing.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This research was supported by grant number: 0142/PUF/FKG/2021-202 from Trisakti University, Indonesia.

ORCID

Adrian Ujin Yap http://orcid.org/0000-0003-0361-6209
Carolina Marpaung http://orcid.org/0000-0002-9621-6257

References

[1] Kapos FP, Exposto FG, Oyarzo JF, et al. Temporomandibular disorders: a review of current concepts in aetiology, diagnosis and management. Oral Surg. 2020;13(4):321–334.
[2] Schiffman E, Ohrbach R, Truelove E, et al. Diagnostic Criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the international RDC/TMD consortium network* and orofacial pain special interest group†. J Oral Facial Pain Headache. 2014;28(1):6–27.
[3] Manfredini D, Guarda-Nardini L, Winocur E, et al. Research diagnostic criteria for temporomandibular disorders: a systematic review of axis I epidemiologic findings. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2011;112(4):453–462.
[4] Ryan J, Akhter R, Hassan N, et al. Epidemiology of temporomandibular disorder in the general population: a systematic review. Adv Dent Oral Health. 2019;10:555787.
[5] Bueno CH, Pereira DD, Pattussi MP, et al. Gender differences in temporomandibular disorders in adult populational studies: a systematic review and meta-analysis. J Oral Rehabil. 2018;45(9):720–729.
[6] Pigozzi LB, Pereira DD, Pattussi MP, et al. Quality of life in young and middle age adult temporomandibular disorders patients and asymptomatic subjects: a systematic review and meta-analysis. Health Qual Life Outcomes. 2021;19(1):83.
[7] Bitiniene D, Zamaliauskiene R, Kubilius R, et al. Quality of life in patients with temporomandibular disorders. A systematic review. Stomatologija. 2018;20(1):3–9.
[8] Yap AU, Qiu LY, Natu VP, et al. Functional, physical and psychosocial impact of temporomandibular disorders in adolescents and young adults. Med Oral Patol Oral Cir Bucal. 2020;25(2):e188–e194.
[9] Yap AU, Marpaung C, Rahmadini ED. Self-reported symptoms of temporomandibular disorders: relationship to psychological well-being, psychological distress, and oral health-related quality of life. Int J Prosthodont. 2022;35(1):45–52.
[10] Lei J, Yap AU, Zhang M, et al. Temporomandibular disorder subtypes, emotional distress, impaired sleep, and oral health-related quality of life in Asian patients. Community Dent Oral Epidemiol. 2021;49(6):543–549.
[11] Reis PHF, Laxe LAC, Lacerda-Santos R, et al. Distribution of anxiety and depression among different subtypes of temporomandibular disorder: a systematic review and meta-analysis. J Oral Rehabil. 2022;49(7):754–767.
[12] Slade GD, Fillingim RB, Sanders AE, et al. Summary of findings from the OPPERA prospective cohort study of incidence of first-onset temporomandibular disorder: implications and future directions. J Pain. 2013;14(12 Suppl):T116–T124.
[13] Christensen U, Schmidt L, Hougaard CØ, et al. Socioeconomic position and variations in coping strategies in musculoskeletal pain: a cross-sectional study of 1,287 40- and 50-year-old men and women. J Rehabil Med. 2006;38(5):316–321.
[14] Reissmann DR, John MT, Schierz O, et al. Stress-related adaptive versus maladaptive coping and temporomandibular disorder pain. J Orofac Pain. 2012;26(3):181–190.
[15] Galdon MJ, Durá E, Andreu Y, et al. Multidimensional approach to the differences between muscular and articular temporomandibular patients: coping, distress, and pain characteristics. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;102(1):40–46.
[16] Ferrando M, Andreu Y, Galdón MJ, et al. Psychological variables and temporomandibular disorders: distress, coping, and personality. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2004;98(2):153–160.
[17] Turner JA, Dworkin SF, Mancl L, et al. The roles of beliefs, catastrophizing, and coping in the functioning of patients with temporomandibular disorders. Pain. 2001;92(1-2):41–51.
[18] Cooper C, Katona C, Livingston G. Validity and reliability of the brief COPE in carers of people with dementia: the LASER-AD study. J Nerv Ment Dis. 2008;196(11):838–843.
[19] Coolidge FL, Segal DL, Hook JN, et al. Personality disorders and coping among anxious older adults. J Anxiety Disord. 2000;14(2):157–172.
[20] Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. J Pers Soc Psychol. 1989;56(2):267–283.
[21] Schnider KR, Elhai JD, Gray MJ. Coping style use predicts posttraumatic stress and complicated grief symptom severity among college students reporting a traumatic loss. J Couns Psychol. 2007;54(3):344–350.
[22] Yap AU, Zhang MJ, Zhang XH, et al. Viability of the quintessential 5 temporomandibular disorder symptoms as a TMD screener. Oral Surg Oral Med Oral Pathol Oral Radiol. 2022;133(6):643–649.
[23] Lovibond SH, Lovibond PF. Manual for the depression anxiety & stress scales. 2nd ed. Sydney: Psychology Foundation; 1995.
[24] Henry JD, Crawford JR. The short-form version of the depression anxiety stress scales (DASS-21): construct validity and normative data in a large non-clinical sample. Br J Clin Psychol. 2005;44(2):227–239.
[25] Lee J, Lee EH, Moon SH. Systematic review of the measurement properties of the depression anxiety stress scales-21 by applying updated COSMIN methodology. Qual Life Res. 2019;28(9):2325–2339.
[26] Dancey CP, Reidy J. Statistics without maths for psychology. 7th ed. London: Pearson; 2017.
[27] Yap AU, Cao Y, Zhang MJ, et al. Age-related differences in diagnostic categories, psychological states and oral health-related quality of life of adult temporomandibular disorder patients. J Oral Rehabil. 2021;48(4):361–368.
[28] Dessauvagie AS, Dang HM, Nguyen TAT, et al. Mental health of university students in Southeastern Asia: a systematic review. Asia Pac J Public Health. 2022;34(2-3):172–181.
[29] Fillingim RB, Ohrbach R, Greenspan JD, et al. Potential psychosocial risk factors for chronic TMD: descriptive data and empirically identified domains from the OPPERA case-control study. J Pain. 2011;12(11 Suppl):T46–T60.
[30] De La Torre Canales G, Câmara-Souza MB, Muñoz Lora VRM, et al. Prevalence of psychosocial impairment in temporomandibular disorder patients: a systematic review. J Oral Rehabil. 2018;45(11):881–889.
[31] Florjański W, Orzeszek S. Role of mental state in temporomandibular disorders: a review of the literature. Dent Med Probl. 2021;58(1):127–133.

[32] Yap AU, Natu VP. Inter-relationships between pain-related temporomandibular disorders, somatic and psychological symptoms in Asian youths. J Oral Rehabil. 2020;47(9):1077–1083.
[33] Friedman ES, Clark DB, Gershon S. Stress, anxiety, and depression: review of biological, diagnostic, and nosologic issues. J Anxiety Disord. 1992;6(4):337–363.
[34] Furquim BD, Flamengui LM, Conti PC. TMD and chronic pain: a current view. Dental Press J Orthod. 2015;20(1):127–133.
[35] Lei J, Fu J, Yap AU, et al. Temporomandibular disorders symptoms in Asian adolescents and their association with sleep quality and psychological distress. Cranio. 2016;34(4):242–249.
[36] Namvar MA, Afkari BF, Moslemkhani C, et al. The relationship between depression and anxiety with temporomandibular disorder symptoms in dental students. Maedica. 2021;16(4):590–594.
[37] Sheng J, Liu S, Wang Y, et al. The link between depression and chronic pain: neural mechanisms in the brain. Neural Plast. 2017; 2017:9724371.
[38] IsHak WW, Wen RY, Naghdechi L, et al. Pain and depression: a systematic review. Harv Rev Psychiatry. 2018;26(6):352–363.
[39] Louca Jounger S, Christidis N, Hedenberg-Magnusson B, et al. Polymorphisms in the HTR2A and HTR3A genes contribute to pain in TMD myalgia. Front Oral Health. 2021;2:647924.
[40] Martinez-Calderon J, Matias-Soto J, Luque-Suarez A. "My pain is unbearable … I cannot recognize myself!" emotions, cognitions, and behaviors of people living with musculoskeletal disorders: an umbrella review. J Orthop Sports Phys Ther. 2022;52(5):243–A102.
[41] Keefe FJ, Williams DA. A comparison of coping strategies in chronic pain patients in different age groups. J Gerontol. 1990; 45(4):P161–P165.
[42] Cao Y, Yap AU, Lei J, et al. Subtypes of acute and chronic temporomandibular disorders: their relation to psychological and sleep impairments. Oral Dis. 2021;27(6):1498–1506.
[43] Vasconcelos-Raposo J, Fernandes HM, Teixeira CM. Factor structure and reliability of the depression, anxiety and stress scales in a large Portuguese community sample. Span J Psychol. 2013;16: e10.
[44] Michaelides A, Zis P. Depression, anxiety and acute pain: links and management challenges. Postgrad Med. 2019;131(7):438–444.
[45] Frydenberg E. Adolescent coping styles and strategies: is there functional and dysfunctional coping? J Psychol Couns. 1991;1:35–42.
[46] Bolier L, Haverman M, Westerhof GJ, et al. Positive psychology interventions: a meta-analysis of randomized controlled studies. BMC Public Health. 2013;13(1):119.
[47] Hilton L, Hempel S, Ewing BA, et al. Mindfulness meditation for chronic pain: systematic review and meta-analysis. Ann Behav Med. 2017;51(2):199–213.
[48] Partlett C, Hall NJ, Leaf A, et al. Application of the matched nested case-control design to the secondary analysis of trial data. BMC Med Res Methodol. 2020;20(1):117.
[49] Smith WG. Does gender influence online survey participation? A record-linkage analysis of University Faculty online survey response behaviour; [accessed 2022 Dec 12]. Available from: https://eric.ed.gov/?id=ED501717
[50] Althubaiti A. Information bias in health research: definition, pitfalls, and adjustment methods. J Multidiscip Healthc. 2016;9:211–217.