Journal of Oral Rehabilitation

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Media Ranking in United Kingdom

SUBJECT AREA AND CATEGORY

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Dentistry (miscellaneous)

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SCOPE

Journal of Oral Rehabilitation aims to be the most prestigious journal of dental research within all aspects of oral rehabilitation and applied oral physiology. It covers all diagnostic and clinical management aspects necessary to re-establish a subjective and objective harmonious oral function. Oral rehabilitation may become necessary as a result of developmental or acquired disturbances in the orofacial region, orofacial traumas, or a variety of dental and oral diseases (primarily dental caries and periodontal diseases) and orofacial pain conditions. As such, oral rehabilitation in the twenty-first century is a matter of skilful diagnosis and minimal, appropriate intervention, the nature of which is intimately linked to a profound knowledge of oral physiology, oral biology, and dental and oral pathology. The scientific content of the journal therefore strives to reflect the best of evidence-based clinical dentistry. Modern clinical management should be based on solid scientific evidence gathered about diagnostic procedures and the properties and efficacy of the chosen intervention (e.g. material science, biological, toxicological, pharmacological or psychological aspects). The content of the journal also reflects documentation of the possible side-effects of rehabilitation, and includes prognostic perspectives of the treatment modalities chosen.

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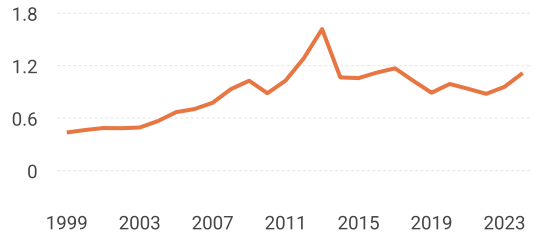

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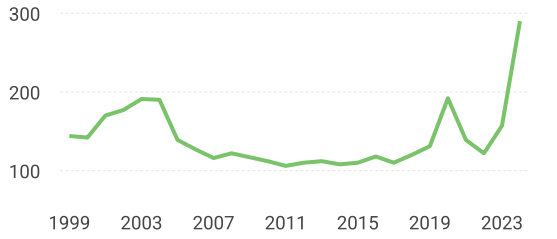

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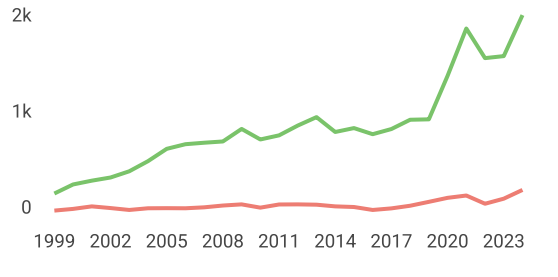

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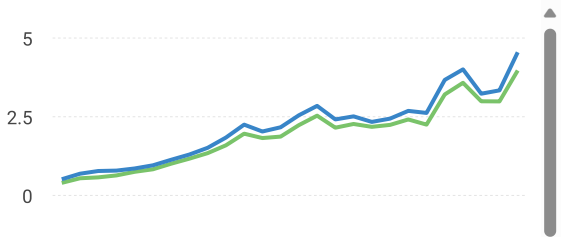

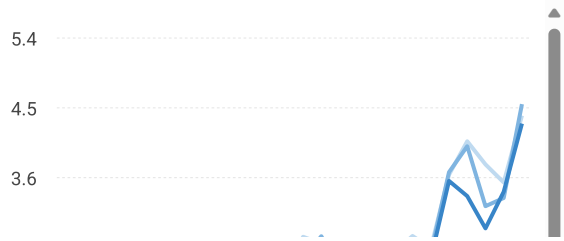

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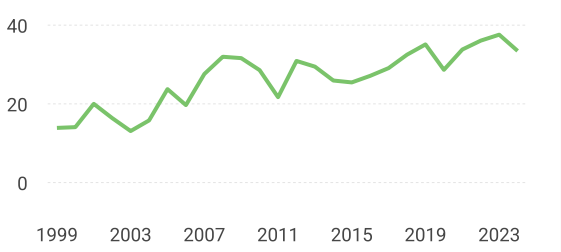

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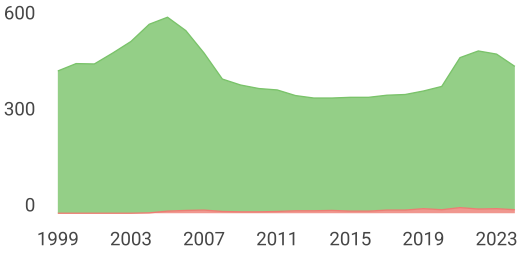

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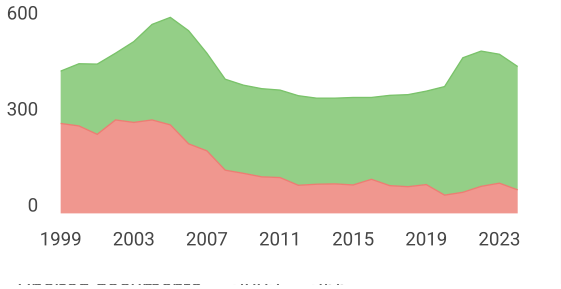

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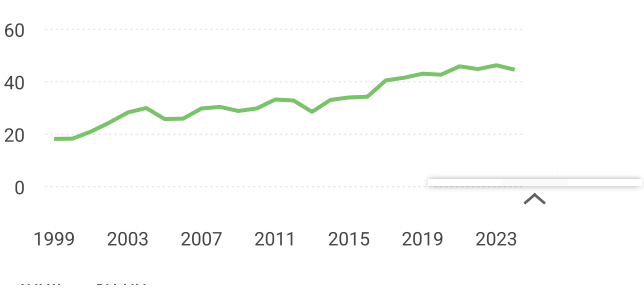

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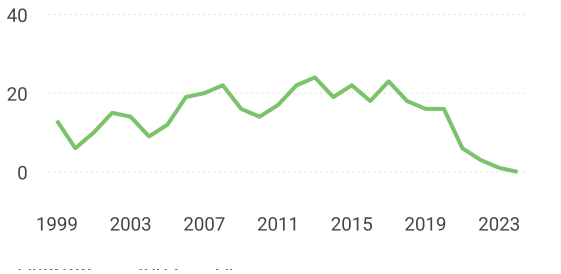

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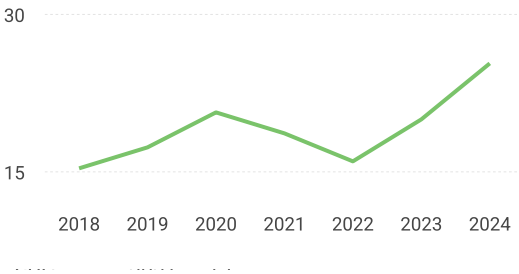

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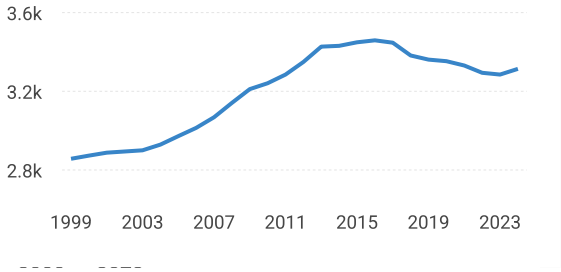

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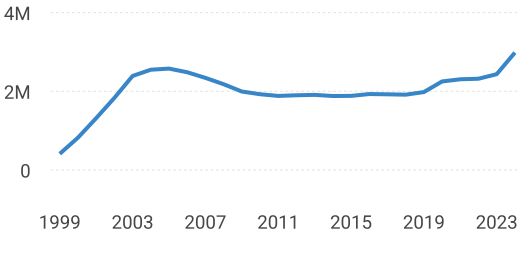

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The focus for the journal is to present original research findings; to generate critical reviews and relevant case stories, and to stimulate commentaries and professional debates in Letters to the Editor. We will invite relevant commercial interests to engage in the journal in order to make it the international forumfor debate between dental clinical sciences and industry, which share a common goal: to improve the quality of oral rehabilitation.

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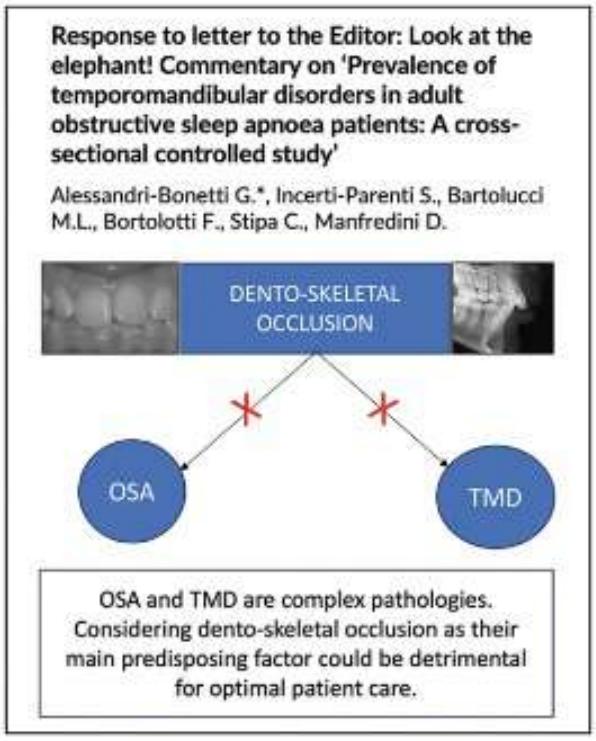
EDITORIAL

Response to letter to the Editor: Look at the elephant! Commentary on 'Prevalence of temporomandibular disorders in adult obstructive sleep apnoea patients: A cross-sectional controlled study'

Giulio Alessandri-Bonetti, Serena Incerti-Parenti, Maria Lavinia Bartolucci, Francesco Bortolotti, Chiara Stipa, Daniele Manfredini

Pages: 1371-1372 | First Published: 01 September 2023



Obstructive sleep apnoea and temporomandibular disorders are complex pathologies. Considering dento-skeletal occlusion as their main predisposing factor could be detrimental for optimal patient care.

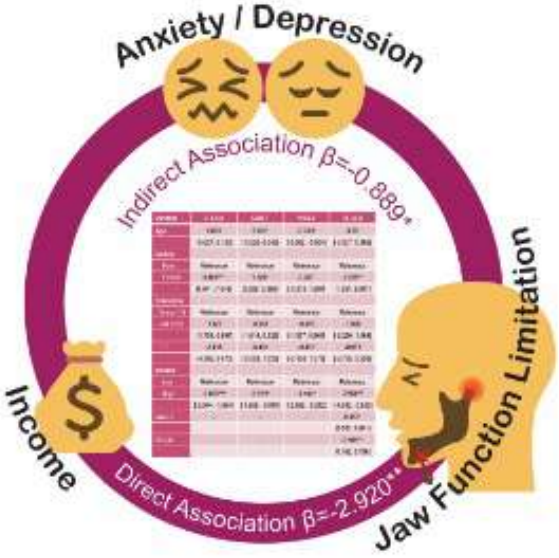
Abstract | Full text | PDF | References | Request permissions

ORIGINAL ARTICLES

Low income is associated with impaired jaw function via anxiety and depression in patients with temporomandibular disorders

Yunhao Zheng, Xueman Zhou, Yi Huang, Jinjin Lu, Qiaoyu Cheng, Peidi Fan, Xin Xiong

Pages: 1373-1381 | First Published: 28 August 2023



Low income is not only directly associated with jaw function limitation in patients with TMD, but is also indirectly associated with jaw function limitation via anxiety and depression.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Psychological characteristics of young adults with temporomandibular disorders, somatization and combined conditions: A multidimensional evaluation

Adrian Ujin Yap, Ni Luh Dewi, Carolina Marpaung

Pages: 1382-1392 | First Published: 21 August 2023

TMD-somatization and their psychological characteristics.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Bruxism, parafunctional oral habits and oral motor problems in children with spastic cerebral palsy: A cross-sectional study

Aysenur Tuncer, Asiye Uzun, Abidin H. Tuncer, Hazel C. Guzel, Elif D. Atılgan

Pages: 1393-1400 | First Published: 28 August 2023

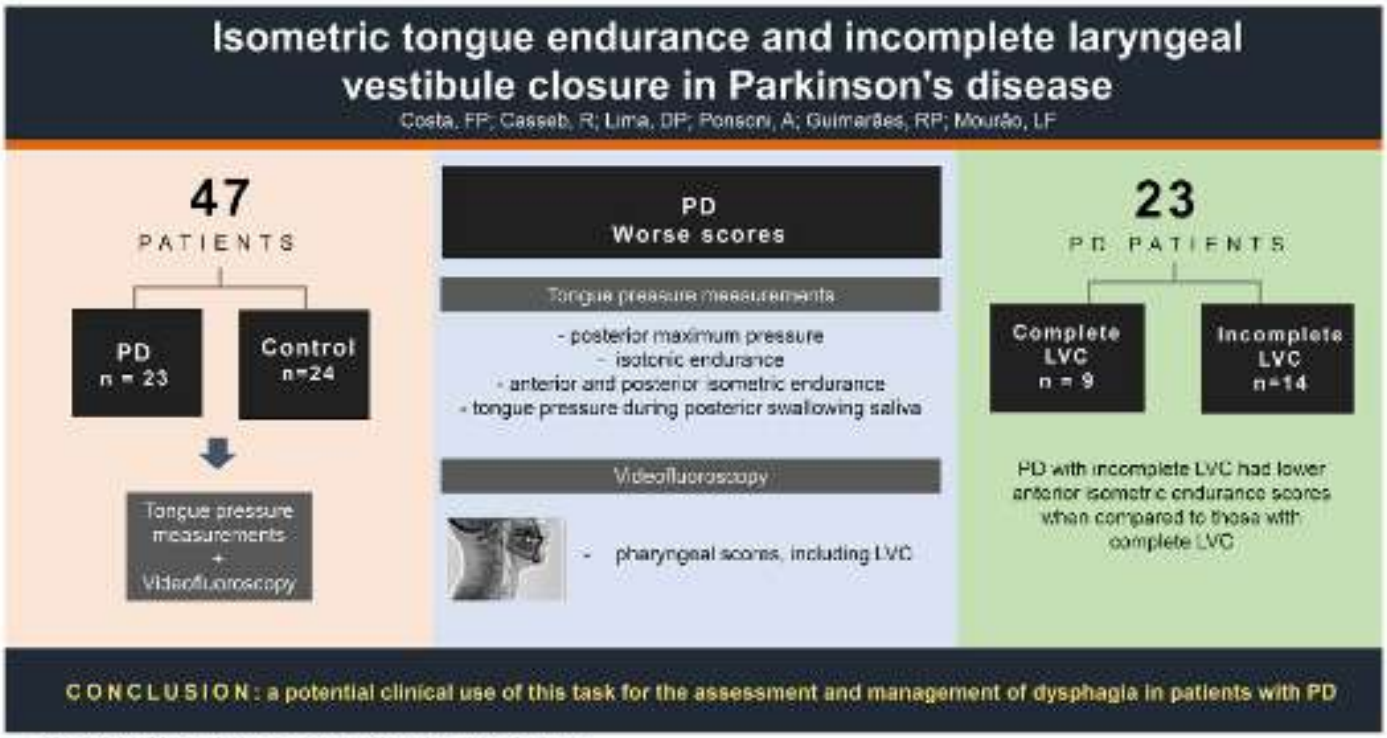
The study found that the prevalence of bruxism was 52.4% among 63 children with spastic cerebral palsy, ranging in age from 3 to 18 years, and the incidence of bruxism decreased as age increased. Individuals with tongue thrust (OR [95% CI] = 8.15 [1.4–47.3]) and swallowing problems (OR [95% CI] = 5.78 [1.3–24.68]) had a significantly higher likelihood of experiencing bruxism. In children with spastic cerebral palsy, both bruxism and the frequency of parafunctional oral habits were notably high, thereby influencing oral motor activities.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Isometric tongue endurance and incomplete laryngeal vestibule closure in Parkinson's disease

Flavia Pereira da Costa, Raphael Fernandes Casseb, Daniella Priscila de Lima, Adriana Ponsoni, Rachel Paes Guimarães, Lucia Figueiredo Mourão

Pages: 1401-1408 | First Published: 21 August 2023



Abbreviations: PD Parkinson's disease; LVC laryngeal vestibule closure

Oropharyngeal dysphagia is a frequent symptom in Parkinson's disease (PD). It is important to investigate the relationship between tongue pressure and airway protection in PD patients. This study showed that PD patients with incomplete laryngeal vestibule closure scored lower in the anterior isometric endurance task, a finding that has potential use in clinical practice.

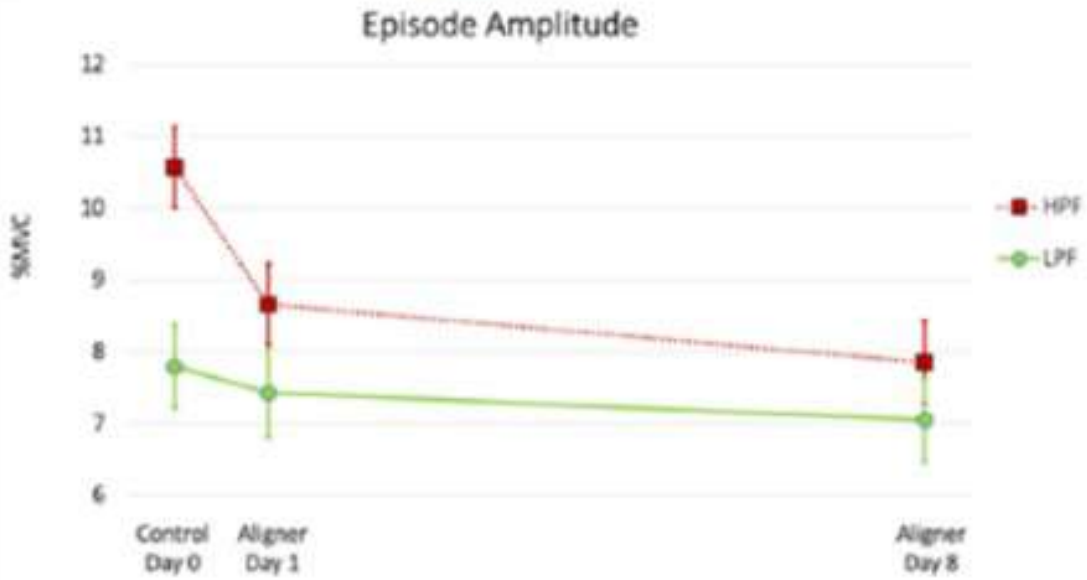
Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Open Access

The effect of passive clear aligners on masticatory muscle activity in adults with different levels of oral parafunction

Nicholas Pittar, Fiona Firth, Hamza Bennani, Mauro Farella

Pages: 1409-1421 | First Published: 24 August 2023



The wearing of passive clear aligners was associated with a decrease in muscle activity in both high and low parafunction individuals. High parafunction (HPF) individuals had higher scores for somatisation and experienced more discomfort in response to the aligners than the lower parafunction (LPF) participants. The wearing of aligners did not exacerbate temporomandibular joint disorder symptoms in the short-term. Screening patients using the somatisation questionnaire could identify individuals more likely to experience discomfort during the initial stages of aligner therapy.

Abstract | Full text | PDF | References | Request permissions

Open Access

White matter abnormalities mediate the association between masticatory dysfunction and cognition among older adults

Linn Hedberg, Abhishek Kumar, Pia Skott, Jan-Ivan Smedberg, Åke Seiger, Gunilla Sandborgh-Englund, Love Engström Nordin, Ingemar Kåreholt, Antonios Tzortzakakis, Eric Westman, Mats Trulsson, Urban Ekman

Pages: 1422-1431 | First Published: 14 September 2023

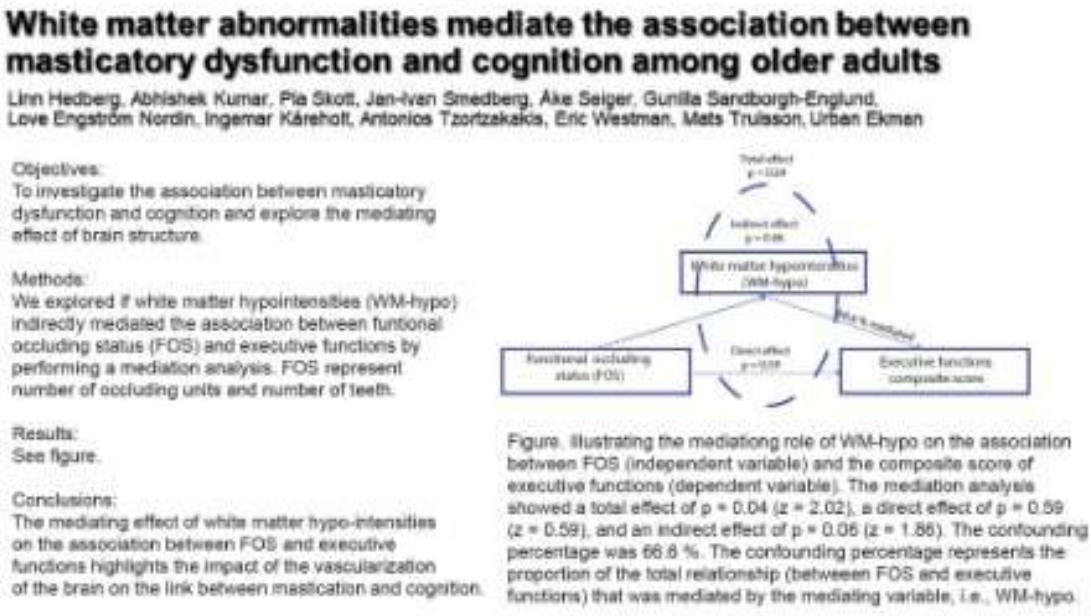


Figure. Illustrating the mediating role of WM-hypo on the association between FOS (independent variable) and the composite score of executive functions (dependent variable). The mediation analysis showed a total effect of p = 0.04 (z = 2.02), a direct effect of p = 0.59 (z = 0.59), and an indirect effect of p = 0.06 (z = 1.86). The confounding percentage was 66.6 %. The confounding percentage represents the proportion of the total relationship (betweeen FOS and executive functions) that was mediated by the mediating variable, i.e., WM-hypo.

WM-hypo mediate the association between FOS and executive functions.

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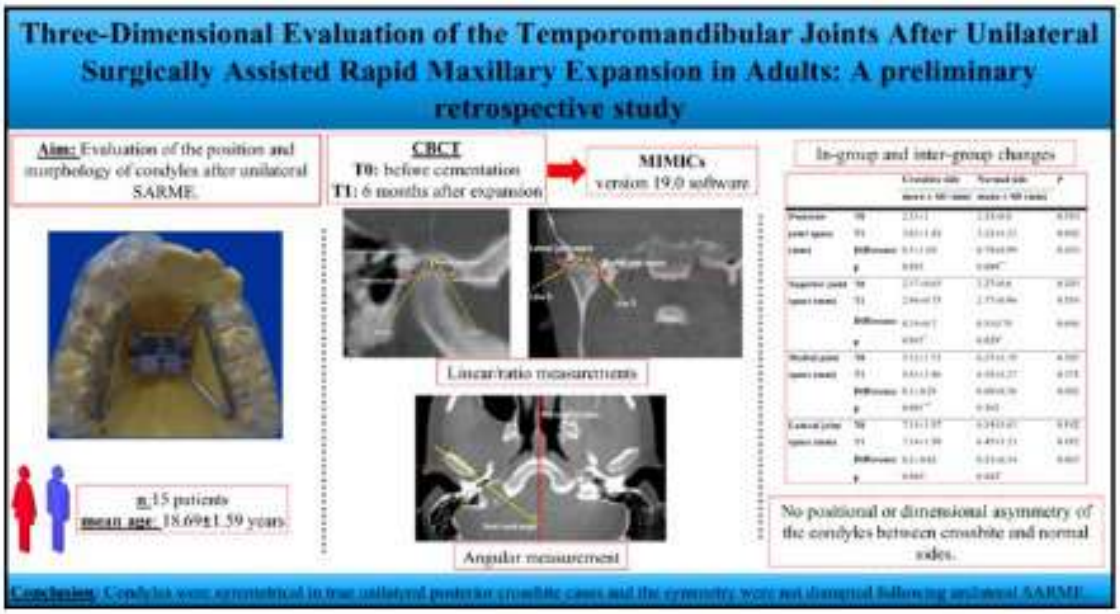
Three-dimensional evaluation of the temporomandibular joints after unilateral surgically assisted rapid maxillary expansion in adults: A preliminary retrospective study

Gülden Karabiber, Hanife Nuray Yilmaz

Pages: 1432-1438 | First Published: 23 August 2023



Three-dimensional evaluation of the temporomandibular joints after unilateral surgically assisted rapid maxillary expansion in adults: a preliminary retrospective study.

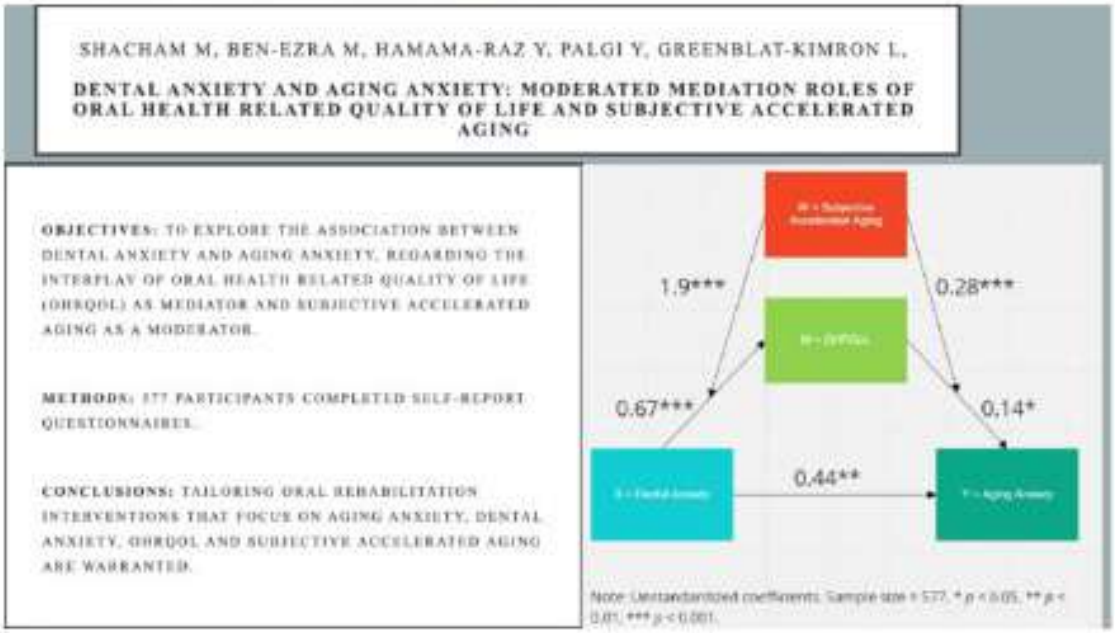
Abstract | Full text | PDF | References | Request permissions

Open Access

Dental anxiety and ageing anxiety: Moderated mediation roles of Oral Health-Related Quality of Life and subjective accelerated ageing

Maayan Shacham, Menachem Ben-Ezra, Yaira Hamama-Raz, Yuval Palgi, Lee Greenblatt-Kimron

Pages: 1439-1445 | First Published: 22 August 2023



To explore the association between dental anxiety and ageing anxiety, regarding the interplay of Oral Health-Related Quality of Life (OHRQoL) as mediator and subjective accelerated ageing as a moderator. 577 participants completed self-report questionnaires. Tailoring oral rehabilitation interventions that focus on ageing anxiety, dental anxiety, OHRQoL and subjective accelerated ageing are warranted.

Abstract | Full text | PDF | References | Request permissions

Factors influencing the selection of oral healthcare providers in multidisciplinary Nutrition Support Team for malnourished inpatients: A cross-sectional study

Hiroyuki Suzuki, Junichi Furuya, Kazuharu Nakagawa, Rena Hidaka, Ayako Nakane, Kanako Yoshimi, Yukue Shimizu, Keiko Saito, Yasuhiro Itsui, Haruka Tohara, Shunsuke Minakuchi

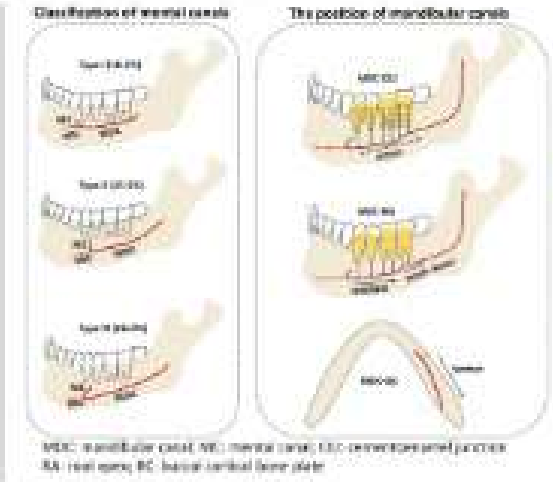
Pages: 1446-1455 | First Published: 13 August 2023

Abstract | Full text | PDF | References | Request permissions

Three-dimensional analysis of mandibular and mental canals corroborating with teeth and mental foramen by cone beam computed tomography

Wenke Xu, Bing Wang, Lu Jia, Shaohua Ge, Jinlong Shao

Pages: 1456-1464 | First Published: 13 September 2023



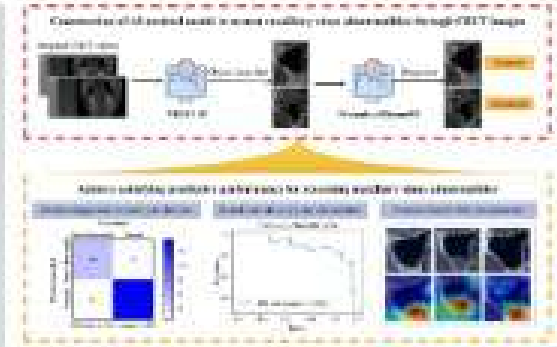
This study analysed three-dimensional positions of the mandibular and mental canals by 354 CBCT scans. Various patterns of canal distribution were identified in relation to the cementoenamel junction, root apex, buccal cortical bone and mental foramen. Interestingly, the MDC were closer to the apexes of the second molars, and the presence of Type I MC may indicate a closer proximity of the MDC to neighbouring teeth. These findings can aid in surgical planning and alert potential nerve injuries during operation.

Abstract | Full text | PDF | References | Request permissions

Abnormal maxillary sinus diagnosing on CBCT images via object detection and 'straight-forward' classification deep learning strategy

Peisheng Zeng, Rihui Song, Yixiong Lin, Haopeng Li, Shijie Chen, Mengru Shi, Gengbin Cai, Zhuohong Gong, Kai Huang, Zetao Chen

Pages: 1465-1480 | First Published: 04 September 2023



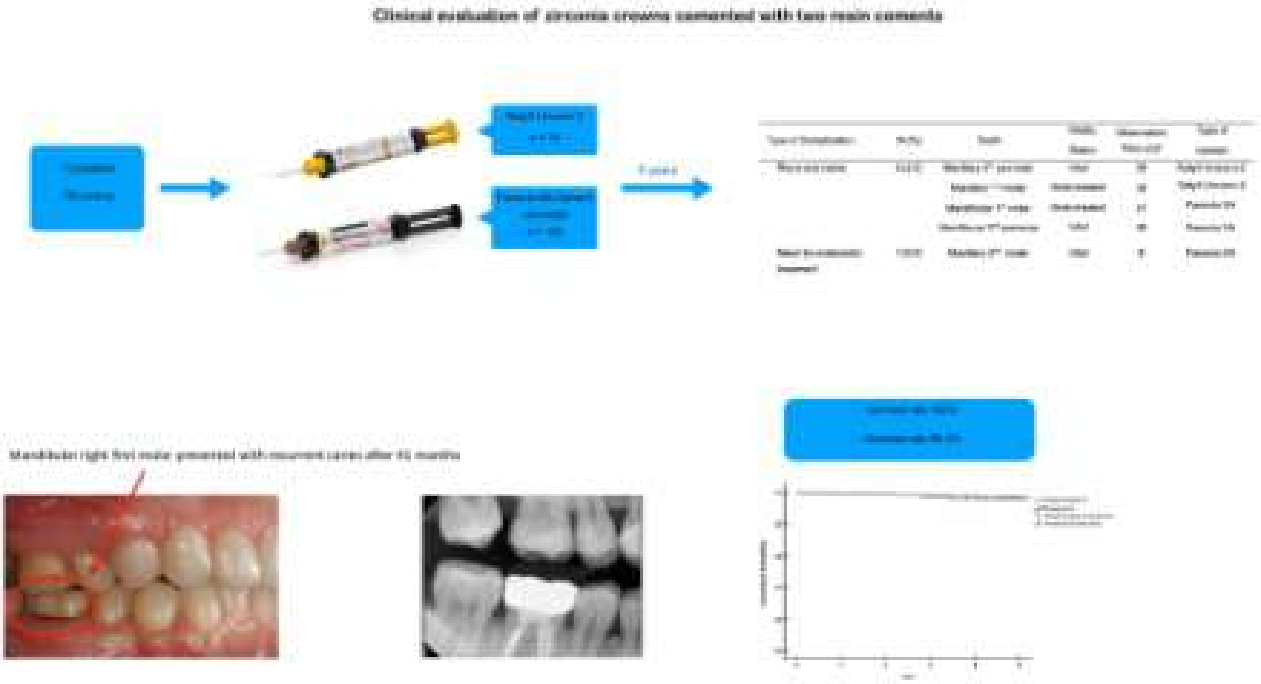
We developed a deep-learning-based screening model incorporating object detection and "straight-forward" classification strategy to screen out maxillary sinus abnormalities on CBCT images. Finally, the model achieved satisfying predictive performance for screening maxillary sinus abnormalities on CBCT images.

Abstract | Full text | PDF | References | Request permissions

Clinical evaluation of zirconia crowns cemented with two different resin cements: A retrospective study

Ahmed M. Aziz, Omar El-Mowafy

Pages: 1481-1486 | First Published: 28 August 2023



This retrospective study aimed to evaluate the clinical performance, survival and success rates and complications encountered with zirconia crowns. A total of 112 patients who received 176 monolithic zirconia crowns were evaluated. Crowns were cemented with RelyX Unicem 2 (n=74) and Panavia SA (n=102) self-adhesive resin cements. The 5-year survival and success rates were 100% and 96.4%, respectively. The complications encountered were recurrent caries (2.2%) and the need for endodontic treatment (0.5%). The type of cement and patient-related factors didn't influence the survival and success rates of the crowns.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

tRNA-derived small RNA changes in bone marrow stem cells under hypoxia and osteogenic conduction

Chen Zhang, Weilong Ye, Mengyao Zhao, Dengsheng Xia, Zhipeng Fan

Pages: 1487-1497 | First Published: 13 August 2023

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

REVIEWS

Open Access

Prevalence of bruxism in down syndrome patients: A systematic review and meta-analysis

Mohammad Khursheed Alam, Ahmed Hamoud L. Alsharari, Maher A. L. Shayeb, Sittana Elfadil, Gabriele Cervino, Giuseppe Minervini

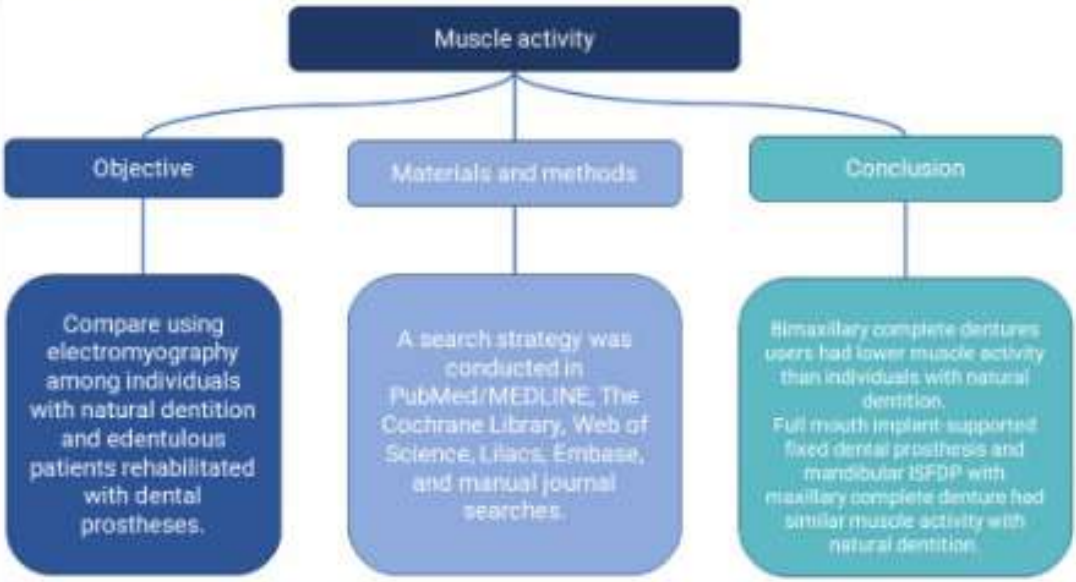
Pages: 1498-1507 | First Published: 28 July 2023

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Muscle activity between dentate and edentulous patients rehabilitated with dental prostheses: A systematic review

Bruna Rocha Neves, Rayanna Thayse Florêncio Costa, Belmiro Cavalcanti do Egito Vasconcelos, Eduardo Piza Pellizzer, Sandra Lúcia Dantas Moraes

Pages: 1508-1517 | First Published: 21 August 2023



A systematic review, with 10 articles included, assessing muscle activity using electromyography while clenching or chewing soft and/or hard foods comparing individuals with natural dentition, complete denture, and implant-supported fixed dental prosthesis.

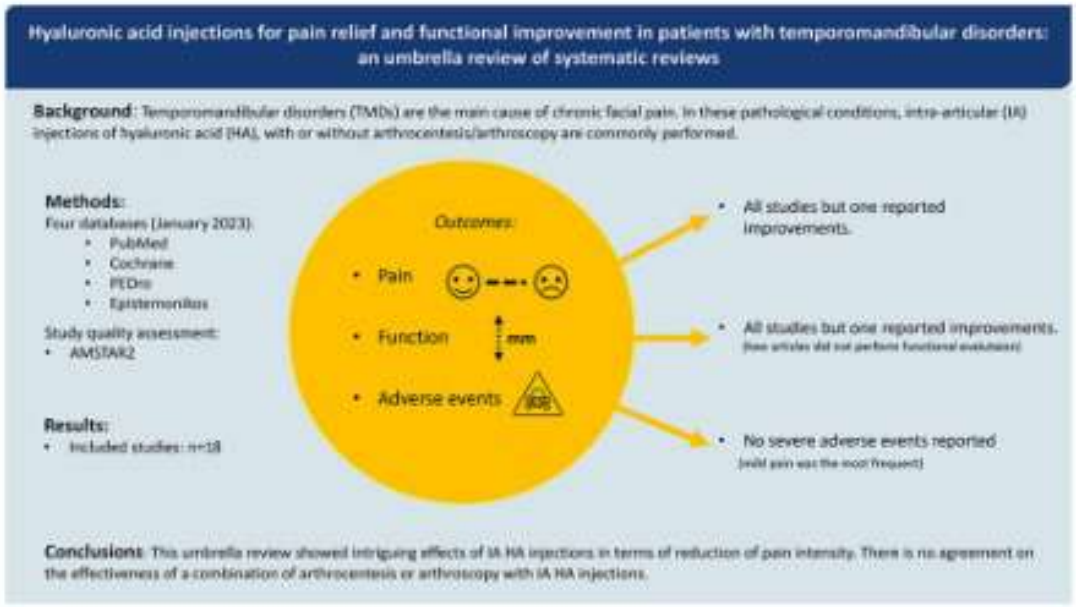
Abstract | Full text | PDF | References | Request permissions

Open Access

Hyaluronic acid injections for pain relief and functional improvement in patients with temporomandibular disorders: An umbrella review of systematic reviews

Francesco Agostini, Martina Ferrillo, Andrea Bernetti, Nikolaos Finamore, Massimiliano Mangone, Amerigo Giudice, Marco Paoloni, Alessandro de Sire

Pages: 1518-1534 | First Published: 22 August 2023



Temporomandibular disorders (TMD) are the main cause of chronic facial pain. In these pathological conditions, intra-articular (IA) injections of hyaluronic acid (HA) with or without arthrocentesis/arthroscopy are commonly performed. Four databases (January 2023): PubMed, Cochrane, PEDro, and Epistemonikos were searched. Study quality assessment: AMSTAR2. Eighteen systematic reviews were included in the umbrella review. This umbrella review showed intriguing effects of IA HA injections in terms of reduction of pain intensity. There is no agreement on the effectiveness of a combination of arthrocentesis or arthroscopy with IA HA injections.

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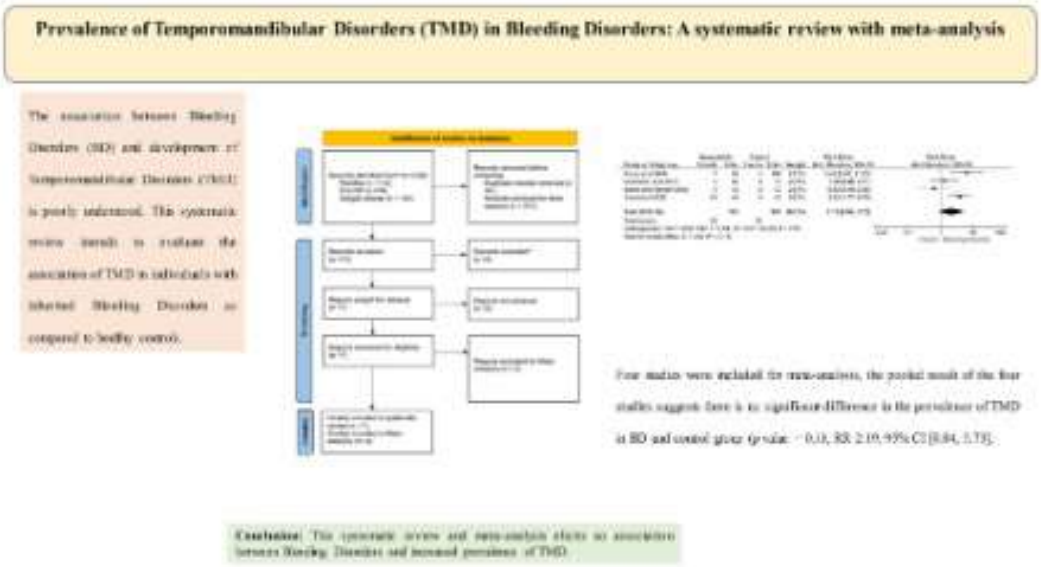
Prevalence of temporomandibular disorders (TMD) in bleeding disorders: A systematic review with meta-analysis

Giuseppe Minervini, Maria Maddalena Marrapodi, Sunnypriyatham Tirupathi, Lamea Afnan, Vincenzo Ronsivalle, Gabriele Cervino, Marco Cicciù

Pages: 1535-1543 | First Published: 29 August 2023



The association between Bleeding Disorders (BD) and development of Temporomandibular Disorders (TMD) is poorly understood. This systematic review intends to evaluate the association of TMD in individuals with inherited Bleeding Disorders as compared to healthy controls. Four studies were included for meta-analysis, the pooled result of the four studies suggests there is no significant difference in the prevalence of TMD in BD and control group (*p* value = .11, RR 2.19; 95% CI [0.84, 5.73]. This systematic review and meta-analysis elicits no association between Bleeding Disorders and increased prevalence of TMD.

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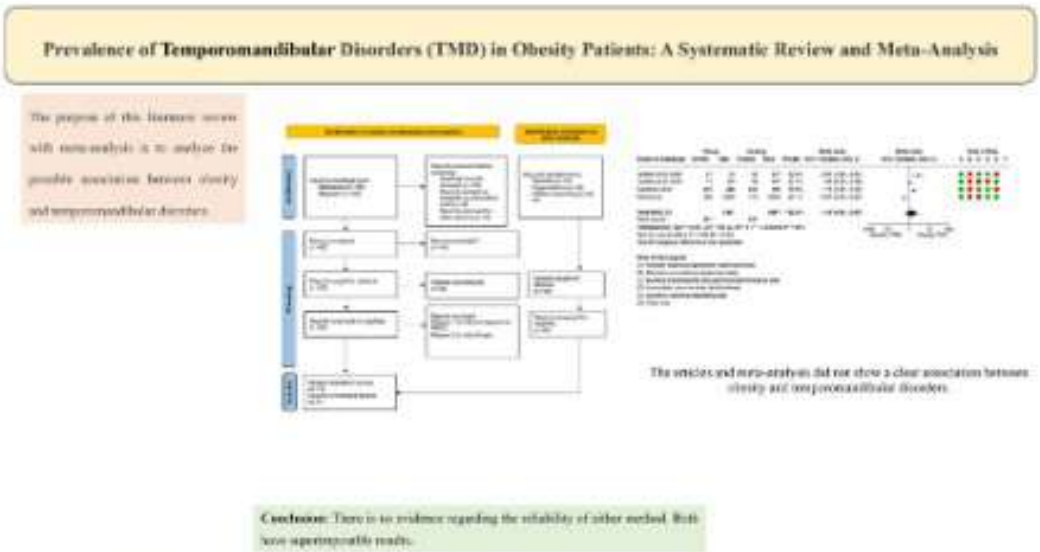
Prevalence of temporomandibular disorders (TMD) in obesity patients: A systematic review and meta-analysis

Giuseppe Minervini, Rocco Franco, Maria Maddalena Marrapodi, Luis Eduardo Almeida, Vincenzo Ronsivalle, Marco Cicciù

Pages: 1544-1553 | First Published: 27 August 2023



The purpose of this literature review with meta-analysis is to analyse the possible association between obesity and temporomandibular disorders. The articles and meta-analysis did not show a clear association between obesity and temporomandibular disorders. In conclusion, there is no evidence regarding the reliability of either method. Both have superimposable results.

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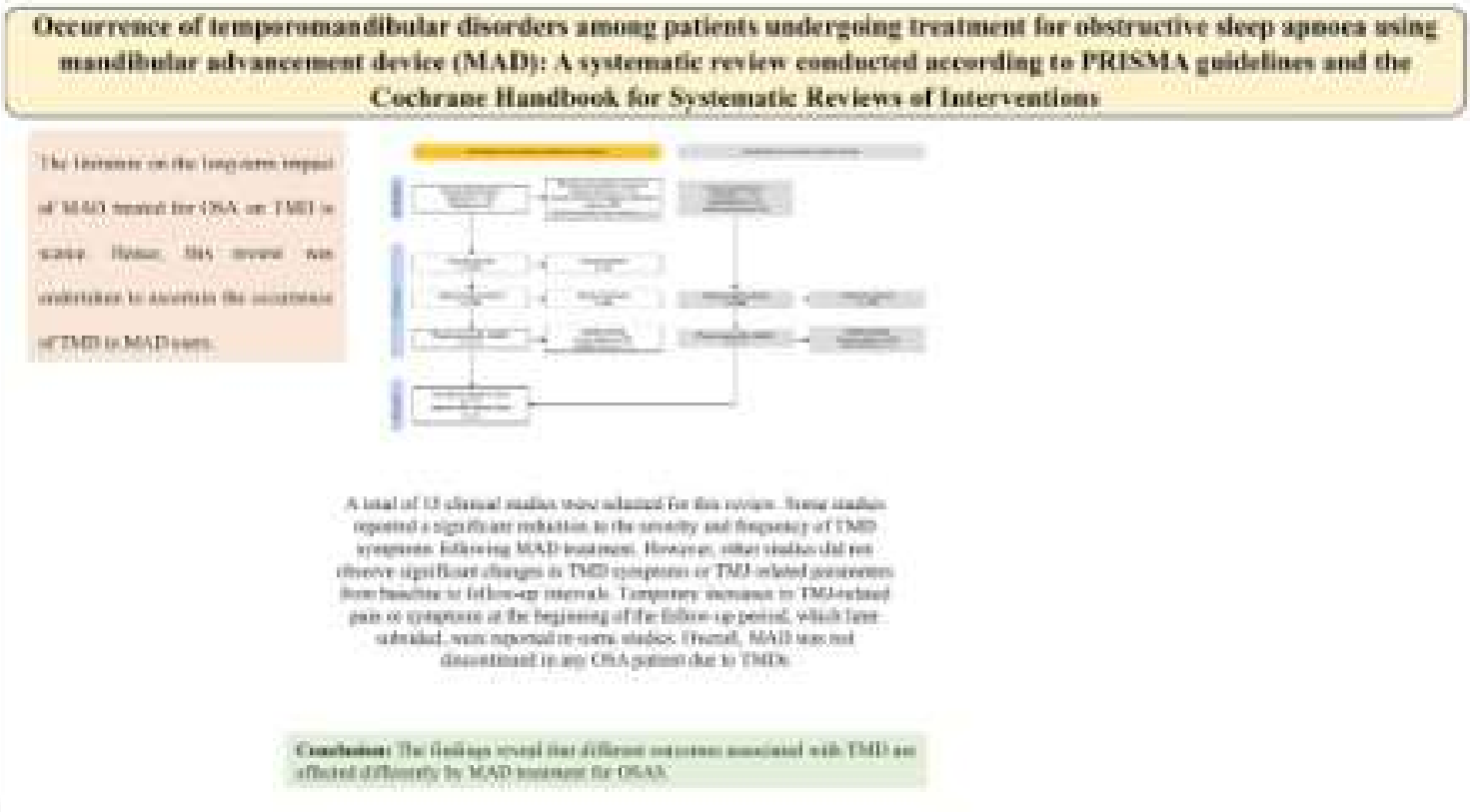
Occurrence of Temporomandibular Disorders among patients undergoing treatment for Obstructive Sleep Apnoea Syndrome (OSAS) using Mandibular Advancement Device (MAD): A Systematic Review conducted according to PRISMA guidelines and the Cochrane handbook for systematic reviews of interventions

Akshayraj Langaliya, Mohammad Khursheed Alam, Usha Hegde, Mangesh Shenoy Panakaje, Gabriele Cervino, Giuseppe Minervini

Pages: 1554-1563 | First Published: 30 August 2023



Abstract | Full text | PDF | References | Request permissions

Received: 9 May 2023 | Revised: 1 July 2023 | Accepted: 7 August 2023

DOI: 10.1111/joor.13570

ORIGINAL ARTICLE

JOURNAL OF ORAL REHABILITATION WILEY

Psychological characteristics of young adults with temporomandibular disorders, somatization and combined conditions: A multidimensional evaluation

Adrian Ujin Yap[1,2,3] | Ni Luh Dewi[3] | Carolina Marpaung[3]

[1]Department of Dentistry, Ng Teng Fong General Hospital and Faculty of Dentistry, National University Health System, Singapore, Singapore

[2]National Dental Research Institute Singapore, National Dental Centre Singapore and Duke-NUS Medical School, Singapore Health Services, Singapore, Singapore

[3]Department of Prosthodontics, Faculty of Dentistry, Universitas Trisakti, Jakarta, Indonesia

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

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Universitas Trisakti, Indonesia, Grant/Award Number: 0142/PUF/FKG/2021-202

Abstract

Background: Temporomandibular disorders and somatization have shown interrelation in many studies. The physical and psychological factors which contributed to the occurrence and relation of both conditions are yet to be determined.

Objectives: The personality traits, coping styles and psychological distress of young adults with temporomandibular disorder (TMD) and somatic symptoms were characterized together with the determination of psychological risk factors for TMDs, somatization and combined conditions.

Methods: Participants were recruited from university-attending young adults. TMD and somatic symptoms were appraised with the short-form Fonseca Anamnestic Index and Patient Health Questionnaire-15. Psychological variables were assessed with the Big Five Personality Inventory-10, Brief-COPE Inventory and Depression, Anxiety, and Stress Scales-21. Data were evaluated using chi-squared/non-parametric tests and logistic regression analyses ($\alpha = .05$).

Results: Among the 507 participants (mean age 22.2 ± 1.5 years), 46.4% reported no TMD/somatic symptoms (NS) while 7.5%, 34.5% and 11.6% had TMDs only (TS), somatization only (SS) and combined TMDs-somatization (CS), respectively. Significant differences in conscientiousness (NS > SS), agreeableness (NS, TS > CS; NS > SS), dysfunctional coping, general distress, depression, anxiety and stress (CS ≥ SS > NS) were discerned. Multivariate analyses indicated that the odds of TS were increased by anxiety (OR = 1.10; 95% CI = 1.01–1.21), while the odds of SS/CS were affected by anxiety (OR = 1.15; 95% CI = 1.06–1.25/OR = 1.34; 95% CI = 0.19–1.52) and problem-focused coping (OR = 0.71; 95% CI = 0.56–0.89/OR = 0.55; 95% CI = 0.39–0.78).

Conclusion: Though individuals with TMDs and somatization have dissimilar psychological profiles, anxiety constantly increased their likelihood. Problem-focused coping strategies may help alleviate psychosocial and physical stressors associated with TMDs and somatization.

KEYWORDS
coping, personality, psychological distress, somatic symptoms, temporomandibular disorders

1 | BACKGROUND

Temporomandibular disorders (TMDs) are a cluster of more than 30 health conditions involving the stomatognathic system. The cardinal features of TMDs consist of temporomandibular joint (TMJ) pain, masticatory muscle pain, TMJ noises during jaw movement/function and limitations in jaw movement.[1,2] TMDs are a significant and increasingly prevalent public health problem affecting 5%–16% of the general population. Furthermore, up to 75% of people have subclinical signs and/or symptoms of TMDs.[3,4] Gender differences in TMD prevalence exist, and women, notably those aged 20–40 years old, have a greater risk of developing TMDs than men.[2–5] The individual and societal burden of TMDs is substantial with impairment of both general and oral health-related quality of life.[6,7] TMDs have multiple 'biopsychosocial' contributing factors including age, gender, genetics, oral parafunction, pain sensitivity, somatic symptoms, somatization (the tendency to experience psychological distress as physical/somatic symptoms) and psychological distress.[1,8] TMD patients have high frequencies of somatic symptoms including headaches, neck and back pain, somatization, as well psychological distress which encompass depression, anxiety and stress.[9–14] East and Southeast Asians are more susceptible to somatization than Westerners as they are socialized to emphasize somatic rather than psychological symptoms because of the social stigma attached to mental problems.[15–17]

The perception and moderation of psychological distress might be influenced by the independent and interactive effects of personality and coping.[18] Personality is the set of unique thoughts, feelings and behaviours that differentiates a person, and personality traits are usually assessed based on the 'five-factor model'. The five personality dimensions (OCEAN) are openness (the tendency to be creative and curious), conscientiousness (the tendency to be self-disciplined and goal-oriented), extraversion (the tendency to be self-confident and sociable), agreeableness (the tendency to be cooperative and empathetic) and neuroticism (the tendency to experience negative emotions). Coping is the set of predictable strategies mobilized by a person to mitigate negative situations/emotions and dispositional coping styles are considered functional or dysfunctional depending on the use of problem/emotion-focused or maladaptive coping strategies correspondingly.[19,20] The few studies investigating the association of TMDs with personality and coping suggested that individuals with TMDs have 'neurotic/distressed' personalities and utilized more maladaptive coping strategies than functional ones.[21–25] Only one study, involving a relatively modest sample of TMD patients, simultaneously analysed the psychological variables of personality, coping and distress.[21] Though patients with joint and muscle conditions had comparable psychological and coping profiles, their personality predictors differed.[21] Nonetheless, many TMD sufferers have combined joint and muscle symptoms.[26,27]

Young adulthood is the unique development period when young people are traditionally expected to shoulder adult responsibilities and engage in work and/or higher education. Young adults constitute a substantial proportion of TMD patients and their mental health appears to have declined over the past decade.[27,28] Additionally, those with chronic pain were found to have poorer psychosocial functioning and quality of life than their peers without pain.[29] Young adults with TMDs may not necessarily have somatic complaints, and the converse is also true for those with somatization.[11] Thus far, no study has synchronously evaluated the three related psychological variables in community-based young adults with TMD and/or somatic symptoms.

Given the aforesaid, the objectives of this study were three folds: (1) to characterize the psychological variables, namely personality traits, coping styles and psychological distress, associated with young adults with TMD and/or somatic symptoms, (2) to explore the interrelationships between physical and psychological variables and (3) to determine the risk factors for TMDs, somatization and combined TMDs-somatization in young adults. The research hypotheses were, (a) young adults with TMDs and somatic symptoms have elevated levels of neuroticism, dysfunctional coping behaviours and/or psychological distress, (b) neurotic personality traits and dysfunctional coping styles are associated with higher levels of distress and (c) the odds of TMDs, somatization and combined conditions are influenced by specific psychological factors.

2 | METHODS

2.1 | Study participants

Data for this study were accrued from an ongoing investigation on the relationship between TMDs/oral parafunction and psychosocial functioning, which was endorsed by the ethics committee of the Faculty of Dentistry, Universitas Trisakti, Indonesia (ID: 013/S3/KEPK/FKG/9/2021). Young adults were recruited from the largest private university in the country using a non-probabilistic voluntary sampling technique. The inclusion criteria were age 18–24 years and proficiency in English, while the exclusion criteria included prior oro-facial trauma/orthognathic surgery and ongoing care for debilitating psychological and/or physical disorders. At least 318 participants were needed for the study based upon a 95% confidence level, 5% precision, university enrolment of 20 638 students and 70% prevalence of TMD/somatic symptoms in young adults.[4,30] Potential participants were sought through public internet postings as well as personal networks. They were supplied with the study details and informed consent was obtained before administering a comprehensive online survey. The latter comprised demographic information, the Short-form Fonseca Anamnestic Index (SFAI), Patients Health Questionnaire-15 (PHQ-15), Big Five Personality Inventory-10 (BFI-10), Brief-COPE (coping orientations to problems experienced) Inventory (BCI) and Depression, Anxiety, Stress Scales-21 (DASS-21).[19,20,31–33]

2.2 | Study measures

2.2.1 | Physical measures

Temporomandibular disorder symptoms were established with the SFAI which consisted of two pain (TMJ and masticatory muscle pain) and three function-related (TMJ noises, jaw opening and side-movement difficulties) items. In addition to evaluating both TMD pain and functional disturbance, the SFAI also has good psychometric properties and high diagnostic accuracy when referenced to both the Diagnostic Criteria (DC/TMD) and Research Diagnostic Criteria for TMDs (RDC/TMD) standards.[31,34,35] A three-point response scale was used to score the items, where 'no' = 0 points, 'sometimes' = 5 points and 'yes' = 10 points. Somatic symptoms were ascertained with the PHQ-15 which involved the 15 most prevalent items for severe forms of somatization.[32] They encompass dizziness, fatigue, sleeping problems, bodily pains (head, stomach, chest, arms, legs or joints), as well as cardiopulmonary and gastrointestinal symptoms. The validity and reliability of the PHQ-15 are well recognized, and it is equivalent or superior to other inventories for screening somatic symptoms and severe somatization.[32,36–38] A three-point response scale was used to score the items, where 'no bothered at all' = 0 points, 'bothered a little' = 1 point and 'bothered a lot' = 2 points. Both TMD and somatic symptoms were assessed over 30 days. TMDs and somatization were deemed present when total SFAI and PHQ-15 scores were ≥15 and ≥5 points, respectively. Higher total scores specify greater TMD and somatic symptom (somatization) severity.[39] The participants were categorized into the following four groups for statistical evaluation: NS—no TMDs or somatization; TS—TMDs only; SS—somatization only; and CS—combined TMDs somatization (concurrent presence of both conditions).

2.2.2 | Psychological measures

Personality traits were examined with the BFI-10 which contained two items for individual OCEAN dimensions.[19] Its between and within-person measurement properties have been confirmed in cross-sectional and longitudinal studies.[19,40] A five-point Likert scale, spanning from 'disagree strongly' = 1 point to 'agree strongly' = 5 points, was used to score the items with one question in each dimension being reverse-scored. Dimension scores were computed, with higher scores indicating a greater tendency towards the specific traits.

Dispositional coping styles were appraised using the BCI which comprised two items for each of the 14 coping strategies utilized in response to 'problems experienced'. It is one of the most widely used and validated measures for coping.[20,41] A four-point Likert scale, spanning from 'I haven't been doing this at all' = 1 point to 'I've been doing this a lot' = 4 points, was used to score the items. The 14 strategies were clustered into the following three coping styles: problem-focused coping (active coping, planning and instrumental support), emotion-focused (acceptance, emotional support, humour, positive reframing and religion) and dysfunctional coping (behavioural disengagement, denial, self-distraction, self-blame, substance use and venting).[20,42] Coping style scores were computed by tallying the points for identified strategies, with higher scores indicating increased utilization of functional (problem and emotion-focused) or dysfunctional coping behaviours.

Psychological distress was assessed with DASS-21 which had seven items for each subscale, specifically depression, anxiety and stress.[33] The DASS-21 has good measurement properties and is frequently employed in clinical and research settings.[33,43] It was demonstrated to have a bifactor structure comprising a general distress factor and the three subscale factors.[43] A four-point Likert scale spanning from 'did not apply to me at all' = 0 points to 'applied to me very much, or most of the time' = 3 points was used to score the items. Total DASS-21 and subscale scores are computed with greater scores indicating higher levels of general distress, depression, anxiety and stress correspondingly. Cut-off points for classifying the severity of the depression, anxiety and stress subscales (normal to extremely severe) are reflected in the DASS manual.[33]

2.3 | Statistical analyses

The Statistical Package for the Social Sciences software version 27.0 (IBM Corporation) was used to analyse the data with the significance level set at 0.05. Categorical data were presented as frequencies with percentages and evaluated with the chi-squared test. Numerical data were presented as means/medians with standard deviations (SDs)/interquartile ranges (IQRs) and inspected for normality using the Shapiro–Wilk's test. As non-normal data distributions were observed, numerical data were assessed with the Kruskal–Wallis/post hoc Mann–Whitney *U* tests and Spearman's rank-order correlation. Correlation coefficients (r_s) of .1, .4 and .7 functioned as the cut-off points for weak, moderate and strong correlations between physical and psychological variables.[44] Univariate and multivariate logistic regression analyses were performed to determine the factors associated with TMDs, somatization and combined conditions. Insignificant factors were isolated using a step-wise variable selection process with a threshold of $p < .10$ in the multivariate model. Forward and backward step-wise analyses were carried out to confirm the model. Outcomes were presented as odds ratios (ORs) with 95% confidence intervals (95% CIs).

3 | RESULTS

A total of 515 young adults volunteered for the study, of which eight were excluded due to age (≥25 years old). The mean age of the final sample ($n = 507$), which consisted of 85.6% women, was 22.2 ± 1.5 years. Among the study participants, 46.4% reported no TMD/somatic symptoms (NS), whereas 7.5%, 34.5% and 11.6% had TMDs, somatization and combined conditions, correspondingly.

While differences in gender distribution were insignificant, the NS group was slightly older than the SS and CS groups (Table 1).

Table 2 displays the mean/median BFI-10, BCI and DASS-21 scores for the different groups. Significant differences in personality scores were observed for conscientiousness (NS > SS) and agreeableness (NS, TS > CS; NS > SS).

Concerning coping styles, the SS and CS groups utilized significantly more dysfunctional coping when compared to the NS group. The SS and CS groups also had significantly higher levels of general distress, depression, anxiety and stress than the NS group. Additionally, significant differences in anxiety were also observed between the SS and CS groups (CS > SS).

Tables 3 and 4 reflect the results of correlation and logistic regression analyses. The correlation between SFAI and PHQ-15 scores, albeit significant, was weak (r_s = .19), as were the correlations between physical and psychological variables (r_s = −.18 to .29). Neuroticism and dysfunctional coping were moderately correlated to general distress and the three DASS subscales (r_s = .44–.60 and .47–.52 accordingly). Moderate to strong correlations were noted between problem and emotion-focused coping style scores (r_s = .76) as well as among the various DASS constituent scores (r_s = .62–.95). Notable variances in the outcomes of univariate analyses were observed for the TS, SS and CS groups. While TMDs were associated only with anxiety, somatization, as well as combined conditions, were related to several psychological variables (Table 4). Multivariate analyses indicated that the odds of TMDs were increased by anxiety (OR = 1.10; 95% CI = 1.01–1.21). However, the odds of somatization were increased by dysfunctional coping (OR = 1.55; 95% CI = 1.06–2.26) and anxiety (OR = 1.15; 95% CI = 1.06–1.25), and reduced by problem-focused coping (OR = 0.71; 95% CI = 0.56–0.89) and depression (OR = 0.91; 95% CI = 0.84–0.99). Additionally, the odds of combined TMDs-somatization were increased by anxiety (OR = 1.34; 95% CI = 0.19–1.52) but reduced by agreeableness (OR = 0.72; 95% CI = 0.57–0.91), problem-focused coping (OR = 0.55; 95% CI = 0.39–0.78) and depression (OR = 0.81; 95% CI = 0.71–0.92).

4 | DISCUSSION

This study is one of the first to explore personality traits, coping styles and distress concurrently in young adults with TMDs and somatization as separate and mutual entities. As young adults with somatization and combined conditions had significantly greater dysfunctional coping and distress scores, the first research hypothesis was partly supported. The second and third research hypotheses were also maintained given the moderately strong correlations between neuroticism/dysfunctional coping and distress scores and the effect of explicit psychological variables on the odds of TMDs and/or somatization. University students, as a young adult population, were selected because of their vulnerability to psychological distress, which can vary from normal mood fluctuations to serious mental disorders.[45] The study participants, like other Southeast Asian young adults, may have a greater propensity to communicate psychological distress as somatic symptoms, including TMDs, than their Western counterparts.[11,15,16]

4.1 | Physical conditions

The overall prevalence rates of TMDs and somatization were 19.1% (97 out of 507) and 46.2% (234 out of 507), which were consistent with the high rates reported in the general population.[3,46,47] Of the 97 participants with TMDs, 60.8% (59/97) experienced somatic symptoms. Conversely, among the 234 individuals with somatization, only 25.2% had TMD symptoms. Therefore, about three-fifths of young adults with TMDs have comorbid somatization, whereas only a quarter with somatization have TMDs. This explained the weak correlation between SFAI and PHQ-15 scores in this and other studies.[11] Given the high prevalence of somatization in TMD patients (up to 76.6%), much of the psychological distress accompanying TMDs could be facilitated by somatization.[9,10] The latter was reinforced by the 4–6 times higher depression/anxiety in persons with somatic symptoms than in the general population

TABLE 1 Demographic characteristics of the study sample.

		Age			Gender		
Variables	***n* (%)**	**Mean (SD)**	**Median (IQR)**	***p*-value[a], Post hoc**	**Male, *n* (%)**	**Female, *n* (%)**	***p*-value[b]**
Total	507 (100)	22.2 (1.5)	22.0 (3)		73 (14.4)	434 (85.6)	-
No TMDs or somatization (NS)	235 (46.4)	22.4 (1.4)	22.0 (2)	**.006 NS > SS,CS**	42 (17.9)	193 (82.1)	.052
TMDs only (TS)	38 (7.5)	22.2 (1.4)	22.0 (1)		8 (21.1)	30 (78.9)	
Somatization only (SS)	175 (34.5)	22.0 (1.6)	22.0 (2)		18 (10.3)	157 (89.7)	
Combined TMDs-somatization (CS)	59 (11.6)	21.9 (1.6)	22.0 (2)		5 (8.5)	54 (91.5)	

Note: Bold indicates $p < .05$.

Abbreviations: IQR, interquartile range; SD, standard deviation.

[a]Results of Kruskal–Wallis tests.

[b]Results of chi-squared test.

TABLE 2 Mean/median psychological variable scores for the various groups.

Physical/psychological variables	No TMDs or somatization (NS)	TMDs only (TS)	Somatization only (SS)	Combined TMDs-somatization (CS)	*p*-value, Post hoc[a]
Personality					
Openness (OP)					
Mean (SD)	6.4 (1.5)	6.5 (1.6)	6.3 (1.4)	6.5 (1.3)	.764
Median (IQR)	6.0 (2)	6.0 (2)	6.0 (2)	6.0 (1)	
Conscientiousness (CP)					
Mean (SD)	6.8 (1.4)	6.4 (1.4)	6.4 (1.3)	6.5 (1.2)	**.038**
Median (IQR)	7.0 (2)	7.0 (2)	6.0 (1)	6.0 (1)	**NS > SS**
Extraversion (EP)					
Mean (SD)	6.9 (1.7)	7.3 (1.7)	6.8 (1.6)	6.6 (1.3)	.160
Median (IQR)	7.0 (2)	7.5 (3)	7.0 (2)	7.0 (2)	
Agreeableness (AP)					
Mean (SD)	7.2 (1.4)	7.2 (1.5)	6.7 (1.6)	6.5 (1.5)	**.013**
Median (IQR)	7.0 (2)	7.0 (1)	7.0 (2)	7.0 (1)	**NS,TS > CS; NS > SS**
Neuroticism (NP)					
Mean (SD)	6.5 (1.8)	6.6 (1.8)	6.9 (1.4)	7.0 (1.6)	.124
Median (IQR)	7.0 (3)	6.5 (3)	7.0 (2)	7.0 (2)	
Coping styles					
Problem-focused (PC)					
Mean (SD)	5.9 (1.1)	6.0 (1.3)	5.7 (1.1)	5.6 (1.1)	.097
Median (IQR)	6.0 (1.3)	6.0 (1.8)	6.0 (1.3)	5.7 (1.3)	
Emotion-focused (EC)					
Mean (SD)	5.7 (1.0)	5.7 (1.1)	5.5 (1.0)	5.6 (0.9)	.279
Median (IQR)	5.6 (1.0)	5.9 (1.4)	5.6 (1.2)	5.6 (1.2)	
Dysfunctional (DC)					
Mean (SD)	3.9 (0.7)	4.0 (0.8)	4.0 (0.7)	4.2 (0.8)	**.013**
Median (IQR)	3.8 (1.0)	3.8 (1.0)	4.0 (1)	4.2 (1.2)	**CS,SS > NS**
Psychological distress					
General (GD)					
Mean (SD)	12.6 (10.3)	15.2 (10.1)	16.0 (9.1)	18.4 (10.9)	**<.001**
Median (IQR)	9.0 (13)	13.0 (15)	15.0 (12)	16.0 (12)	**CS,SS > NS**
Depression (DD)					
Mean (SD)	3.0 (3.6)	3.5 (3.5)	3.6 (3.4)	3.9 (3.8)	**<.001**
Median (IQR)	2.0 (4)	3.0 (4)	2.0 (4)	3.0 (4)	**CS,SS > NS**
Anxiety (AD)					
Mean (SD)	3.9 (3.4)	5.2 (3.5)	5.2 (3.1)	6.5 (3.8)	**<.001**
Median (IQR)	3.0 (4)	4.0 (4)	5.0 (4)	6.0 (5)	**CS > SS > NS**
Stress (SD)					
Mean (SD)	5.7 (4.4)	6.4 (4.5)	7.1 (3.8)	8.0 (4.3)	**<.001**
Median (IQR)	5.0 (6)	5.0 (8)	7.0 (4)	8.0 (6)	**CS,SS > NS**

Note: Bold indicates $p < .05$.

Abbreviations: IQR, interquartile range; SD, standard deviation.

[a]Results of Mann–Whitney *U* tests.

as well as the variance in psychological characteristics between the TS and CS groups (TMDs without and with somatization) and stronger correlation between PHQ-15 and DASS than SFAI and DASS observed in this study.[48]

4.2 | Psychological factors

Both personality traits and dispositional coping had been linked to psychological distress. While they jointly accounted for 40%–50%

TABLE 3 Correlations between physical and psychological variables.

Variables	TM	SM	OP	CP	EP	AP	NP	PC	EC	DC	GD	DD	AD
TM	-	-	-	-	-	-	-	-	-	-	-	-	-
SM	0.19**	-	-	-	-	-	-	-	-	-	-	-	-
OP	0.06	0.04	-	-	-	-	-	-	-	-	-	-	-
CP	−0.11*	−0.12	−0.23**	-	-	-	-	-	-	-	-	-	-
EP	−0.02	−0.06	−0.16**	0.16**	-	-	-	-	-	-	-	-	-
AP	−0.05	−0.18**	0.01	−0.01	0.08	-	-	-	-			-	-
NP	0.07	0.13**	0.20**	0.19**	−0.27**	0.04	-	-	-	-	-	-	-
PC	−0.01	−0.12**	−0.05	0.14**	0.13**	0.05	−0.12**	-	-	-	-	-	-
EC	0.02	−0.08	−0.08	0.06	0.20**	0.11*	−0.16**	**0.76****	-	-	-	-	-
DC	0.08	0.18**	0.17**	0.20**	−0.06	−0.08	0.23**	0.33**	0.31**	-	-	-	-
GD	0.12*	0.28**	0.27**	0.25**	−0.28**	−0.03	**0.57****	−0.04	−0.05	**0.52****	-	-	-
DD	0.08	0.23**	0.26**	0.26**	−0.34**	−0.07	**0.44****	−0.12**	−0.10*	**0.47****	**0.84****	-	-
AD	0.16**	0.29**	0.22**	0.21**	−0.19**	−0.01	**0.49****	0.02	0.02	**0.45****	**0.89****	**0.62****	-
SD	0.10*	0.27**	0.24**	0.22**	−0.24**	−0.03	**0.60****	−0.01	−0.04	**0.48****	**0.95****	**0.71****	**0.79****

Note: Results of Spearman's correlation. *$p < .05$; **$p < .01$ and Bold indicates correlation coefficient >.4.

Abbreviations: SM, somatic symptom scores with the Patient Health Questionnaire-15 (PHQ-15); TM, TMD symptom scores with the Short-form Fonseca Anamnestic Index (SFAI); personality: AP, agreeableness; CP, conscientiousness; EP, extraversion; NP, neuroticism; OP, openness; coping: DC, dysfunctional; EC, emotion-focused; PC, problem-focused; distress: AD, anxiety; DD, depression; GD, general; SD, stress.

TABLE 4 Risk factors for the presence of TMDs, somatization and combined conditions.

	Univariate		Multivariate	
Variables	**Odds ratio (95% CI)**	***p*-value[a]**	**Odds ratio (95% CI)**	***p*-value[b]**
TMDs only				
Gender				
Male	Reference			
Female	0.82 (0.35–1.91)	.639		
Personality				
Openness	1.07 (0.85–1.35)	.567		
Conscientiousness	0.83 (0.65–1.06)	.128		
Extraversion	1.16 (094–1.43)	.161		
Agreeablenes	1.08 (0.84–1.38)	.539		
Neuroticism	1.02 (0084–1.24)	.819		
Coping				
Problem-focused	1.07 (0.78–1.46)	.696		
Emotion-focused	1.10 (0.78–1.56)	.592		
Dysfunctional	1.28 (0.82–2.01)	.274		
Psychological distress				
Depression	1.04 (095–1.14)	.380		
Anxiety	**1.10 (1.01–1.21)**	**.032**	**1.10 (1.01–1.21)**	**.032**
Stress	1.04 (0.96–1.12)	.343		
Somatization only				
Gender				
Male	Reference			
Female	**1.90 (1.05–3.43)**	**.034**		
Personality				
Openness	0.95 (0.83–1.09)	.470		
Conscientiousness	**0.82 (0.71–0.95)**	**.009**		
Extraversion	0.97 (0.86–1.09)	.619		
Agreeableness	**0.85 (0.75–0.98)**	**.020**		
Neuroticism	**1.14 (1.01–1.29)**	**.029**		
Coping				
Problem-focused	**0.83 (0.69–0.99)**	**.048**	**0.71 (0.56–0.89)**	**.003**
Emotion-focused	0.87 (0.71–1.06)	.164		
Dysfunctional	1.38 (1.05–1.81)	**.022**	**1.55 (1.06–2.26)**	**.023**
Psychological distress				
Depression	**1.06 (0.99–1.12)**	**.055**	**0.91 (0.84–0.99)**	**.038**
Anxiety	**1.12 (1.06–1.19)**	**<.001**	**1.15 (1.06–1.25)**	**.001**
Stress	**1.09 (1.04–1.14)**	**.001**		
Combined TMDs somatization				
Gender				
Male	Reference			
Female	2.35 (0.89–6.23)	.086		
Personality				
Openness	1.06 (0.87–1.29)	.589		
Conscientiousness	0.84 (0.68–1.03)	.091		
Extraversion	0.89 (0.74–1.07)	.216		

TABLE 4 (Continued)

Variables	Univariate		Multivariate	
	Odds ratio (95% CI)	*p*-value[a]	Odds ratio (95% CI)	*p*-value[b]
Agreeableness	**0.78 (0.63–0.95)**	**.014**	**0.72 (0.57–0.91)**	**.005**
Neuroticism	1.17 (0.99–1.39)	.061		
Coping				
Problem-focused	0.79 (0.60–1.03)	.080	**0.55 (0.39–0.78)**	**.032**
Emotion-focused	0.90 (0.67–1.21)	.484		
Dysfunctional	**1.68 (1.15–2.45)**	**.007**		
Psychological distress				
Depression	1.07 (0.99–1.15)	.078	**0.81 (0.71–0.92)**	**.001**
Anxiety	**1.20 (1.11–1.29)**	**<.001**	**1.34 (0.19–1.52)**	**<.001**
Stress	**1.11 (1.05–1.19)**	**.001**		

Note: Bold indicates $p < .05$.

[a]Results of univariate logistic regression analyses.

[b]Results of multivariate logistic regression analyses.

of the variance in psychopathology, coping was found to mediate the relationship between personality and distress.[18,49] This clarified the moderately strong correlations of neuroticism and dysfunctional coping to general distress, depression, anxiety and stress. The bifactor structure of the DASS-21 was validated by the strong correlations between general distress and the three subscales.[43] Participants with TMDs had dissimilar psychological profiles when compared to those with somatization. While differences in psychological characteristics were insignificant between the TS and NS (reference) groups, the SS group presented significantly lower conscientiousness and agreeableness, and greater dysfunctional coping, general distress, depression, anxiety and stress than the NS group. The CS group exhibited substantially lower agreeableness than both TS and NS groups, and greater dysfunctional coping and psychological distress than the NS group. Consequently, participants having somatization without and with TMDs were reckoned to possess comparable psychological characteristics.

Findings regarding young adults with TMDs were in contrast to prior studies specifying that TMDs were associated with neurotic personalities, more frequent use of dysfunctional coping strategies and higher levels of psychological distress.[9–11,21,22–25] Besides variations in race, participant selection, diagnostic criteria and psychological measures, disparities could be attributed to the exclusion of somatization as a plausible factor for distress. In this study, a conscious effort was made to distinguish participants with TMDs, somatization and combined conditions to scrutinize the bearing of somatization on psychological characteristics. Like TMDs, studies that simultaneously examined all three psychological variables in persons with somatization are scant. Nevertheless, somatization had been related to neuroticism, agreeableness, dysfunctional coping, depression, anxiety and stress.[50,51] Except for neuroticism, findings corroborated those of earlier studies and were ascribed to cognitive-affective amplification of somatosensory responses. This may develop through stress-mediated neuroplasticity as well as inflammatory neuromodulation and is subjected to genetic and environmental factors.[50,52] Neuroticism was not related to somatization in this study. This phenomenon could be qualified by the exclusion of young adults with debilitating psychological disorders, such as bipolar disorder, post-traumatic stress disorder and schizophrenia, and the generally normal depression (0–4 points), mild-to-moderate anxiety (4–7 points) and normal-to-mild stress (0–9 points) observed among the participants.

4.3 | Risk factors for TMDs and/or somatization

After adjusting for confounding effects in the multivariate model, anxiety increased the odds of TMDs, somatization and combined conditions by 10%, 15% and 34%, while depression reduced the odds of somatization and combined conditions by 9% and 19% correspondingly. Anxiety was thus the main emotional risk factor for TMDs and somatization in community-based young adults. Findings were consistent with those of other community-based studies demonstrating a stronger association between anxiety and TMD/somatic symptoms than depression and stress.[50,53,54] The apparent 'protective effect' of depression was an aberrant outcome that can be credited to the largely normal level of depression in the study sample as specified by the DASS severity classification.[33] Depression is usually more severe in patient populations and is anticipated to have interactive effects with anxiety.[9,10,48,55]

While dysfunctional coping increased the odds of somatization by 55%, problem-focused coping reduced the odds of somatization and combined conditions by 29% and 45%, respectively. The relation to dysfunctional coping, which is associated with low self-esteem, low optimism and greater distress, was not surprising as somatization might be a maladaptive coping technique where somatic complaints are utilized to communicate psychological

distress.[16,56,57] Moreover, poor verbal ability/skills were reported to play a role in the development of multiple functional somatic symptoms because of the augmented use of dysfunctional coping strategies.[57] Problem-focused coping reduced the risk of somatization without and with TMDs substantially. Therefore, the management of TMDs and somatization should incorporate the training and practice of problem-focused coping strategies for alleviating accompanying psychosocial stressors, pain and functional disability. Problem-focused coping strategies may be more effective in agreeable (the tendency to be cooperative, compliant and kind) and conscientious (the tendency to be goal-oriented, self-disciplined and reliable) patients given the influence of these traits on the interactions with healthcare providers.[58] Agreeableness also reduced the odds of combined conditions by 28%. It has been linked to effortful control and high levels of agreeableness have been shown to decouple the relation between neuroticism and somatic symptoms.[59]

4.4 | Study limitations

This analytical observational study had some limitations. First, the temporal and causal relationships between physical conditions and psychological distress cannot be determined with the cross-sectional design employed. While personality traits and coping styles remain fairly constant, TMD, somatic, depressive, anxiety and stress symptoms could fluctuate over the assessment period. Second, the study sample, which comprised mainly of women, involved only students from a private University and is not representative of all young adults in the country. The predominance of female responders is partly due to the greater inclination for women to participate in research surveys than men and might result in possible gender bias.[60] Future research could incorporate a longitudinal design, working young adults and more male participants. The study should also be replicated in other racial/ethnic groups as well as TMD patient populations. Third, participants with TMD pain and/or dysfunction were not differentiated. Though this could yield greater insights into the psychological aspects of pain, it involves numerous test groups and requires considerably more participants for accurate comparisons. Lastly, the physical and psychological measures were self-reported and disposed to various sources of information partialities including recall, social desirability, confirmation and other biases.[61]

5 | CONCLUSION

The prevalence of TMDs, somatization and combined TMDs-somatization in the study sample was 7.5%, 34.5% and 11.6%, respectively. Young adults with TMDs were found to have dissimilar psychological profiles to their peers with somatization and combined conditions. Those with somatization, without and with TMDs, presented significantly lower agreeableness, greater dysfunctional coping, general distress, depression, anxiety and stress. As almost three-fifths of young adults with TMDs had comorbid somatization, whereas only a quarter with somatization had TMDs, much of the purported psychological distress accompanying TMDs could be facilitated by somatization. Multivariate analyses indicated that anxiety was the main emotional risk factor for TMDs and somatization in community-based young adults. While dysfunctional coping increased the likelihood of somatization, problem-focused coping reduced the risk of somatization without and with TMDs. The management of TMDs and somatization should thus incorporate the training and practice of problem-focused coping strategies for alleviating associated psychosocial stressors, pain and functional disability. Findings added to understanding of the multifaceted interaction between personality, coping and distress in young adults with TMDs and/or somatization and underscored the importance of psychological screening as part of comprehensive patient care.

AUTHOR CONTRIBUTIONS

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

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The authors declare no conflicts of interest.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Adrian Ujin Yap https://orcid.org/0000-0003-0361-6209
Ni Luh Dewi https://orcid.org/0000-0002-6265-0805
Carolina Marpaung https://orcid.org/0000-0002-9621-6257

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Psychological characteristics of young adults with temporomandibular disorders, somatization and combined conditions: A multidimensional evaluation

by Carolina Damayanti Marpaung

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Psychological characteristics of young adults with temporomandibular disorders, somatization and combined conditions: A multidimensional evaluation

Adrian Ujin Yap[1,2,3] | Ni Luh Dewi[3] | Carolina Marpaung[3]

[1]Department of Dentistry, Ng Teng Fong General Hospital and Faculty of Dentistry, National University Health System, Singapore, Singapore

[2]National Dental Research Institute Singapore, National Dental Centre Singapore and Duke-NUS Medical School, Singapore Health Services, Singapore, Singapore

[3]Department of Prosthodontics, Faculty of Dentistry, Universitas Trisakti, Jakarta, Indonesia

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

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Abstract

Background: Temporomandibular disorders and somatization have shown interrelation in many studies. The physical and psychological factors which contributed to the occurrence and relation of both conditions are yet to be determined.

Objectives: The personality traits, coping styles and psychological distress of young adults with temporomandibular disorder (TMD) and somatic symptoms were characterized together with the determination of psychological risk factors for TMDs, somatization and combined conditions.

Methods: Participants were recruited from university-attending young adults. TMD and somatic symptoms were appraised with the short-form Fonseca Anamnestic Index and Patient Health Questionnaire-15. Psychological variables were assessed with the Big Five Personality Inventory-10, Brief-COPE Inventory and Depression, Anxiety, and Stress Scales-21. Data were evaluated using chi-squared/non-parametric tests and logistic regression analyses ($\alpha = .05$).

Results: Among the 507 participants (mean age 22.2 ± 1.5 years), 46.4% reported no TMD/somatic symptoms (NS) while 7.5%, 34.5% and 11.6% had TMDs only (TS), somatization only (SS) and combined TMDs-somatization (CS), respectively. Significant differences in conscientiousness (NS > SS), agreeableness (NS, TS > CS; NS > SS), dysfunctional coping, general distress, depression, anxiety and stress (CS ≥ SS > NS) were discerned. Multivariate analyses indicated that the odds of TS were increased by anxiety (OR = 1.10; 95% CI = 1.01–1.21), while the odds of SS/CS were affected by anxiety (OR = 1.15; 95% CI = 1.06–1.25/OR = 1.34; 95% CI = 0.19–1.52) and problem-focused coping (OR = 0.71; 95% CI = 0.56–0.89/OR = 0.55; 95% CI = 0.39–0.78).

Conclusion: Though individuals with TMDs and somatization have dissimilar psychological profiles, anxiety constantly increased their likelihood. Problem-focused coping strategies may help alleviate psychosocial and physical stressors associated with TMDs and somatization.

KEYWORDS
coping, personality, psychological distress, somatic symptoms, temporomandibular disorders

1 | BACKGROUND

Temporomandibular disorders (TMDs) are a cluster of more than 30 health conditions involving the stomatognathic system. The cardinal features of TMDs consist of temporomandibular joint (TMJ) pain, masticatory muscle pain, TMJ noises during jaw movement/function and limitations in jaw movement.[1,2] TMDs are a significant and increasingly prevalent public health problem affecting 5%–16% of the general population. Furthermore, up to 75% of people have subclinical signs and/or symptoms of TMDs.[3,4] Gender differences in TMD prevalence exist, and women, notably those aged 20–40 years old, have a greater risk of developing TMDs than men.[2–5] The individual and societal burden of TMDs is substantial with impairment of both general and oral health-related quality of life.[6,7] TMDs have multiple 'biopsychosocial' contributing factors including age, gender, genetics, oral parafunction, pain sensitivity, somatic symptoms, somatization (the tendency to experience psychological distress as physical/somatic symptoms) and psychological distress.[1,8] TMD patients have high frequencies of somatic symptoms including headaches, neck and back pain, somatization, as well psychological distress which encompass depression, anxiety and stress.[9–14] East and Southeast Asians are more susceptible to somatization than Westerners as they are socialized to emphasize somatic rather than psychological symptoms because of the social stigma attached to mental problems.[15–17]

The perception and moderation of psychological distress might be influenced by the independent and interactive effects of personality and coping.[18] Personality is the set of unique thoughts, feelings and behaviours that differentiates a person, and personality traits are usually assessed based on the 'five-factor model'. The five personality dimensions (OCEAN) are openness (the tendency to be creative and curious), conscientiousness (the tendency to be self-disciplined and goal-oriented), extraversion (the tendency to be self-confident and sociable), agreeableness (the tendency to be cooperative and empathetic) and neuroticism (the tendency to experience negative emotions). Coping is the set of predictable strategies mobilized by a person to mitigate negative situations/emotions and dispositional coping styles are considered functional or dysfunctional depending on the use of problem/emotion-focused or maladaptive coping strategies correspondingly.[19,20] The few studies investigating the association of TMDs with personality and coping suggested that individuals with TMDs have 'neurotic/distressed' personalities and utilized more maladaptive coping strategies than functional ones.[21–25] Only one study, involving a relatively modest sample of TMD patients, simultaneously analysed the psychological variables of personality, coping and distress.[21] Though patients with joint and muscle conditions had comparable psychological and coping profiles, their personality predictors differed.[21] Nonetheless, many TMD sufferers have combined joint and muscle symptoms.[26,27]

Young adulthood is the unique development period when young people are traditionally expected to shoulder adult responsibilities and engage in work and/or higher education. Young adults constitute a substantial proportion of TMD patients and their mental health appears to have declined over the past decade.[27,28] Additionally, those with chronic pain were found to have poorer psychosocial functioning and quality of life than their peers without pain.[29] Young adults with TMDs may not necessarily have somatic complaints, and the converse is also true for those with somatization.[11] Thus far, no study has synchronously evaluated the three related psychological variables in community-based young adults with TMD and/or somatic symptoms.

Given the aforesaid, the objectives of this study were three folds: (1) to characterize the psychological variables, namely personality traits, coping styles and psychological distress, associated with young adults with TMD and/or somatic symptoms, (2) to explore the interrelationships between physical and psychological variables and (3) to determine the risk factors for TMDs, somatization and combined TMDs-somatization in young adults. The research hypotheses were, (a) young adults with TMDs and somatic symptoms have elevated levels of neuroticism, dysfunctional coping behaviours and/or psychological distress, (b) neurotic personality traits and dysfunctional coping styles are associated with higher levels of distress and (c) the odds of TMDs, somatization and combined conditions are influenced by specific psychological factors.

2 | METHODS

2.1 | Study participants

Data for this study were accrued from an ongoing investigation on the relationship between TMDs/oral parafunction and psychosocial functioning, which was endorsed by the ethics committee of the Faculty of Dentistry, Universitas Trisakti, Indonesia (ID: 013/S3/KEPK/FKG/9/2021). Young adults were recruited from the largest private university in the country using a non-probabilistic voluntary sampling technique. The inclusion criteria were age 18–24 years and proficiency in English, while the exclusion criteria included prior oro-facial trauma/orthognathic surgery and ongoing care for debilitating psychological and/or physical disorders. At least 318 participants were needed for the study based upon a 95% confidence level, 5% precision, university enrolment of 20 638 students and 70% prevalence of TMD/somatic symptoms in young adults.[4,30] Potential participants were sought through public internet postings as well as personal networks. They were supplied with the study details and informed consent was obtained before administering a comprehensive online survey. The latter comprised demographic information, the Short-form Fonseca Anamnestic Index (SFAI), Patients Health Questionnaire-15 (PHQ-15), Big Five Personality Inventory-10 (BFI-10), Brief-COPE (coping orientations to problems experienced) Inventory (BCI) and Depression, Anxiety, Stress Scales-21 (DASS-21).[19,20,31–33]

2.2 | Study measures

2.2.1 | Physical measures

Temporomandibular disorder symptoms were established with the SFAI which consisted of two pain (TMJ and masticatory muscle pain) and three function-related (TMJ noises, jaw opening and side-movement difficulties) items. In addition to evaluating both TMD pain and functional disturbance, the SFAI also has good psychometric properties and high diagnostic accuracy when referenced to both the Diagnostic Criteria (DC/TMD) and Research Diagnostic Criteria for TMDs (RDC/TMD) standards.[31,34,35] A three-point response scale was used to score the items, where 'no' = 0 points, 'sometimes' = 5 points and 'yes' = 10 points. Somatic symptoms were ascertained with the PHQ-15 which involved the 15 most prevalent items for severe forms of somatization.[32] They encompass dizziness, fatigue, sleeping problems, bodily pains (head, stomach, chest, arms, legs or joints), as well as cardiopulmonary and gastrointestinal symptoms. The validity and reliability of the PHQ-15 are well recognized, and it is equivalent or superior to other inventories for screening somatic symptoms and severe somatization.[32,36–38] A three-point response scale was used to score the items, where 'no bothered at all' = 0 points, 'bothered a little' = 1 point and 'bothered a lot' = 2 points. Both TMD and somatic symptoms were assessed over 30 days. TMDs and somatization were deemed present when total SFAI and PHQ-15 scores were ≥15 and ≥5 points, respectively. Higher total scores specify greater TMD and somatic symptom (somatization) severity.[39] The participants were categorized into the following four groups for statistical evaluation: NS—no TMDs or somatization; TS—TMDs only; SS—somatization only; and CS—combined TMDs somatization (concurrent presence of both conditions).

2.2.2 | Psychological measures

Personality traits were examined with the BFI-10 which contained two items for individual OCEAN dimensions.[19] Its between and within-person measurement properties have been confirmed in cross-sectional and longitudinal studies.[19,40] A five-point Likert scale, spanning from 'disagree strongly' = 1 point to 'agree strongly' = 5 points, was used to score the items with one question in each dimension being reverse-scored. Dimension scores were computed, with higher scores indicating a greater tendency towards the specific traits.

Dispositional coping styles were appraised using the BCI which comprised two items for each of the 14 coping strategies utilized in response to 'problems experienced'. It is one of the most widely used and validated measures for coping.[20,41] A four-point Likert scale, spanning from 'I haven't been doing this at all' = 1 point to 'I've been doing this a lot' = 4 points, was used to score the items. The 14 strategies were clustered into the following three coping styles: problem-focused coping (active coping, planning and instrumental support), emotion-focused (acceptance, emotional support, humour, positive reframing and religion) and dysfunctional coping (behavioural disengagement, denial, self-distraction, self-blame, substance use and venting).[20,42] Coping style scores were computed by tallying the points for identified strategies, with higher scores indicating increased utilization of functional (problem and emotion-focused) or dysfunctional coping behaviours.

Psychological distress was assessed with DASS-21 which had seven items for each subscale, specifically depression, anxiety and stress.[33] The DASS-21 has good measurement properties and is frequently employed in clinical and research settings.[33,43] It was demonstrated to have a bifactor structure comprising a general distress factor and the three subscale factors.[43] A four-point Likert scale spanning from 'did not apply to me at all' = 0 points to 'applied to me very much, or most of the time' = 3 points was used to score the items. Total DASS-21 and subscale scores are computed with greater scores indicating higher levels of general distress, depression, anxiety and stress correspondingly. Cut-off points for classifying the severity of the depression, anxiety and stress subscales (normal to extremely severe) are reflected in the DASS manual.[33]

2.3 | Statistical analyses

The Statistical Package for the Social Sciences software version 27.0 (IBM Corporation) was used to analyse the data with the significance level set at 0.05. Categorical data were presented as frequencies with percentages and evaluated with the chi-squared test. Numerical data were presented as means/medians with standard deviations (SDs)/interquartile ranges (IQRs) and inspected for normality using the Shapiro–Wilk's test. As non-normal data distributions were observed, numerical data were assessed with the Kruskal–Wallis/post hoc Mann–Whitney *U* tests and Spearman's rank-order correlation. Correlation coefficients (r_s) of .1, .4 and .7 functioned as the cut-off points for weak, moderate and strong correlations between physical and psychological variables.[44] Univariate and multivariate logistic regression analyses were performed to determine the factors associated with TMDs, somatization and combined conditions. Insignificant factors were isolated using a step-wise variable selection process with a threshold of $p < .10$ in the multivariate model. Forward and backward step-wise analyses were carried out to confirm the model. Outcomes were presented as odds ratios (ORs) with 95% confidence intervals (95% CIs).

3 | RESULTS

A total of 515 young adults volunteered for the study, of which eight were excluded due to age (≥25 years old). The mean age of the final sample ($n = 507$), which consisted of 85.6% women, was 22.2 ± 1.5 years. Among the study participants, 46.4% reported no TMD/somatic symptoms (NS), whereas 7.5%, 34.5% and 11.6% had TMDs, somatization and combined conditions, correspondingly.

While differences in gender distribution were insignificant, the NS group was slightly older than the SS and CS groups (Table 1).

Table 2 displays the mean/median BFI-10, BCI and DASS-21 scores for the different groups. Significant differences in personality scores were observed for conscientiousness (NS > SS) and agreeableness (NS, TS > CS; NS > SS).

Concerning coping styles, the SS and CS groups utilized significantly more dysfunctional coping when compared to the NS group. The SS and CS groups also had significantly higher levels of general distress, depression, anxiety and stress than the NS group. Additionally, significant differences in anxiety were also observed between the SS and CS groups (CS > SS).

Tables 3 and 4 reflect the results of correlation and logistic regression analyses. The correlation between SFAI and PHQ-15 scores, albeit significant, was weak ($r_s = .19$), as were the correlations between physical and psychological variables ($r_s = -.18$ to $.29$). Neuroticism and dysfunctional coping were moderately correlated to general distress and the three DASS subscales ($r_s = .44–.60$ and $.47–.52$ accordingly). Moderate to strong correlations were noted between problem and emotion-focused coping style scores ($r_s = .76$) as well as among the various DASS constituent scores ($r_s = .62–.95$). Notable variances in the outcomes of univariate analyses were observed for the TS, SS and CS groups. While TMDs were associated only with anxiety, somatization, as well as combined conditions, were related to several psychological variables (Table 4). Multivariate analyses indicated that the odds of TMDs were increased by anxiety (OR = 1.10; 95% CI = 1.01–1.21). However, the odds of somatization were increased by dysfunctional coping (OR = 1.55; 95% CI = 1.06–2.26) and anxiety (OR = 1.15; 95% CI = 1.06–1.25), and reduced by problem-focused coping (OR = 0.71; 95% CI = 0.56–0.89) and depression (OR = 0.91; 95% CI = 0.84–0.99). Additionally, the odds of combined TMDs-somatization were increased by anxiety (OR = 1.34; 95% CI = 0.19–1.52) but reduced by agreeableness (OR = 0.72; 95% CI = 0.57–0.91), problem-focused coping (OR = 0.55; 95% CI = 0.39–0.78) and depression (OR = 0.81; 95% CI = 0.71–0.92).

4 | DISCUSSION

This study is one of the first to explore personality traits, coping styles and distress concurrently in young adults with TMDs and somatization as separate and mutual entities. As young adults with somatization and combined conditions had significantly greater dysfunctional coping and distress scores, the first research hypothesis was partly supported. The second and third research hypotheses were also maintained given the moderately strong correlations between neuroticism/dysfunctional coping and distress scores and the effect of explicit psychological variables on the odds of TMDs and/or somatization. University students, as a young adult population, were selected because of their vulnerability to psychological distress, which can vary from normal mood fluctuations to serious mental disorders.[45] The study participants, like other Southeast Asian young adults, may have a greater propensity to communicate psychological distress as somatic symptoms, including TMDs, than their Western counterparts.[11,15,16]

4.1 | Physical conditions

The overall prevalence rates of TMDs and somatization were 19.1% (97 out of 507) and 46.2% (234 out of 507), which were consistent with the high rates reported in the general population.[3,46,47] Of the 97 participants with TMDs, 60.8% (59/97) experienced somatic symptoms. Conversely, among the 234 individuals with somatization, only 25.2% had TMD symptoms. Therefore, about three-fifths of young adults with TMDs have comorbid somatization, whereas only a quarter with somatization have TMDs. This explained the weak correlation between SFAI and PHQ-15 scores in this and other studies.[11] Given the high prevalence of somatization in TMD patients (up to 76.6%), much of the psychological distress accompanying TMDs could be facilitated by somatization.[9,10] The latter was reinforced by the 4–6 times higher depression/anxiety in persons with somatic symptoms than in the general population

TABLE 1 Demographic characteristics of the study sample.

		Age			Gender		
Variables	*n* (%)	Mean (SD)	Median (IQR)	*p*-value[a], Post hoc	Male, *n* (%)	Female, *n* (%)	*p*-value[b]
Total	507 (100)	22.2 (1.5)	22.0 (3)		73 (14.4)	434 (85.6)	-
No TMDs or somatization (NS)	235 (46.4)	22.4 (1.4)	22.0 (2)	**.006 NS > SS,CS**	42 (17.9)	193 (82.1)	.052
TMDs only (TS)	38 (7.5)	22.2 (1.4)	22.0 (1)		8 (21.1)	30 (78.9)	
Somatization only (SS)	175 (34.5)	22.0 (1.6)	22.0 (2)		18 (10.3)	157 (89.7)	
Combined TMDs-somatization (CS)	59 (11.6)	21.9 (1.6)	22.0 (2)		5 (8.5)	54 (91.5)	

Note: Bold indicates $p < .05$.

Abbreviations: IQR, interquartile range; SD, standard deviation.

[a]Results of Kruskal–Wallis tests.

[b]Results of chi-squared test.

TABLE 2 Mean/median psychological variable scores for the various groups.

Physical/psychological variables	No TMDs or somatization (NS)	TMDs only (TS)	Somatization only (SS)	Combined TMDs-somatization (CS)	*p*-value, Post hoc[a]
Personality					
Openness (OP)					
Mean (SD)	6.4 (1.5)	6.5 (1.6)	6.3 (1.4)	6.5 (1.3)	.764
Median (IQR)	6.0 (2)	6.0 (2)	6.0 (2)	6.0 (1)	
Conscientiousness (CP)					
Mean (SD)	6.8 (1.4)	6.4 (1.4)	6.4 (1.3)	6.5 (1.2)	**.038**
Median (IQR)	7.0 (2)	7.0 (2)	6.0 (1)	6.0 (1)	**NS > SS**
Extraversion (EP)					
Mean (SD)	6.9 (1.7)	7.3 (1.7)	6.8 (1.6)	6.6 (1.3)	.160
Median (IQR)	7.0 (2)	7.5 (3)	7.0 (2)	7.0 (2)	
Agreeableness (AP)					
Mean (SD)	7.2 (1.4)	7.2 (1.5)	6.7 (1.6)	6.5 (1.5)	**.013**
Median (IQR)	7.0 (2)	7.0 (1)	7.0 (2)	7.0 (1)	**NS,TS > CS; NS > SS**
Neuroticism (NP)					
Mean (SD)	6.5 (1.8)	6.6 (1.8)	6.9 (1.4)	7.0 (1.6)	.124
Median (IQR)	7.0 (3)	6.5 (3)	7.0 (2)	7.0 (2)	
Coping styles					
Problem-focused (PC)					
Mean (SD)	5.9 (1.1)	6.0 (1.3)	5.7 (1.1)	5.6 (1.1)	.097
Median (IQR)	6.0 (1.3)	6.0 (1.8)	6.0 (1.3)	5.7 (1.3)	
Emotion-focused (EC)					
Mean (SD)	5.7 (1.0)	5.7 (1.1)	5.5 (1.0)	5.6 (0.9)	.279
Median (IQR)	5.6 (1.0)	5.9 (1.4)	5.6 (1.2)	5.6 (1.2)	
Dysfunctional (DC)					
Mean (SD)	3.9 (0.7)	4.0 (0.8)	4.0 (0.7)	4.2 (0.8)	**.013**
Median (IQR)	3.8 (1.0)	3.8 (1.0)	4.0 (1)	4.2 (1.2)	**CS,SS > NS**
Psychological distress					
General (GD)					
Mean (SD)	12.6 (10.3)	15.2 (10.1)	16.0 (9.1)	18.4 (10.9)	**<.001**
Median (IQR)	9.0 (13)	13.0 (15)	15.0 (12)	16.0 (12)	**CS,SS > NS**
Depression (DD)					
Mean (SD)	3.0 (3.6)	3.5 (3.5)	3.6 (3.4)	3.9 (3.8)	**<.001**
Median (IQR)	2.0 (4)	3.0 (4)	2.0 (4)	3.0 (4)	**CS,SS > NS**
Anxiety (AD)					
Mean (SD)	3.9 (3.4)	5.2 (3.5)	5.2 (3.1)	6.5 (3.8)	**<.001**
Median (IQR)	3.0 (4)	4.0 (4)	5.0 (4)	6.0 (5)	**CS > SS > NS**
Stress (SD)					
Mean (SD)	5.7 (4.4)	6.4 (4.5)	7.1 (3.8)	8.0 (4.3)	**<.001**
Median (IQR)	5.0 (6)	5.0 (8)	7.0 (4)	8.0 (6)	**CS,SS > NS**

Note: Bold indicates $p < .05$.
Abbreviations: IQR, interquartile range; SD, standard deviation.
[a]Results of Mann–Whitney *U* tests.

as well as the variance in psychological characteristics between the TS and CS groups (TMDs without and with somatization) and stronger correlation between PHQ-15 and DASS than SFAI and DASS observed in this study.[48]

4.2 | Psychological factors

Both personality traits and dispositional coping had been linked to psychological distress. While they jointly accounted for 40%–50%

TABLE 3 Correlations between physical and psychological variables.

Variables	TM	SM	OP	CP	EP	AP	NP	PC	EC	DC	GD	DD	AD
TM	-	-	-	-	-	-	-	-	-	-	-	-	-
SM	0.19**	-	-	-	-	-	-	-	-	-	-	-	-
OP	0.06	0.04	-	-	-	-	-	-	-	-	-	-	-
CP	−0.11*	−0.12	−0.23**	-	-	-	-	-	-	-	-	-	-
EP	−0.02	−0.06	−0.16**	0.16**	-	-	-	-	-	-	-	-	-
AP	−0.05	−0.18**	0.01	−0.01	0.08	-	-	-	-			-	-
NP	0.07	0.13**	0.20**	0.19**	−0.27**	0.04	-	-	-	-	-	-	-
PC	−0.01	−0.12**	−0.05	0.14**	0.13**	0.05	−0.12**	-	-	-	-	-	-
EC	0.02	−0.08	−0.08	0.06	0.20**	0.11*	−0.16**	**0.76****	-	-	-	-	-
DC	0.08	0.18**	0.17**	0.20**	−0.06	−0.08	0.23**	0.33**	0.31**	-	-	-	-
GD	0.12*	0.28**	0.27**	0.25**	−0.28**	−0.03	**0.57****	−0.04	−0.05	**0.52****	-	-	-
DD	0.08	0.23**	0.26**	0.26**	−0.34**	−0.07	**0.44****	−0.12**	−0.10*	**0.47****	**0.84****	-	-
AD	0.16**	0.29**	0.22**	0.21**	−0.19**	−0.01	**0.49****	0.02	0.02	**0.45****	**0.89****	**0.62****	-
SD	0.10*	0.27**	0.24**	0.22**	−0.24**	−0.03	**0.60****	−0.01	−0.04	**0.48****	**0.95****	**0.71****	**0.79****

Note: Results of Spearman's correlation. *$p < .05$; **$p < .01$ and Bold indicates correlation coefficient >.4.

Abbreviations: SM, somatic symptom scores with the Patient Health Questionnaire-15 (PHQ-15); TM, TMD symptom scores with the Short-form Fonseca Anamnestic Index (SFAI); personality: AP, agreeableness; CP, conscientiousness; EP, extraversion; NP, neuroticism; OP, openness; coping: DC, dysfunctional; EC, emotion-focused; PC, problem-focused; distress: AD, anxiety; DD, depression; GD, general; SD, stress.

TABLE 4 Risk factors for the presence of TMDs, somatization and combined conditions.

Variables	Univariate		Multivariate	
	Odds ratio (95% CI)	*p*-value[a]	Odds ratio (95% CI)	*p*-value[b]
TMDs only				
Gender				
Male	Reference			
Female	0.82 (0.35–1.91)	.639		
Personality				
Openness	1.07 (0.85–1.35)	.567		
Conscientiousness	0.83 (0.65–1.06)	.128		
Extraversion	1.16 (094–1.43)	.161		
Agreeablenes	1.08 (0.84–1.38)	.539		
Neuroticism	1.02 (0084–1.24)	.819		
Coping				
Problem-focused	1.07 (0.78–1.46)	.696		
Emotion-focused	1.10 (0.78–1.56)	.592		
Dysfunctional	1.28 (0.82–2.01)	.274		
Psychological distress				
Depression	1.04 (095–1.14)	.380		
Anxiety	**1.10 (1.01–1.21)**	**.032**	**1.10 (1.01–1.21)**	**.032**
Stress	1.04 (0.96–1.12)	.343		
Somatization only				
Gender				
Male	Reference			
Female	**1.90 (1.05–3.43)**	**.034**		
Personality				
Openness	0.95 (0.83–1.09)	.470		
Conscientiousness	**0.82 (0.71–0.95)**	**.009**		
Extraversion	0.97 (0.86–1.09)	.619		
Agreeableness	**0.85 (0.75–0.98)**	**.020**		
Neuroticism	**1.14 (1.01–1.29)**	**.029**		
Coping				
Problem-focused	**0.83 (0.69–0.99)**	**.048**	**0.71 (0.56–0.89)**	**.003**
Emotion-focused	0.87 (0.71–1.06)	.164		
Dysfunctional	1.38 (1.05–1.81)	**.022**	**1.55 (1.06–2.26)**	**.023**
Psychological distress				
Depression	**1.06 (0.99–1.12)**	**.055**	**0.91 (0.84–0.99)**	**.038**
Anxiety	**1.12 (1.06–1.19)**	**<.001**	**1.15 (1.06–1.25)**	**.001**
Stress	**1.09 (1.04–1.14)**	**.001**		
Combined TMDs somatization				
Gender				
Male	Reference			
Female	2.35 (0.89–6.23)	.086		
Personality				
Openness	1.06 (0.87–1.29)	.589		
Conscientiousness	0.84 (0.68–1.03)	.091		
Extraversion	0.89 (0.74–1.07)	.216		

TABLE 4 (Continued)

Variables	Univariate Odds ratio (95% CI)	Univariate *p*-value[a]	Multivariate Odds ratio (95% CI)	Multivariate *p*-value[b]
Agreeableness	**0.78 (0.63–0.95)**	**.014**	**0.72 (0.57–0.91)**	**.005**
Neuroticism	1.17 (0.99–1.39)	.061		
Coping				
Problem-focused	0.79 (0.60–1.03)	.080	**0.55 (0.39–0.78)**	**.032**
Emotion-focused	0.90 (0.67–1.21)	.484		
Dysfunctional	**1.68 (1.15–2.45)**	**.007**		
Psychological distress				
Depression	1.07 (0.99–1.15)	.078	**0.81 (0.71–0.92)**	**.001**
Anxiety	**1.20 (1.11–1.29)**	**<.001**	**1.34 (0.19–1.52)**	**<.001**
Stress	**1.11 (1.05–1.19)**	**.001**		

Note: Bold indicates $p < .05$.

[a]Results of univariate logistic regression analyses.

[b]Results of multivariate logistic regression analyses.

of the variance in psychopathology, coping was found to mediate the relationship between personality and distress.[18,49] This clarified the moderately strong correlations of neuroticism and dysfunctional coping to general distress, depression, anxiety and stress. The bifactor structure of the DASS-21 was validated by the strong correlations between general distress and the three subscales.[43] Participants with TMDs had dissimilar psychological profiles when compared to those with somatization. While differences in psychological characteristics were insignificant between the TS and NS (reference) groups, the SS group presented significantly lower conscientiousness and agreeableness, and greater dysfunctional coping, general distress, depression, anxiety and stress than the NS group. The CS group exhibited substantially lower agreeableness than both TS and NS groups, and greater dysfunctional coping and psychological distress than the NS group. Consequently, participants having somatization without and with TMDs were reckoned to possess comparable psychological characteristics.

Findings regarding young adults with TMDs were in contrast to prior studies specifying that TMDs were associated with neurotic personalities, more frequent use of dysfunctional coping strategies and higher levels of psychological distress.[9–11,21,22–25] Besides variations in race, participant selection, diagnostic criteria and psychological measures, disparities could be attributed to the exclusion of somatization as a plausible factor for distress. In this study, a conscious effort was made to distinguish participants with TMDs, somatization and combined conditions to scrutinize the bearing of somatization on psychological characteristics. Like TMDs, studies that simultaneously examined all three psychological variables in persons with somatization are scant. Nevertheless, somatization had been related to neuroticism, agreeableness, dysfunctional coping, depression, anxiety and stress.[50,51] Except for neuroticism, findings corroborated those of earlier studies and were ascribed to cognitive-affective amplification of somatosensory responses. This may develop through stress-mediated neuroplasticity as well as inflammatory neuromodulation and is subjected to genetic and environmental factors.[50,52] Neuroticism was not related to somatization in this study. This phenomenon could be qualified by the exclusion of young adults with debilitating psychological disorders, such as bipolar disorder, post-traumatic stress disorder and schizophrenia, and the generally normal depression (0–4 points), mild-to-moderate anxiety (4–7 points) and normal-to-mild stress (0–9 points) observed among the participants.

4.3 | Risk factors for TMDs and/or somatization

After adjusting for confounding effects in the multivariate model, anxiety increased the odds of TMDs, somatization and combined conditions by 10%, 15% and 34%, while depression reduced the odds of somatization and combined conditions by 9% and 19% correspondingly. Anxiety was thus the main emotional risk factor for TMDs and somatization in community-based young adults. Findings were consistent with those of other community-based studies demonstrating a stronger association between anxiety and TMD/somatic symptoms than depression and stress.[50,53,54] The apparent 'protective effect' of depression was an aberrant outcome that can be credited to the largely normal level of depression in the study sample as specified by the DASS severity classification.[33] Depression is usually more severe in patient populations and is anticipated to have interactive effects with anxiety.[9,10,48,55]

While dysfunctional coping increased the odds of somatization by 55%, problem-focused coping reduced the odds of somatization and combined conditions by 29% and 45%, respectively. The relation to dysfunctional coping, which is associated with low self-esteem, low optimism and greater distress, was not surprising as somatization might be a maladaptive coping technique where somatic complaints are utilized to communicate psychological

distress.[16,56,57] Moreover, poor verbal ability/skills were reported to play a role in the development of multiple functional somatic symptoms because of the augmented use of dysfunctional coping strategies.[57] Problem-focused coping reduced the risk of somatization without and with TMDs substantially. Therefore, the management of TMDs and somatization should incorporate the training and practice of problem-focused coping strategies for alleviating accompanying psychosocial stressors, pain and functional disability. Problem-focused coping strategies may be more effective in agreeable (the tendency to be cooperative, compliant and kind) and conscientious (the tendency to be goal-oriented, self-disciplined and reliable) patients given the influence of these traits on the interactions with healthcare providers.[58] Agreeableness also reduced the odds of combined conditions by 28%. It has been linked to effortful control and high levels of agreeableness have been shown to decouple the relation between neuroticism and somatic symptoms.[59]

4.4 | Study limitations

This analytical observational study had some limitations. First, the temporal and causal relationships between physical conditions and psychological distress cannot be determined with the cross-sectional design employed. While personality traits and coping styles remain fairly constant, TMD, somatic, depressive, anxiety and stress symptoms could fluctuate over the assessment period. Second, the study sample, which comprised mainly of women, involved only students from a private University and is not representative of all young adults in the country. The predominance of female responders is partly due to the greater inclination for women to participate in research surveys than men and might result in possible gender bias.[60] Future research could incorporate a longitudinal design, working young adults and more male participants. The study should also be replicated in other racial/ethnic groups as well as TMD patient populations. Third, participants with TMD pain and/or dysfunction were not differentiated. Though this could yield greater insights into the psychological aspects of pain, it involves numerous test groups and requires considerably more participants for accurate comparisons. Lastly, the physical and psychological measures were self-reported and disposed to various sources of information partialities including recall, social desirability, confirmation and other biases.[61]

5 | CONCLUSION

The prevalence of TMDs, somatization and combined TMDs-somatization in the study sample was 7.5%, 34.5% and 11.6%, respectively. Young adults with TMDs were found to have dissimilar psychological profiles to their peers with somatization and combined conditions. Those with somatization, without and with TMDs, presented significantly lower agreeableness, greater dysfunctional coping, general distress, depression, anxiety and stress. As almost three-fifths of young adults with TMDs had comorbid somatization, whereas only a quarter with somatization had TMDs, much of the purported psychological distress accompanying TMDs could be facilitated by somatization. Multivariate analyses indicated that anxiety was the main emotional risk factor for TMDs and somatization in community-based young adults. While dysfunctional coping increased the likelihood of somatization, problem-focused coping reduced the risk of somatization without and with TMDs. The management of TMDs and somatization should thus incorporate the training and practice of problem-focused coping strategies for alleviating associated psychosocial stressors, pain and functional disability. Findings added to understanding of the multifaceted interaction between personality, coping and distress in young adults with TMDs and/or somatization and underscored the importance of psychological screening as part of comprehensive patient care.

AUTHOR CONTRIBUTIONS

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

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

PEER REVIEW

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Adrian Ujin Yap https://orcid.org/0000-0003-0361-6209
Ni Luh Dewi https://orcid.org/0000-0002-6265-0805
Carolina Marpaung https://orcid.org/0000-0002-9621-6257

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