



The Role of Manual Therapy for Osteopaths in the Management of Temporomandibular Disorders - A Qualitative Study

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Abstract

Title: The Role of Manual Therapy for Osteopaths in the Management of Temporomandibular disorders – A Qualitative Study

Introduction: Temporomandibular disorders are common and can affect people's health-related quality of life in many ways. Often, managing the condition can be complex and many strategies are utilised to provide positive outcomes for patients. This qualitative study aims to explore the role of osteopathic manual therapy in the management of this condition.

Methods: Osteopathic clinics and practitioners in New Zealand that advertise the management of temporomandibular disorders were targeted for recruitment to the study. Participants that met the inclusion criteria participated in semi structured interviews, where their opinions, experiences and beliefs on the topic were explored, transcribed and analysed.

Findings: Of the 54 clinics and practitioners contacted, 6 met the inclusion criteria and participated in the study. The rich data provided by the participants led to the development of three overarching themes; Osteopathic Role, Management and Collaboration which explicate where and why osteopathic manual therapy may be indicated as effective for the management of temporomandibular disorders.

Conclusion: Osteopaths can and do play a role in the management of temporomandibular disorders. This study highlights areas where further research should be conducted in order to understand where the role of osteopathic manual therapy can be most effective in the management paradigm.

Keywords: Manual Therapy, Osteopathic Manual Therapy or OMT, Temporomandibular Disorder or TMD, Management, Multidisciplinary (Collaboration

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Introduction

Many people experience jaw pain, headaches and dental issues which are often the result of an issue with the joint between the jaw and the skull called the temporomandibular joint (TMJ). The joint is musculoskeletal, though many different health disciplines can and do manage patients whose joint has become dysfunctional. This study focuses on a particular form of treatment used by osteopaths called osteopathic manual therapy (OMT), and aims to elucidate where and why it is useful for the management of patients with dysfunction in the joint. An extensive literature review makes up the first section of this study, drawing out definitions, causal factors, contentions and gaps in the current literature as well as building a rationale behind the intent of the project. The second section delineates between the methodological approaches of qualitative research, provides a justification for why a qualitative methodology has been chosen for this study, and outlines the method used for answering the research question. Rich data was drawn from the interviews of six participants, analysed and then organized into overarching themes and sub-themes which is found in the successive findings section. Lastly, in the discussion section, the findings of the study will be explored, considering OMT and its role for management of disorders in the TMJ, current healthcare paradigms and their comparison to current research and proposing areas that could be studied to further comprehension of the topic in the literature.

Literature Review

Temporomandibular disorders

The term temporomandibular disorder (TMD) envelopes all dysfunctions of the TMJs and is a subcategory of musculoskeletal disorders. The TMJ, of which there are two in each human, forms the relationship between the jaw and the skull on both sides of the face (Craig Connor, 2017; Murphy et al., 2013). This joint is responsible for movement of the jaw, chewing, breathing, talking and other common functions (Alomar et al., 2007). The structure and function of the muscles and bones that make up the TMJ facilitate the joint's unique purpose (Alomar et al., 2007; Chisnoiu et al., 2015; List & Jensen, 2017; Scrivani et al., 2008; Sharma et al., 2011). When one TMJ is dysfunctional, it can affect the other and patients can have severe pain, headache, obstruction of mouth opening (lockjaw), pain while chewing or speaking and loud functional joint noises such as 'popping' or 'clicking' (Chisnoiu et al., 2015; List & Jensen, 2017; Scrivani et al., 2008; Sharma et al., 2011). Dysfunctions of the TMJ are common with as many as 12% of the NZ population experiencing one at some point in their life (Fan et al., 2019). Females are more likely to develop a TMD than males with a ratio of 5:1, and a typical patient will present with TMD between the second and fourth decade of life (Fan et al., 2019; Gondim et al., n.d.; Liu & Steinkeler, 2013; Murphy et al., 2013). Because dysfunction in the joint often leads to long term pain, chronic TMD symptoms are usually the primary reason for patients to seek care from a health professional (List & Jensen, 2017). These symptoms affect a patient physically, socially, and psychologically and have been shown to significantly decrease their oral health related quality of life (Pigozzi et al., 2021).

There is not one clear pathway for a patient with TMD, as there are a multitude of etiological factors that can lead to its development, prognosis and management

(Chisnoiu et al., 2015a, 2015b, 2015c; Greene, 2001; List & Jensen, 2017; Liu & Steinkeler, 2013; Murphy et al., 2013a, 2013b; Sharma et al., 2011). Because of this, a diversity of healthcare approaches to the study, treatment and management of TMD are seen in the literature base with varying amounts of contribution, evidence level, and research methodology.

Osteopathic Research

The osteopathic research literature base is an example of a health field that is expanding the knowledge of TMD, especially regarding its management, and this has provided some new insights. It is likely that the complexity and prevalence of TMD has been a driving force behind the research that has been carried out, particularly over the last two decades, with regards to the anatomy, physiology, aetiology, epidemiology, and management of a dysfunctional joint. The disorder's multifactorial characteristics have drawn many health fields to the pursuit of expanding knowledge on the topic as it pertains to their particular professional scope, which does not always lend itself to consensus, but does provide a researcher with many lenses through which they can view the disorder. Orthognathic surgeons and dental fields have been large contributors to this research paradigm, with many other health fields often represented with articles of lower evidence quality and new, novel approaches to this complex issue. Though there is some evidence of benefits for TMD patients, the osteopathic literature is still comparatively minor in its contribution and is an area where more research needs to be carried out. The articles that are available with regards to osteopathy and TMD can be low in evidence quality, unspecific with regards to technique and approaches and the conclusions of interventional studies are often obscured by the nature of the individual practitioner's experience and skill level. The aim of the literature review was to collate, organise and outline the current literature with regard to osteopathy and TMD. Due to

the lack of Osteopathic research regarding TMD management, search terms needed to be broadened to ensure sufficient literature was reviewed.

Literature reviewed

The databases that were utilised for the acquisition of research papers for this project were ‘Google Scholar’, ‘Pubmed’, ‘NzResearch’ and ‘ScienceDirect/SCOPUS’ as these were the most appropriate and accessible.

The most prevalent terminology in the literature referred to either “*manual therapy*” or “*physical therapy*” which encompass the techniques or practices that are employed between comparable healthcare professions. These terms refer to manual or physical therapists as a collective which can often include osteopathic intervention, or similar interventions like physiotherapy or chiropractic. This allowed the author to glean information from a broader range of research evidence, but the lack of distinction between healthcare professionals further highlighted the need for more clarity in the research.

To be exhaustive in the literature search, keywords and MeSH terms were used both individually and in varying combinations. The keywords and MeSH terms used were:

- *Physical Therapy*
- *Manual Therapy*
- *Osteopathic Manual Therapy or OMT*
- *Temporomandibular Joint or TMJ*
- *Temporomandibular Disorder or TMD*
- *Temporomandibular dysfunction*

- *Management*
- *Intervention*
- *Occlusion or Malocclusion*
- *Multidisciplinary (Collaboration)*
- *Bruxism*
- *Surgery (Surgical intervention)*

Articles found

The literature search identified approximately 6,000 titles which were screened by the author for relevance to the topic. Limiters of English, full text articles and the exclusion of grey literature were then employed which left 418 articles. Duplicates and articles deemed inappropriate were removed and a list of approximately 86 articles were considered of interest, and contained high levels of relevancy to this paper and thus, underwent review.

Introduction to Temporomandibular Disorders

The TMJs are two synergistic bilateral joints that connect and facilitate movement between the jaw (mandible) and the skull. The joints are located in the temporal regions of the skull and it is this relationship with the mandible which earns the joint its name - “Temporo”, “mandibular” (Alomar et al., 2007, Craig Connor, 2017). The main components of the TMJ are (Figure 1): the mandibular condyles (head of mandible), the articular disc, the articular surfaces of the temporal bone (skull), the joint capsule, the ligaments surrounding the joint and the muscles that act on the joint (Alomar et al.,

2007; Chisnoiu et al., 2015; List & Jensen, 2017; Scrivani et al., 2008; Sharma et al., 2011).

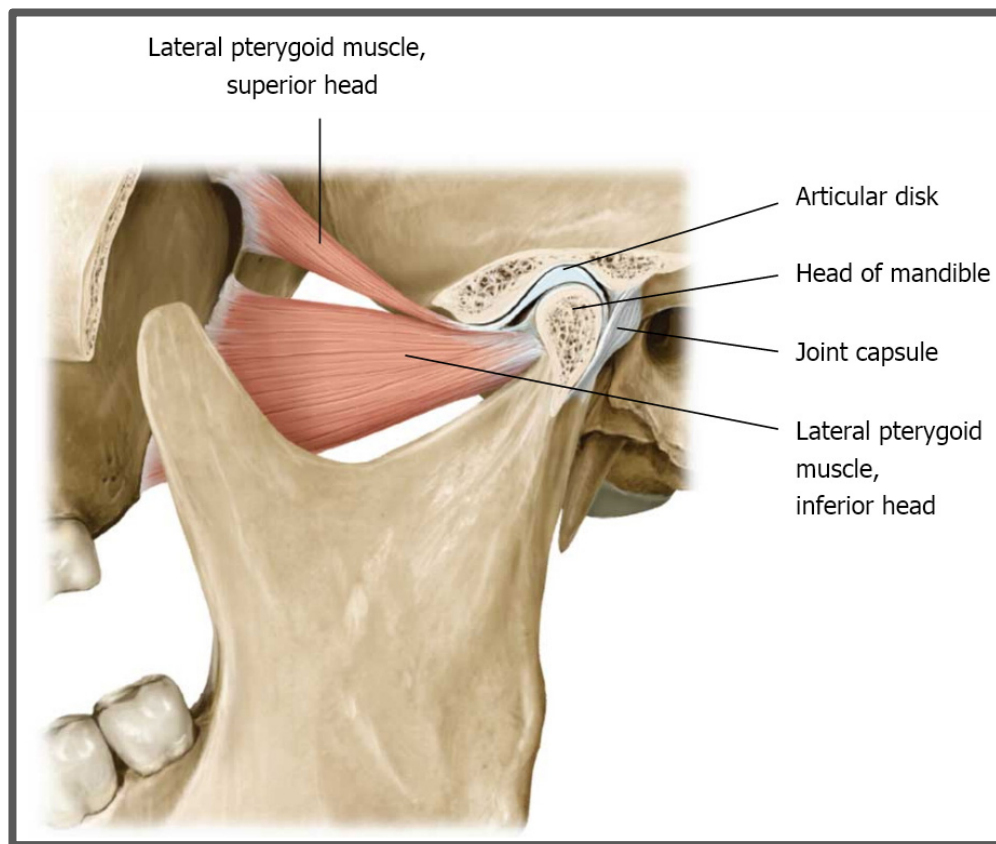


Figure 1: The Anatomy of the TMJ (Connor, 2017)

The TMJ has been suggested to be among the most commonly used joints in the body as it is responsible for facilitating speech, mastication (chewing), heavy breathing and some research establishes a relationship between the TMJ and spinal posture (Alomar et al., 2007; Baião Da Neiva et al., 2012; Chisnoiu et al., 2015; Scrivani et al., 2008; Walczyńska-Dragon et al., 2014).

The TMJ works synergistically with its opposite counterpart, and thus the structure and functioning of one joint will affect the other. When a TMJ is dysfunctional it can lead to symptoms of discomfort, mild to severe joint pain, headache, earache, popping or clicking joint noises, difficulty chewing and an inability to fully open the mouth (Chisnoiu et al., 2015; Fan et al., 2019; Gondim et al., n.d.; List & Jensen, 2017; Liu &

Steinkeler, 2013; Murphy et al., 2013; Pigozzi et al., 2021; Scrivani et al., 2008; Sharma et al., 2011).

Research is not conclusive as to the direct cause of TMD, but there are many factors that can play a role in its development (Fan et al., 2019; Gondim et al., n.d; Murphy et al., 2013). These factors are categorised into predisposing, initiating or perpetuating to further define their role in the development of TMD (Fan et al., 2019; Gondim et al., n.d; Murphy et al., 2013). Stress and other psychosocial factors can be predisposing for TMD and are related to bruxism syndromes (grinding of the teeth) which are often seen in conjunction with muscle overuse or joint malfunction associated with TMD.

Evidence showing a link between occlusion of the teeth, whether that be from overbite, underbite or other irregular occlusal patterns is debated, however is often considered clinically as a predisposing factor for TMD (Manfredini et al., 2017; Mohlin et al., 2007; Turp & Schindler, 2012; Van 't Spijker et al., 2007). This idea is contended, as due to the complex nature of TMJ dysfunction, it is difficult to determine whether altered occlusion causes TMD or vice versa (List & Jensen, 2017). Direct physical trauma is also a factor in the development of TMD as it can alter the structure and functioning of the joint. Indirect physical traumas such as flexion-extension injuries of the neck, such as you would see in whiplash, have also been implicated as detrimental to TMJ function (Armijo-Olivo et al., 2006; Baião Da Neiva et al., 2012; Garstka et al., 2022; Rocha et al., 2013; Walczyńska-Dragon et al., 2014). The contention surrounding the progression or development of TMD originates, at least in large part, from the variety of factors that can influence prognosis and this can make management complex (List & Jensen, 2017; Gil-Martínez et al., 2018a; List & Axelsson, 2010a, 2010b; McNeill, 1996; Murphy et al., 2013c; Wieckiewicz et al., 2015).

The Causal Factors for TMD

Though the factors that contribute to the development of TMD can occur individually, more commonly we see a multiplicity and overlap between these factors which is important to consider when debating optimal management strategies for TMD patients. Though the line between these factors can blur, there are causative elements that recur more often in the literature and are apparent as substantial contributors to the morbidity rates of TMD (Chisnoiu et al., 2015c, 2015a; Greene, 2001; Shetty et al., 2010). This section will explore the more prominent factors and explicate where some of these factors might contrast, interact or coalesce.

Bruxism

In the literature, bruxism and TMD are often considered together in a ‘two sides of the same coin’ type paradigm, and though they do often occur together, it is important to differentiate between their respective definitions. Bruxism can be described as an involuntary, dysfunctional clenching or grinding of the teeth (Bussadori et al., 2020; Commisso et al., 2014; Jiménez-Silva et al., 2017; Kalamir et al., 2007b; Shetty et al., 2010). This can be spasmodic or rhythmic, and is noted as differing from usual mandibular mechanics like chewing (Dorland, 2003). Though there is debate in the literature over the specific arthrokinematics which constitute the definition of actual bruxism, we can loosely define it as a collection of oral parafunctional habits, including grinding and clenching, that become excessive. Though these habitual movement patterns do affect functioning, bruxism is not to be confused with physiological and/or anatomical dysfunction of the TMJ itself.

Bruxism can be asymptomatic, occur at any age, and for some patients, be relatively difficult to establish a primary cause for, though this is antithetical to the experience of

many patients. Because bruxism is an involuntary condition, it can occur either while awake or as parasomnia (while asleep), independent of conscious movement (Fan et al., 2019; Jiménez-Silva et al., 2017; Macedo et al., 2007; Ohayon et al., 2001; Yadav et al., 2020). This means that there is also further distinction to be made between wake bruxism and sleep bruxism when considering how predominant the risk factors are for each. For example, sleep disorders like snoring, breath pauses, and obstructive sleep apnoea are risk factors for both wake bruxism and sleep bruxism but are unsurprisingly far more predominant for sleep bruxism patients (Fan et al., 2019; Jiménez-Silva et al., 2017; Macedo et al., 2007; Ohayon et al., 2001). Similarly, anxiety and mood disorders have been implicated as major influences in bruxism development (both wake and sleep bruxism), having more apparent relation to wake bruxism amongst the literature (Bussadori et al., 2020; Fillingim et al., 2011; Jiménez-Silva et al., 2017; Kalamir et al., 2007b; Manfredini et al., 2013; Ohayon et al., 2001; Pakkala & Kellokoski, 2007; Przystańska et al., 2019; Rollman & Gillespie, 2000; Yadav et al., 2020). The daily use of tobacco, alcohol and caffeine have also been associated with the development of general bruxism conditions (Ohayon et al., 2001).

The relationship between bruxism and TMD is not difficult to perceive, and it has been postulated that these oral parafunctional habits can cause overwork of muscles that act on the TMJ, put high shear stress forces through the articular disc, or grind away surfaces of the teeth which lead to long term malpositioning of the joint itself (Commisso et al., 2014). Ultimately, the research suggests that these could all be subfactors for symptom generation in the TMJ, but the diagnostic criteria for both bruxism conditions and TMDs are complex. Another intersection between TMD and bruxism is the presence of anxiety or mood disorders that often appear alongside either/both.

In 2019, a study measured and analysed patient-reported psychosocial factors as predictors for bruxism conditions and concluded that “factors such as state anxiety and trait anxiety, alexithymia, and perceived stress are as important as somatic causes in the occurrence and maintenance of bruxism.” (Przysańska et al., 2019). Psychosocial factors including stress, anxiety and depression, catastrophization and hypervigilance are also major considerations in the etiology of all TMD, especially for chronic disorders (Chisnoiu et al., 2015c; Fillingim et al., 2011; Rollman & Gillespie, 2000; Yadav et al., 2020). Some cite a relationship between the higher anxiety/depression scores in females and higher degrees of the prevalence of TMD in female populations as a hypothesis for this epidemiological pattern (Chisnoiu et al., 2015c; Fillingim et al., 2011; Rollman & Gillespie, 2000; Yadav et al., 2020). Bruxism, TMD and anxiety/mood disorders can interact with each other physiologically, anatomically, psychologically, behaviourally and be affected by a patient's immediate environment which complicates diagnosis and further impacts the management of the condition. A 2014 literature review summed up this concept by noting the one certainty with regard to bruxism; that the responsibility of its causation cannot be laid on one factor alone, and thus there is no evidence that a single treatment approach could be effective for its resolution, or even in some cases, in its reduction (Shetty et al., 2010). It is for this reason that much of the literature suggests a biopsychosocial approach as the best approach for a patient that falls into this paradigm (Chisnoiu et al., 2015c; Fillingim et al., 2011; Rollman & Gillespie, 2000; Yadav et al., 2020).

Muscle-related temporomandibular disorders

The masticatory muscles, which include the masseter, temporalis, medial and lateral pterygoids and other accessory muscles like the buccinator and suprahyoid are of both structural and functional significance in the TMJ, and by definition, are constitutional to

the makeup of the joint itself. Muscle-related issues of the masticatory muscles make up a large subgroup of TMD, as the muscles in the area are nociceptive and can thus, be a source of pain generation in the area, often referred to in the literature as myofascial pain (Ariji et al., 2004; Castroflorio et al., 2012; Dinsdale et al., 2021; Ferrillo et al., 2022; Mapelli et al., 2016; Stohler DDS et al., 1999; Tartaglia et al., 2008). Myofascial pain with referral past the borders of regional TMJ anatomy, such as the eye, ear or teeth is referred to as 'myalgia'. Some studies report that myofascial pain and myalgia are the most commonly diagnosed form of TMD, contributing anywhere up to 80% of TMD diagnoses (Dinsdale et al., 2021). It is also instrumental that masticatory muscles both coordinate and cooperate for healthy kinematics, functions like chewing and speaking, and for internal arrangement of the TMJ (Ferrillo et al., 2022). Patients with TMD are often found to have a reduction in both cooperation and coordination when analysed according to an electromyographic functional index, and this reduction is proportional to the severity of symptomatology in a patient (Castroflorio et al., 2012). Simply put, the poorer the functioning of masticatory muscles, the worse the symptoms of TMD, or vice versa.

Posture

There are many links made between postural disorders and TMD in the literature, often referring to 'biokinematic chains' of the musculoskeletal anatomy (Garstka et al., 2022). For example, an abnormal posturing of the neck or back, could alter the positioning of the anatomy of the TMJ, or induce muscular disorders around the TMJ and ultimately contribute to TMD. After all, the structure and functioning of the musculoskeletal system as a whole is inversely proportional. Though this is logically coherent as a theory for TMD contribution or aetiological influence, postural correlation with TMD is still an area of contention in the literature. Studies have reported however, that altered

head positioning has correlation with mandibular positioning, higher regional muscle activity and the internal arrangement of the TMJ, and even indicated that postural improvement is closely related to a decrease in TMD symptomatology (Armijo-Olivo et al., 2005; Garstka et al., 2022). The source of contention about this issue lies not in the reasoning behind the effects that posture could have on the TMJ, but rather in the quality of evidence presented in the literature. Large scale systematic reviews come to the conclusion that though correlation between posture and TMD is found, the lack of high-quality evidence impedes the ability to accept or deny this association (Armijo-Olivo et al., 2006; Rocha et al., 2013; Walczyńska-Dragon et al., 2014). Furthermore, findings from interventional studies show variance in results, largely dependent on the individual nature of postural disorders which further obscures validity in the evidence. Despite this, much of the literature refers to this relationship, and it could be that the complex and individual characteristics of both postural defect and TMD, has hindered the generation of high-quality methodological studies in this area.

Occlusion

The term ‘occlusion’ is used to describe the position of the teeth when the jaw is closed, this can be more colloquially referred to as one's ‘bite’. In much of the early literature, issues with occlusion of the teeth were suggested as a causative factor for TMD, and many orthodontic approaches to TMD management were based on this hypothesis (Bussadori et al., 2020; Manfredini et al., 2017; Turp & Schindler, 2012; Van ’t Spijker et al., 2007). Alterations to occlusion such as cross-bite, overbite, malocclusion, occlusal interferences, overcrowding and missing teeth have all been identified in studies as triggering factors for TMD (Mohlin et al., 2007). These theories were based on the presumption that alterations to occlusion would impact the functioning of TMJ, leading to the overwork of muscles that act on it, high shear stress forces through the

articular disc, and long term malpositioning of the joint itself. For years, TMD symptoms have been treated with occlusal, orthodontic and orthognathic appliances in order to align the teeth and consequently align the TMJ, which has shown signs of success for reduction in some of the symptoms associated with TMD (Mohlin et al., 2007). This conceptual framework is contested in the literature, as many systematic reviews elucidate a weak association between occlusal patterns and TMD, with some discounting the relationship and its relevance for management practices entirely (Manfredini et al., 2017; Mohlin et al., 2007). The cause-effect type interplay is not in concordance with modern knowledge on TMD, as the multifactorial nature of its pathophysiology becomes more established amongst research (Mohlin et al., 2007). One systematic review found evidence to suggest that the inverse might be closer to truth, that is, that alterations to occlusion may be a result of TMD rather than its cause. (Manfredini et al., 2017). Regardless of whether there is association between them or not, the rhetoric around occlusion and its impact on TMD is phasing out in the literature as a more comprehensive picture of causation is developed, and more effective strategies for management are employed. Similar rhetoric surrounded the use of occlusal splints for sleep bruxism, claiming huge reductions in symptom and behaviour patterns. This too, is becoming outdated in science as we learn to account for the blurring of evidence for the efficacy of occlusal appliances, for patients with TMD and/or bruxism (Bussadori et al., 2020; Hardy & Bonsor, 2021; Macedo et al., 2007; Turp and Schindler, 2012).

Acute Trauma and Disc Displacement

The TMJ, like any other structure in the human body, is susceptible to damage from direct injury. When the bones and soft tissues that make up the joint, as well as surrounding and accessory tissues incur trauma, functioning of the joint itself can be

interrupted and this can result in sequelae specific to the patient's injury (He et al., 2016; Iodice et al., 2013; Manfredini & Guarda-Nardini, 2008b). Some traumas are seen more commonly in the research however, namely, condylar fractures and displacement of the articular disc (Guo et al., 2021b). The predominant factor for condylar fractures in the etiology of disc displacement is facial trauma (often to the chin area). Research suggests that the contributing factors to the disc's positioning in the TMJ are many, such as soft-tissue, posture and orthognathic influences (He et al., 2016; Iodice et al., 2013; Manfredini & Guarda-Nardini, 2008). The articular disc itself has no neurovascular innervation and consequently is not a pain generating tissue. Symptomatically, issues arise when the disc is mispositioned, most commonly anteriorly, which can cause excessive loading onto other tissues as they compensate, leading to dysfunction and disorder (Guo et al., 2021a, 2021b; He et al., 2016; Iodice et al., 2013; Manfredini & Guarda-Nardini, 2008). The most identifiable clinical signs and symptoms for disc displacement are decreased maximal mouth opening, joint noises and visible dyskinesia in one or both of the TMJs. A study from 2021 found that over 80% of patients with symptomatic TMD had articular discs that were mispositioned in the joint (Guo et al., 2021b). Though there is variance in etiological processes between disc related TMDs, they are often categorized into a subgroup of TMD in the literature (Guo et al., 2021b; He et al., 2016; Iodice et al., 2013; Manfredini & Guarda-Nardini, 2008a).

Diagnostic Criteria

Diagnosis of TMD in a patient can become complex, especially when it is vital for underpinning optimal management for a specific patients presentation, largely due to the multifactorial nature of the disorder's aetiology (Ahmad et al., 2009; Dubner et al., 2016; Look et al., 2010; Manfredini & Guarda-Nardini, 2008; Schiffman et al., 2014; Schiffman & Ohrbach, 2016). The Research Diagnostic Criteria for

Temporomandibular Disorders (RDC/TMD) is the most widely accepted diagnostic protocol for TMD patients, gaining international renown and general acceptance for use in both clinical and research settings (Dubner et al., 2016; Look et al., 2010; Schiffman et al., 2014; Schiffman & Ohrbach, 2016). This assessment protocol was first designed in 1992, has improved in diagnostic validity since, and is made up of a dual system coined Axis I and Axis II, respectively (Look et al., 2010). Axis I provides an assessment tool for the diagnosis of physical aspects of TMD, the 12 most common diagnoses being four different disc displacements, subluxation, arthralgia, degenerative joint disease, myofascial pain, myofascial pain with referral, myalgia and myalgia with referral, though more types that are less common are also listed (Schiffman, Ohrbach, Truelove, Look, Anderson, Goulet, Svensson, et al., 2014) Axis II is centred around a questionnaire, investigating the psychosocial status and pain-related disability associated with TMD in a patient, and affecting the rationale behind their subsequent management (Look et al., 2010). The RDC/TMD provides the most organised, valid and simplistic answer for researchers and clinicians, by collating the complexities of TMD presentations, and categorising them for practical application.

Osteopathic philosophy

In 1874 Dr Andrew Still founded the osteopathic profession. Still had previously trained as a medical physician before developing an approach to health that, at the time, was unorthodox (Paulus, 2013). The term osteopath (osteo- related to bone and -path meaning pathology or disease) encompassed his philosophical approach to health, emphasising the role of the musculoskeletal system in healthy functioning of the human body. The osteopathic profession has grown on the global scale, and with the integration of new science, is recognised in many countries as an evidence-based approach to clinical practice (Paulus, 2013). Core tenets have been drawn from Still's original works

and have been modernised to amalgamate his philosophical approach with the best medical data available. Today there are four core tenets:

1. *The human being is a dynamic unit of function* - This tenet pertains to treating the body 'holistically', an approach that considers the effect of disease in a part of the body as an influence on all other bodily systems either anatomically or physiologically (Paulus, 2013).
2. *The body possesses self-regulatory mechanisms that are self-healing in nature* - This tenet has been corroborated by physiological research in many areas of musculoskeletal disease, though not wholly. The philosophical approach recognises the body's innate ability to heal and considers the osteopathic role as one to remove obstructions that cause disease, allowing the body to return to a state which promotes physiological healing. Thus, Osteopaths recognise themselves as facilitators of health rather than 'curers' of disease (Paulus, 2013).
3. *Structure and function are reciprocally interrelated* - This tenet acknowledges the relationship that structure (anatomy) has on function (physiology) and contrariwise. This is a core ideal of the osteopathic approach in that practitioners can affect patients positively by intervening anatomically or physiologically to encourage equilibrium and ultimately health in the human body (Paulus, 2013).
4. *Rational treatment is based upon an understanding of these principles* - This tenet explicitly guides practitioners to make clinical decisions based on the philosophical approach of the tenets above (Paulus, 2013).

The Management of TMD

TMD can present clinically in a range of differing severities or syndromes depending on the factors that have led to its development and the stage to which the dysfunction has

progressed. This in turn means that there can be a variety of approaches to the management of TMD as it pertains to a specific patient (Gil-Martínez et al., 2018, 2018a; List & Axelsson, 2010, 2010; Mcneill, 1996; Murphy et al., 2013; Wieckiewicz et al., 2015). Despite this, research emphasises conservative therapies as the first port of call for a patient with TMD as they are low risk, reversible and have an expanding evidence base to support their efficacy (Goddard & Mauro, 2018; Nandhini et al., 2018; Wieckiewicz et al., 2015). There are many modalities supported by evidence in the literature:

Patient education

This approach is often successful in simple or minor cases of dysfunction in the TMJ. Advice surrounding rest of mandibular functioning, habit modification, self-massage of surrounding musculature, application of heat packs or ice to the affected area or graded range of motion exercises can reduce TMD symptoms (Gil-Martínez et al., 2018; List & Axelsson, 2010).

Cognitive behavioural therapy

This approach incorporates the biopsychosocial model often useful for patients of TMD. Stress management and counselling can aid in lifestyle change, behaviour modification, and ultimately promote better mental health. This can be a large factor in mediating the development of chronicity. This therapy aims directly at psychosocial factors that can predispose someone to TMD, for example, a stress or anxiety related bruxism syndrome (Mcneill, 1996a, List & Axelsson, 2010)

Pharmacotherapy

Analgesics, anti-inflammatories and low-dosage anti-anxiety agents can be beneficial for patients with TMD. Though there can be detrimental side-effects to their use, the

respective pharmacological interventions can aid in reducing acute muscular pain, decreasing inflammation in the local tissues and counteracting neuropathologies in chronic cases of pain in the TMJ (Zhang et al., 2016; Ouanounou et al., 2017).

Intervention with orthodontic appliances

Occlusal splints are a common dental approach to TMD management largely due to the high-level evidence supporting their efficacy, with some research suggesting a success rate of more than 70% in categorically appropriate TMD patients (Dimitroulis, 2013). The two major types of appliance are categorized as stabilisers or mandibular orthopaedic repositioning appliances (MORAs) (Guo et al., 2021). Stabilising appliances aim to immobilise the joint, which alleviates force intensity through the teeth and joint, as well as reducing strain on musculature that elevates the jaw. Usually implemented for acute pain, arthritic pain or lock-jaw, MORAs work by altering the line of stress through the joint and avoiding aggravation of the pain-generating tissues (Guo et al., 2021). Normally, appliances are worn at night (often to counteract bruxism), but can also be worn during painful episodes throughout the day (Guo et al., 2021a; Macedo et al., 2007; Turp & Schindler, 2012; Zhang et al., 2016). Long-term use of appliances can have a detrimental effect on patients and lead to further complication of a TMD, as irreversible structural change will occur in the arch of the mouth and alter the occlusal pattern of the teeth, yet are still indicated as effective in treating TMJ symptoms (Guo et al., 2021).

Occlusal treatment

There are many dental conditions that are treated by altering occlusal patterns structurally. These treatments usually aim to distribute force evenly through the teeth to avoid deterioration of a particular dental condition or to improve aesthetics to a patient's perceived needs. These therapies can be used for treatment of TMD, however should be

considered after the failure of other non-invasive and reversible approaches (List & Axelsson, 2010).

Surgical intervention

The 3 main types of orofacial surgery for the TMJ are: Arthrocentesis, arthroscopy, and open joint surgery. These procedures can range from low to high with regards to invasiveness and recovery time in the respective order of the line above (Sebastiani et al., 2016). Most of the literature supports these interventions for patients with severe cases of TMD (Dervis & Tuncer, 2002; Dimitroulis, 2013; Sebastiani et al., 2016). Despite the high levels of evidence for success reported in some of the research, controversy surrounds their use with regards to common severe disorders such as internal derangement (disc pathology), and arthrosis (Dervis & Tuncer, 2002; Pahkala & Kellokoski, 2007; Sebastiani et al., 2016). Due to the economic burden, psychosocial impact on the patient, and risk of complications, surgery is often considered a last port of call in the management process (Garrigós-Pedróñ et al., 2019). Collaboration with the aforementioned modes of treatment is supported in the literature for both preoperative and post-operative patients to maximise the likelihood of success (Dervis & Tuncer, 2002; Kafas et al., 2007; Pahkala & Kellokoski, 2007; Sebastiani et al., 2016).

Manual therapy

This approach has been shown to be effective for the reduction of musculoskeletal pain, the restoration of proper joint function, and can encourage physiological repair in the surrounding muscle and joint tissue (Armijo-Olivo et al., 2016a, 2016b; Cuccia et al., 2010; Kalamir et al., 2007a; Kondo et al., 1999; Nandhini et al., 2018). Techniques applied by manual therapists can include direct myofascial or soft tissue releases, correction of jaw position, mobilisation, neurovascular stimulation, postural adjustment of the spine and the prescription of exercise programs that promote masticatory

kinematics (Armijo-Olivo et al., 2016; Cuccia et al., 2010a, 2010b, 2011; Easterbrook et al., 2019; Hraby, 2019; Kalamir et al., 2007a; Monaco et al., 2008; Orner & Yao, n.d.; Tang & King, 2017). These techniques can vary between practitioners and are often patient specific. This approach is conservative, non-invasive, comparatively inexpensive and has been shown to reduce pharmacological intervention, pain intensity levels and kinematic dysfunction in patients with TMD (Cuccia et al., 2010).

Multidisciplinary Collaboration

Etiologically, the factors involved in the development of TMD are numerous, and ambiguity surrounds the relative impact that each factor may play in the condition (Garrigós-Pedron et al., 2019). This has made categorizing TMD's difficult, and in turn there are multiple classification systems attempting to organise the condition into a clinically digestible diagnosis and management formula (Garrigós-Pedron et al., 2019). The lack of a 'gold standard' system can lead to diagnostic confusion as patients may present with TMD's that are complex and individual (Garrigós-Pedron et al., 2019). It is also easy to see a parallel in the literature between the multifactorial etiology of TMD, and the plethora of modalities employed by varying healthcare disciplines that target the resolution of a dysfunction. The 'many modality' approach has been supported by evidence as effective, with the majority of studies indicating better patient outcomes when various approaches are taken in conjunction (Garrigós-Pedron et al., 2019; Kafas et al., 2007; Pahkala & Kellokoski, 2007). This effect is seen even more obviously in chronic patients, where the amalgam between mechanical and psychological factors can cause further complexity with regards to diagnosis and treatment (Garrigós-Pedron et al., 2019; Rollman & Gillespie, 2000b). Therefore, multimodal, multidisciplinary care presents itself as the optimal management pathway for a patient with a complex TMD, as seen in Figure 2 (Chisnoiu et al., 2015b; Garrigós-Pedron et al., 2019; Greene, 2001;

Herrero Babiloni et al., 2020; Kafas et al., 2007; Mcneill, 1996; Wieckiewicz et al., 2015). Even when considering patients with more mild dysfunctions, referral, if not also collaboration, between appropriate healthcare practitioners should be carried out to ensure that management is tailored to the individual as this will promote better patient outcomes (Garrigós-Pedróñ et al., 2019; Rollman & Gillespie, 2000b).

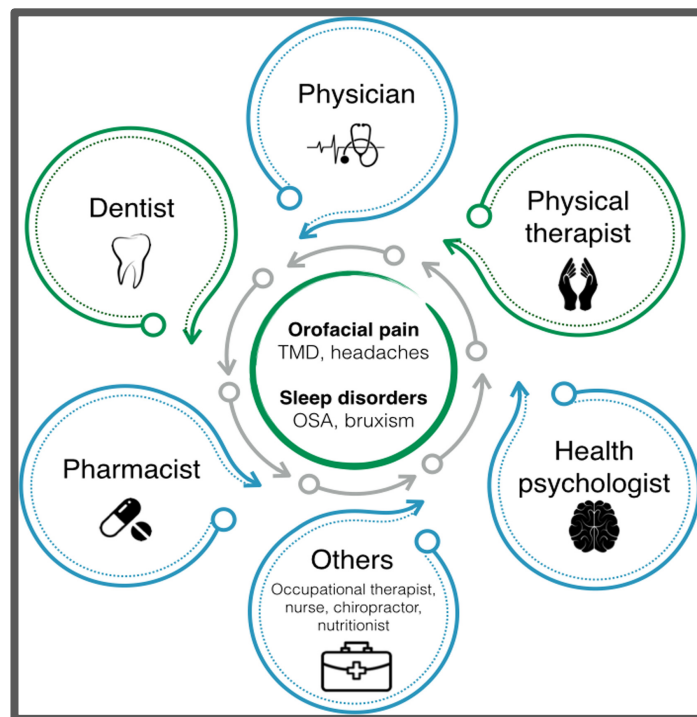


Figure 2: Multidisciplinary Collaboration (Herrero Babiloni et al., 2020).

Project Rationale

This research investigation aimed to broaden the knowledge regarding OMT intervention, and its place in the treatment and management of TMD. Currently, the research suggests that conservative intervention should be considered first when this joint is dysfunctional, as it provides a non-invasive, low-risk, and comparatively inexpensive alternative to other common interventions prescribed by dentists or surgeons (Goddard & Mauro, 2018; Nandhini et al., 2018; Wieckiewicz et al., 2015). Dental approaches often involve orofacial appliances, occlusal restructuring or surgery which are required for more severe cases of TMD. Evidence places manual therapy as

an approach to treat TMDs preventively or to manage it when symptoms are mild or in the early stages of developing, or alongside dental or surgical intervention if those approaches are indicated (Armijo-Olivo et al., 2016; Cuccia et al., 2010; Kalamir et al., 2007a; Mcneill, 1996b; Nandhini et al., 2018). Though manual therapy interventions are supported in the literature, there is a paucity of research about the management strategies that osteopaths employ. Research in this area would elucidate where an Osteopath can be effective in the management process of TMD. Without this research, clinically justifying referral to an Osteopath could be difficult as other healthcare professions have little information about the manual therapy approaches that are employed. This means there is little guidance as to when the referral of a TMD patient is indicated or optimal. It is also unclear whether multi-disciplinary referrals are currently being implemented, and there is a lack of knowledge surrounding the factors that are considered before an osteopath refers to a dentist/surgeon or vice versa. It is important to note that throughout this paper the term 'management' will be utilised to describe the entirety of the management process for a patient with a TMD including; treatment, exercise prescription, multidisciplinary collaboration or referral and ongoing care.

Research question

This research aimed to investigate how temporomandibular disorders are managed by Osteopaths, to explore whether multidisciplinary collaboration occurs between Osteopaths and other health practitioners in the management of TMD and to explore the techniques and practices used by Osteopaths in the treatment of TMD. The research question has been designed to incorporate all of these aims clearly and succinctly: “What is the role of Osteopathic manual therapy in the management of temporomandibular disorders?”

Project intent

This paper has explored where Osteopaths see their role in the management of TMD by outlining their treatment aims, techniques, management approaches, and multidisciplinary referral patterns. To achieve this, 7-10 osteopathic practitioners who self-identify as those who treat TMDs underwent a guided semi-structured interview (approx. 1 hour). Open questions allowed them to share their individual opinions, experiences and approaches regarding the management of TMD. The process of thematic analysis drew key ideas from the interviews and a thorough pattern analysis elucidated a broader understanding of where manual therapists place themselves within the multidisciplinary paradigm. This is intended to provide research for dentists, orofacial surgeons, sleep specialists and other healthcare professionals when considering when/if referral to an Osteopath is indicated and what a manual therapist aims to achieve when managing TMD patients.

Methodology

All research needs to employ an explicit, planned and systematic approach to ensure credible evidence is achieved as a product of the study (Mohajan, 2018). Two main categories envelop the methodological practices within research: they are known as either 'quantitative' or 'qualitative'.

As its name suggests, quantitative research is a logic, measure, and number-based approach that is used to establish 'fact', often utilising experiments, observation or surveys to produce numerical or statistical data in a particular area of research. In contrast, qualitative research is the process of collection, analysis and interpretation of non-numerical data in a particular area of research (Mohajan, 2018; Thompson Burdine et al., 2021; Vasileiou et al., 2018). Qualitative research is used to investigate ideas, concepts, thought and experience which creates a level of complexity that is avoided with quantitative approaches (Mohajan, 2018). This is because quantitative methodology creates controlled designs which often involve fixed quantifiable outcomes which can be limiting, especially in new areas of research where we may not yet know which outcomes are important. Qualitative research uses real life contexts as they are experienced by participants, with outcomes derived from the data given by participants, and this can lay the groundwork for further quantitative research in the future.

Despite these distinctions, research has developed techniques which are not bound entirely to these binary definitions. Methodology can be adapted so that quantitative and qualitative approaches, or approaches within their respective subcategories, can interact to answer research questions comprehensively (Thompson Burdine et al., 2021; Vasileiou et al., 2018). The combination of qualitative and quantitative methodologies into a study is often referred to as 'mixed methods', and the term 'multimethod' can be

used similarly to describe an inclusion of multiple approaches (i.e. within a methodological framework) for the purpose of answering a research question. When different strategies are employed for different scenarios it allows multiple research systems to approach a topic from different angles, which is highly beneficial when addressing a complex research question.

Quantitative approaches are an excellent way to test theories, prove or disprove concepts and establish facts, but these theories and concepts are required to exist before they can be tested. This is where qualitative research can provide a valuable framework for progress in a research paradigm where literature is lacking. Without the assignment of numerical value, qualitative research is prey to subjectivity and the bias inherent in a participant's conceptions, thoughts and experiences. This subjectivity in a quantitative methodology study would be considered to be a systemic flaw, but in a qualitative study it is a necessary and purposeful element. In the qualitative paradigm, the process of data collection, analysis and interpretation within a real-life context can highlight key themes across the personal experience of participants, and establish a basis on which theories and concepts could be formed (Mohajan, 2018; Thompson Burdine et al., 2021; Vasileiou et al., 2018).

A concise explanation of qualitative research is not easy to articulate, even for those most proficient in its application. In 2018, Mohajan wrote - "Qualitative research is difficult to define clearly. It has no theory or paradigm that is distinctively its own. Nor does qualitative research have a distinct set of methods or practices that are entirely its own". (Mohajan, 2018, p. 6-7) Because the qualitative approach is younger in its evolution, its implementation throughout research is still growing, with new systems being adapted for optimal use based on many different situations. This has provided some contention in the past with regard to its methodological viability, as much of earlier scientific evidence is based on empiricism, the philosophical theory that real

knowledge is true by definition, or 'factual'. This is why much of the quantitative research is strict in its methodological integrity - to achieve the 'factual' hypothesis requires that the results of repetition of the experiment are reproducible. The approach from a reason and logic-based theory is challenged however when considering its rigidity to methodology. It has been critiqued for its reductionist and overgeneralised framework that have been argued to lead to methodological limitation and poor real-world applications (Mohajan, 2017). A major advantage of a qualitative approach is the methodological freedom afforded to it, enabling the researcher to tailor their approach to glean 'rich data' for a complex question that would not be authentically answered in all its nuances by numerical and statistical data.

Despite the critiques of both, it is likely that the dissimilarities between quantitative and qualitative provide a type of symbiosis for the 'best evidence' approach in a research topic. Because there is a paucity of literature with regards to the research question in this study, a qualitative approach is best suited for the gleaning of rich data, in hopes that future quantitative studies can further investigate the credibility of the themes and concepts produced. This section will aim to provide a synopsis of the qualitative methodological approaches investigated for use in this study, the advantages and benefits of each, and a discussion surrounding which approaches could interact most effectively to answer the research question.

Qualitative methodology

Data Collection and sample size

Within the qualitative paradigm there are a range of data collection techniques. First, there is a form of data collection that occurs, often in the form of purposive sampling, and semi-structured open-ended interviews (Mohajan, 2018). Purposive sampling is a

targeted approach to recruitment in a study, where participants are selected by virtue of their ability to provide rich data relevant to the phenomenon under investigation (Vasileiou et al., 2018). This purposive approach also lends itself to flexibility for a topic in terms of sample size, and often involves smaller sample groups. When considering the best sample size for a topic, 'saturation' is a term often associated with the number of participants and subsequent interviews required. The term refers to the point in a study where an adequate level of data has been gleaned in order to form a robust and credible comprehension of the phenomenon being investigated (Saunders et al., 2018). Saturation is often identified by the researcher when he or she begins to hear the same comments repeated by participants without generating new rich data. It has been argued that it is important for a qualitative researcher to aim for saturation to ensure the reliability of the collected data, placing it amongst the recognised criteria for the assessment of a study's quality (Saunders et al., 2018).

Despite the initial widespread use of the saturation model, more recently it has become 'side-lined' and a more acceptable standard in purposive sampling has been established with an aim for 'data richness' or 'data accuracy' (Vasileiou et al., 2018). These terms envelope the notion that data and its subsequent portrayal in qualitative research, should disseminate the deep complexity of the phenomenon being studied. That is to say, that there is not an elementary, consistent or justifiable answer to the question of "how many participants constitutes the best sample size?", and qualitative research experts now recommend that sample size be dependent on many factors relating to epistemological, methodological and practical issues (Vasileiou et al., 2018). To apply a framework like saturation to qualitative sampling hinders a researcher's ability to fully consider the particular characteristics of the study, including the aims of the study, the richness and quality of data collected, the researcher's experience, the nature of the phenomenon under investigation, and the study's theoretical and epistemological approach (Vasileiou

et al., 2018) These are all factors that should affect the assembly of the qualitative methodology in a study and should guide a researcher when justifying the sample size for a topic to ensure that the core tenet of 'data richness' is achieved during data collection (Vasileiou et al., 2018).

Content Analysis of Interview Transcripts

The aim of analysis of data is to generate codes or themes from a qualitative data set which can contribute to theory or hypothesis generation (Braun & Clarke, 2019; Clarke, 2015; Clarke & Braun, 2017; Terry et al., n.d.; Thorne, 2020). The data set is collected via interviews, and is usually presented as transcripts before the researcher. Qualitative data analysis often becomes complicated by the volume of data generated, and usually the challenge for the researcher is to analyse the data with as much depth as possible, and then to present the findings in a concise and digestible way (Mohajan & Mohajan, 2018). The process of data analysis is dynamic and requires a researcher to recognise the emergence of key themes in the data whilst also identifying key ideas in the literature reviewed for the research (Thorne, 2020). Data analysis can begin before all of the data has been collected but must have an intensive analysis process when all of the data is available to the researcher. Each interview transcript must be read in its entirety, and the researcher must be thorough and meticulous when looking for pertinent words, themes, or concepts from within the data pool. Once the researcher has immersed themselves in the data, they become more adept at pattern identification and will view transcripts through a sharper lens. The patterns that are identified by the researcher should provide some type of 'pseudo-answer' or 'partial answer' to the research question and will illuminate an area of the topic that contributes to the overarching aim of the research (Mohajan, 2018). As these patterns become more numerous, thematic categories can be described. The transcripts are then systematically scanned for words,

sentences, phrases or paragraphs which the researcher can detect as relevant to the area of interest in the study (Mohajan, 2018).

Narrative Research

The narrative method in research has been established as a way to draw data from within social, cultural and historical contexts (Moen, 2006). It has been described simply as “the study of how human beings experience the world, when researchers gather stories and write narratives of this experience” (Moen, 2006 p. 56). Because the participant data is collected in narrative, analysed as narrative, and presented in narrative, the narrative approach is considered to be both phenomenon and method (Moen, 2006). This style lends itself to the examination of procedural and intangible elements in a participant’s individual experience, their unique context, and how the phenomenon in question has evolved according to them. This methodology is therefore placed in the midst of sociocultural theory (Moen, 2006; Mohajan, 2018). Because narrative research is context-based, it is most beneficially used when there is specific contextual focus in a study, for example, in a classroom, clinic or corporation (Moen, 2006).

Phenomenological Research

Phenomenological inquiry is complicated, both theoretically and philosophically, and is used to study areas where there is little knowledge (Wilding & Whiteford, 2005). Many aspects of its subjectivist methodology can be poorly understood, but its core aim is to explore participant’s life experiences of a particular phenomenon (Mohajan, 2018; Wilding & Whiteford, 2005). It often involves questions like: ‘what is it like to be a mother of a child with a terminal health condition?’, from which a researcher might draw themes like feelings of worry, hopelessness or grief. This type of research can produce multifaceted, impalpable, rich, and dynamic data consistent with daily life,

which will be influenced by a participant's values, feelings, religious beliefs and individual perceptions (Mohajan 2018; Wilding & Whiteford, 2005). This is, of course, a context that could not be investigated by measure, logic or numerical-based methodologies. For this reason, its use can be instrumental in early exploratory studies into a phenomenon, where there is need for more elemental investigation.

Action Research

Action research is an approach that has emerged from a range of disciplines and is focused on finding ways to improve practices (McNiff & Whitehead, 2010). There is some contention over its legitimacy as a mode of inquiry and it has been labelled as informal as it aims to enhance practice by professionals rather than establish evidence. (Mohajan, 2018). It has three fundamental stages: making claims to new knowledge from experience or research, testing for validity of the new knowledge claims, and hypothesis generation (McNiff & Whitehead, 2010). Effectively, it is a systematic investigation, where an action takes place, the effects of that action are then studied and this can lead to the implementation of improved procedures and enhancement within practice (McNiff & Whitehead, 2010.; Mohajan, 2018). Though it does share some of the experimental elements seen in more comprehensive research approaches, it is not applied in controlled atmospheres and thus its main strength is in practical application rather than establishing research evidence.

Case study

A case study focuses on a singular case or a small series of cases, and this is what defines it as a methodological approach (Mohajan, 2018; Yin, 2015). Case studies can be either qualitative or quantitative depending on the structure and purpose of the research, and can even be mixed-method if considered appropriate by the researcher (Yin, 2015). In general, case-studies are used in conjunction with other research to

formulate hypotheses about a particular phenomenon, rather than to test a theory (Mohajan, 2018; Yin, 2015).

Interpretive Description

This approach was originally birthed in the field of nursing science and is a qualitative research approach that aims at generating practical knowledge to advance clinical practices. This form of inquiry is a credible way to investigate the subjective experience of a population, from holistic, interpretive relational perspectives of healthcare (Thompson Burdine et al., 2021). The use of the methodology is most beneficial in areas where social and experiential factors are associated with the inquiry, and where the researcher's goal is to develop or explain a hypothesis where there is not one yet developed (Thompson Burdine et al., 2021). This methodology has theoretical integrity and is especially applicable when answering clinical questions in the healthcare fields, where experience and interpretation by the participants is the information most useful for answering the research question (Mohajan, 2018; Thompson Burdine et al., 2021).

Methodological Disclaimer

The methodological paradigm is expansive and diverse, and it is important to note that the summaries above fail to comprehensively cover all of the permutations of qualitative research. The purpose of conducting studies with a qualitative methodology, is to describe and provide explanations for peoples experiences, interactions, social contexts and behaviours which cannot be sophisticatedly articulated by adherence to single methodological process (Fossey et al., 2007). Many studies can, do, and are considered more credible for drawing on multiple or many qualitative strategies in order to tailor methodology to specific research scenarios (Fossey et al., 2007). The qualitative modalities chosen for summary above are used commonly, and were noted as relevant

for the purposes of fulfilling the aims of the study. The previous summaries seek to position readers by providing them an understanding of the methodological influence on the composition of this research.

Methodological Composition and Rationale

The aim of this research was to answer a specific question about the role of osteopaths in the management of TMD, as it relates to the human experience of osteopathic practitioners themselves. Qualitative methodologies have been popularised within health disciplines as it can be sensitive to the intricacies inherent in human experience. This research intends to draw on the experience, opinion and understanding of human practitioners and their perceived role in the management of TMD and the qualitative methodology is most appropriate for investigating this phenomenon. Interviews where osteopaths are put at ease and asked open-ended questions will allow them to share their individual perspective, and a collection of multiple transcripts will provide a rich set of data from which we can draw common themes on this topic. It is important that throughout analysis, common themes are not considered the “end-game” of the study, but rather are used to inform a more in depth analysis about how these themes should be interpreted within a broader lens of benefit in clinical practice.

Qualitative Rigour

It is important to ensure reliability and validity of the findings in qualitative research and that consistency is established and applied across the methods of the study. This is to provide a valid way for future replications of a study to be carried out with other participant samples and accurate recommendations for further research (Mohajan, 2017; Thomas & Magilvy, 2011). Though strict adherence to a single methodology is antithetical to the fluidity of approaches characteristic of qualitative research, steps can be taken to increase the credibility of the data collected (Thomas & Magilvy, 2011). For

this reason an interview schedule was created and applied to all of the participants included in the study, listing organized questions that provoke perceptions and opinions from each of them individually (Appendix B). The questions were structured, practiced with peers and then reorganized to optimize flow and clarity throughout the real interviews. This meant that the interviews could be conducted in similar fashion across the board, and that the data collected in their responses would relate to the research question. The carefully pre-formed questions also ensured that the researcher did not lead the participants to their conclusion, but rather opened up discussions where definitions, perceptions and opinions could be delved into in more rich detail. It also allows other researchers to borrow the schedule and closely replicate the format of the interviews. Another essential aspect of qualitative rigour is to create dependability on the researcher's analysis process, ensuring that steps were taken to increase the quality and depth of analysis (Thomas & Magilvy, 2011). Dependability was achieved in this study through peer review, where the analysis process was overseen weekly by two research advisors. The conversations between the researcher and advisors encompassed reflection on, and critique of, the researcher's analytical process. This ensured that no steps were missed, theme generation was coherent, and that the entire process led to dependable data. A further step taken to ensure that the data collected had validity, was the sending of transcripts back to the participants for review. This ensured that the transcripts were correct, and that their perceptions and opinions were accurately expressed.

To further ensure qualitative rigour, the study has been developed in accordance with the set of guidelines provided by the Standards for Reporting Qualitative Research (SRQR). These guidelines were developed by researchers, methodologists, and journal editors to increase transparency, rigour and quality when reporting qualitative research. The SRQR guidelines provide a checklist for the essential components of any good

quality reporting in the qualitative methodology, and this checklist can be found in Appendix A. Conformation to this checklist helps to ensure that this study is reported in a clear and transparent manner and provides a way for readers to understand and assess the research, which increases the study's credibility and validity. The SRQR guidelines also ensure standardisation across studies with qualitative methodological compositions, which makes it easier for readers to compare and contrast findings across different studies.

To achieve qualitative rigour, it is also of importance for a qualitative researcher to be aware of biases and preconceptions that could affect the research process, and that a self-critical approach is undertaken throughout the study. Though this attitude was striven for by the researcher throughout, and measures were put in place to alleviate bias, the following section has been included to provide transparency by describing the researcher's qualifications, interest and preconceptions when undergoing this study.

The Researcher

The researcher holds a Bachelor of Applied Science in Human Biology. This study was conducted as part of their completion of a postgraduate Master's degree programme at Unitec in New Zealand. The Master's degree programme is undertaken over the course of two years or more, where the student can achieve a Masters in Osteopathy.

The researcher acknowledges that their main interest in the study is similar to their interest in the programme overall, which is the study of musculoskeletal anatomy, physiology, diagnostics, manual therapy, patient management and ultimately the bettering of health for patients with musculoskeletal issues. The focus on the TMJ in the study was also born out of interest by the researcher, when discussions with dentists known to them aroused an awareness that there were multiple forms of management for

a TMD patient, and that many dentists were unaware that osteopathy was an option when considering referral.

Multidisciplinary collaboration, a model for better patient outcomes in many musculoskeletal disorders, is one that the researcher subscribes to and has an active interest in. For these reasons the researcher intended this study to investigate the merits of OMT for TMD, explore the efficaciousness of osteopathic techniques, and consider whether the multidisciplinary model might have a positive impact on patients with TMD.

Method

Recruitment and Participants

The 18 Osteopathic Clinics in New Zealand that specifically advertise TMJ treatment at the time of the study were targeted for recruitment via email. Any other osteopathic clinics in New Zealand that do not advertise were also contacted through available email addresses asking for the inclusion of practitioners that self-identify as capable of, or consistent in, the treatment of TMJ dysfunctions. The goal was to recruit between 7 and 10 participants of which 6 were achieved, overall, 54 clinics or individual practitioners were contacted for inclusion in the study. The participants included in the study had high levels of experience, though there was variance with regard to years practicing and treatment styles. Anonymity for the participants was of importance, consent forms and participant information slips were delivered to and signed by each participant of the study (See Appendix B and Appendix C). Transcripts were anonymised for their professional discretion.

Inclusion and Exclusion Criteria

All participants included in the study were registered, practicing osteopaths in either Australia or New Zealand. Alongside this, the osteopaths included self-identified as practitioners who can treat TMJ disorders. All non-registered osteopaths or osteopaths that identify as practitioners who do not treat the TMJ were excluded from this study.

Data Collection and Management

To collect the data 45-60 minute recorded semi-structured interviews were undertaken with each of the participants according to the interview schedule (see Appendix D). Participants were to be initially offered the choice between face-to-face interviews or over an online medium such as Zoom. However, due to the circumstances associated with Covid-19 lockdowns throughout the process of data collection, all interviews were conducted and recorded over Zoom between January and September of 2022, from which the transcripts were generated. This thesis received funding from Unitec Institute of Technology student fund for the transcription of interviews, after which they were checked against audio recordings to ensure accuracy of transcription, and thus, accuracy of the data.

Data Analysis

A qualitative methodology was chosen for this study as it lends itself to describing an issue in rich detail, which will be effective at elucidating current practices and the extent of research needed in this area. The interview type study was the most appropriate approach as themes were identified and analysed more easily than, for instance, a survey method. Thematic analysis is a flexible method for qualitative analysis used to identify, analyse and report patterns (themes) within the data (Braun & Clarke, 2014, 2019; Clarke, 2015; Nowell et al., 2017; Terry et al., n.d.; Thorne, 2020). Braun and Clarke first wrote this paper in 2006 and has since been cited over 26,000 times, demonstrating the Method's extensive use in qualitative literature and validity within the research paradigm (Braun & Clarke, 2014; Nowell et al., 2017). Because this research involved semi-structured interviews to gather qualitative data, this form of analysis allowed the author to meet the aforementioned objectives. The transcripts recorded from the interviews were analysed with this method to organise and describe

the dataset in rich detail (Braun & Clarke, 2014, 2019; Clarke, 2015; Nowell et al., 2017; Terry et al., n.d.).

Procedure

The procedure for conducting thematic analysis in this study was kept in accordance with the process detailed by Braun and Clarke (2006) and later elaborations. Firstly, the researcher familiarized themselves with the data sets provided by the interview transcripts, this was undertaken by transcribing the data, reading the transcripts over multiple times and noting down any initial thoughts. Secondly, the whole data set was coded systematically, congregating the data from participants that was relevant to the code it was given. Then, using the coding system, the researcher looked for themes, overarching ideas that held multiple areas of relevance across portions of the entire data set, and quotes from the interview transcripts were organised into their theme. These initial themes were reviewed to ensure that the overarching idea worked in relation to the coding system, which generated a 'map' of themes. Continual and ongoing analysis of these themes lead to a refining of their naming, constitution and consummated their definitions. The final and most refined analysis took place when producing a report of the findings, when quotes were chosen for their relevance, clarity and efficaciousness with regards to underscoring the richness of the data for the particular theme that they characterised.

Findings

This section will report the themes and subthemes that were extracted from the recorded interviews and their transcripts throughout the process of analysis. Direct quotes from the interview transcripts will be used to underscore the substance of a theme or sub-theme, to demonstrate thematic integrity, and to ensure accuracy in the reporting of findings. The quotes reported below have been chosen for their clarity, depth, and relevance to the research question: ‘What is the role of osteopathic manual therapy in the management of temporomandibular disorders?’. The six osteopaths that were interviewed will be anonymized for ethical purposes and will now be referred to as Participant A (PA), Participant B (PB), and so forth until Participant F (PF).

Themes

Thematic analysis of the data from recorded interviews and transcripts of the participants in the study led to the recognition of four major themes and 15 sub themes pertinent to the research question and satisfying the aim of the project. The first theme, ‘Osteopathic role’, reports on diagnosis, types of TMD, efficacy of osteopathy, commonality of occurrence, and the roles of dentists and surgeons. The sub themes have been categorized as such to provide a comprehensive picture of the perceived role of osteopaths for TMD patients. The second major theme reports on the participants' techniques, aims of treatment, aims of management and strategies for generating management plans, subthemes of which are categorized under the umbrella of ‘management’. The third major theme is ‘collaboration’, and reports on the referral patterns, pathways, and the opinions held by participants on multidisciplinary cooperation for the management of TMD patients. The last theme is ‘Other’ which refers to any material that was drawn from the data as a theme that was not anticipated or immediately relevant to the research, but that added contextual value for

comprehensive answering of the research question. Throughout the analysis process, COVID-19 was discussed by participants as relevant when discussing the role, management or collaborative efforts of osteopaths and therefore provides contextual value to the aforementioned themes.

Table 1: Themes and their respective sub-themes

Themes	Subthemes
Osteopathic Role	<ul style="list-style-type: none"> ● Diagnosis ● Types of TMD ● Efficacy ● Commonality of occurrence ● Role of dentists ● Role of surgeons
Management	<ul style="list-style-type: none"> ● Techniques ● Aims of treatment ● Aims of management ● Strategies for generating a management plan
Collaboration	<ul style="list-style-type: none"> ● Clinical decision making ● Referral pathways ● Importance of collaboration ● Occurrence of collaboration ● Awareness of osteopathy
Other	<ul style="list-style-type: none"> ● Covid-19 ● Botox

Theme 1: Osteopathic Role

The “Osteopathic Role” is the first major theme identified from the data set. This theme encompasses 5 subthemes. During the interview process, participants’ perceptions regarding the osteopathic role for TMD patients were recognized in words, phrases, or passages of conversation. Identifiable perceptions in the data were then accumulated into groups and these collections provide evidence for a subtheme. The subthemes have been categorized under this theme as they provide context and extrapolate the lenses through which the participants view the osteopathic role. When considering the osteopathic role during the interview, participants explored diagnosis, types of TMDs, efficacy of osteopathy, commonality of occurrence, and the roles of dentistry and surgery. The subthemes relating to the roles of dentists and surgeons are included under this theme, as they help to identify where the perception of osteopathic role ends and where other disciplines begin. That is to mean, that there is value in describing what the osteopathic role is not, to understand what it is.

Diagnosis

This section focuses on the diagnostic ideas expressed by the participants of the study, and will report any of the data's concurrence, disparity or anomaly. All participants of this study spoke of ‘diagnosis’ with regard to TMD, though there was variance in the way that they formed their diagnosis. Some of the participants listed the signs and symptoms or ways that they are led in practice in order to diagnose a patient with TMD. This has been included as a subtheme under “Osteopathic role” as it speaks to the participants’ perceptions of their role, and demonstrates their practices and competencies in the diagnostic process.

Apart from jaw pain... that's the big one, so headaches that are not sort of responding to anything else, inability to open or close fully or a feeling of weakness, anything like that. Upper C-spine dysfunction, even if they're not complaining of TMJ pain. I would usually just, as a screen, check the function of the jaw. A history of any kind of... Not necessarily a head injury, but some kind of knock to the face or the jaw. (PB)

So obviously pain in the area. Sometimes patients can say that it's quite tender. You can see puffiness, so obviously inflammation, local inflammation and things like that. Locking of the jaw. Clicking of the jaw and deviation of the jaw. So when the jaw is not actually just opening up nicely down, it will slightly kinda deviate to one side or the other. And I mean, the more you see people with TMJ, the more you kind of realize, it's pattern recognition, there's that whole clinical reasoning that you do and you kind of realize that, okay, you've seen so many TMJ and if one does a little bit of that, there's no pain, there's no clicking, less likely to be a TMJ dysfunction, but we'll have a look and things like that. But if you've got deviation, pain in the area, pain on opening up or difficulty opening up the jaw, plus clicking and then the patient can't chew, that's definitely what I would say, okay, you're probably looking at TMJ dysfunction. (PC)

The usual ones. Jaw pain, clicking, inability to use the jaw for its normal function in terms of them coming in with TMD as the presented complaint or the ones that you would expect. For hidden TMDs or subclinical ones, headaches are a big one, or non-resolving neck or upper thorax issues, including rib cage. That would be the second big group of presentations where I start to look at the jaw, if they're not responding. So headaches would be first line

investigation, usually, but as I said, ribcage, neck, and thorax, by the second or third appointment symptom progression isn't doing what I'd expect it to, then the jaw makes it onto the to do list. (PD)

Yeah, yeah, it's all kind of what I'd call the standard jaw stuff. So clicking is the big one, pain in jaw on chewing and biting, talking or yawning, less often, but also shows up. And then... And headaches would be the next big one, even as in primary, what I'm gonna call primary or direct sort of TMD headaches. So they're not headaches with a coexisting TMD of two different kinda pain generation sources. They're actually headaches caused by the jaw. (PD)

Somebody will come in for something else, neck or something else, and will mention that they've been having clicking or pain in their jaw or things haven't been right, and you'll pick it up with that. (PE)

A lot of the time you can perceive the click. But just by listening to the click or while you're just [touching] the joint and feeling the movement of the joint while the patient is opening the mouth, you can feel some shift, some click, while the patient is clenching can be discomfort or you can feel like that one condyle is not moving, the other one is moving too much. So one is shifted, then it has to balance by shifting rapidly. So, you have the click. So there are a lot of things you have to consider to see if there is a balance between the two joints.. So for example, the condyle is not shifting enough, so the opening of the mouth is a lot reduced. (PF)

Another participant extrapolated what they would do beyond finding signs and symptoms during the diagnostic process, and considered the option of referral for diagnostic confirmation.

So when you're diagnosing, you're taking in a few of the typical TMD symptoms and lumping them together and that's putting it right up the top of the differential diagnoses. And then if they don't have the entire typical symptoms and I'm like, okay, TMJ is to be considered, but let's have a look at other things. Which you always do anyway. You don't wanna just say, oh, they've got those symptoms, that's definitely TMJ. You never rule out everything. And if we feel like we haven't got the perfect diagnosis, then we just refer them for an x-ray and ultrasound to get that confirmation that we're dealing with exactly what we think it is. (PC)

Types of TMD

Most of the participants in the study also mentioned the different types of TMDs, the spectrum that they can be on and their opinions as to the aetiological factors behind the differing types. This section of findings has been included with the overarching theme of “osteopathic role” as it helps to delineate which types of TMD the participants were aware of, interact with, or see often, and this could give insight into where the osteopathic role is situated in the TMD space. The participants commonly expressed TMD types as those of injury, wear and tear or other muscle or joint related dysfunctions and this seemed to be related to aetiology of the TMD.

It's always an element, a percentage of influence that the psychosocial factors have within that particular person's presentation. It varies. If someone's had no TMJ problems and then they've had some kind of impact injury, then obviously, it's a much smaller influence than if they've been stressed, they're a real stress bunny and they've been stressed for years and they've got bruxism and very habitual, and they... The entire reason that they've got the problem is because they're stressed all the time and can't manage the stress, so you've got both ends

of the spectrum here. Like with any injury, you have an element of psychosocial, but it varies a lot. (PB)

There's a progression of TMD because if you, you know, logic dictates that if you have a structure that isn't functioning well, then you demand that it functions well forever more, it will eventually progressively get worse and that's the human body. That's how it goes. It might be very slow and slow enough that you don't notice it until it's much, much later, but it will happen. But there's also a spectrum because you could have somebody who went through a really intense period of stress and bit their pencil 10 hours a day for a week, revising for exams. And they've locked their jaws on one side with a perfectly healthy joint. They've just got a tear that's gone spasm. Right up to somebody who got hit by a car and their TMJ is now in six different bits. (PD)

I think for me in approaching a TMJ, you need to look at the cause because that'll often determine. So there's traumatic injuries to the TMJ, then there are wear and tear, osteoarthritis, and then also stress-related, so grinding of jaws where there are sort of more emotional concept components to that dysfunction. (PF)

So, we have to always consider which type of disorder we are talking about. Because there are some... Some things that can be treated with osteopathy, some things that cannot be treated with osteopathy. So we can always give and help, aid it differently with the different disorders. (PF)

Three of the participants of the study also reported a type of disorder that they saw more commonly than the others, referring to stress or psychosocial factors as major influences in those TMD's.

TMJ seems to present a little differently, I think. They tend to be more at the...

This is sweeping judgment, but it's just based on, anecdotally, on what I've seen in the clinic, they tend to be more at the end of their tether. That's been an exhausting road for them already. (PA)

TMD is really, really hard 'cause it requires habitual change from and lifestyle change from people, and that's a really, really hard one. You can't just click it and it feels better and they're on their way. Which is why you've gotta go down that psychosocial road. So I would say all of them are directly linked to that, except for... Bar maybe one, which is a concussion. Sometimes it's linked with concussion as well. So, someone who's had a direct impact on the side of their jaw. So, all of them I think have come about from lifestyle factors. (PA)

So it's a combination of posture, but also stress levels. So you will find someone who, for example, have a lot of stress, they would tend to clench their teeth so the masseters are gonna be working a lot harder and we see them here, like you see them, they just like fidget with their legs. They just grind their teeth. They're stressed, people are stressed at the moment and there's just a shortage of people working. So they've gotta work longer hours. And that's often what we see is just the stress will lead to TMJ dysfunctions. (PC)

I would say so. I think beforehand, I think the main reasons why we were seeing people with TMJ pain was purely, you know, you've had braces or you would just grind them and you don't have to be stressed to be a teeth grinder like they will tell you that, some people are just grinders. But I would say that the next reason now that we are seeing people with TMJ is stress levels. Yeah.

Absolutely. (PC)

Pretty much all jaw issues will have either primarily or secondarily be psychosocial, and that's because either you have a direct link between whatever is going on in their life and therefore their stress levels and how their jaw functions... Or you have an extra step in between, so stress levels, bruxism TMD, and they will almost always be in that loop. (PD)

Efficacy of Osteopathy

Each of the participants included in this study had opinions or perspectives regarding the efficacy of osteopathy with regard to TMD. These perspectives ranged from effectiveness of hands-on manual therapy, osteopathic approaches and into the specifics of which TMD patient presentations were most likely to benefit from osteopathy and how. These perspectives help to create a framework in which the participants feel they are most effective if effective at all, and this aids in representing the role of osteopathy for the management of TMDs overall. The following quotes are chosen for data richness in partial response to the researcher prompt: 'Where do you perceive the role of osteopathic manual therapy in the management of TMD?'. The opinions all indicate that osteopaths have positive impacts on TMD, but most also indicate that their ability to be effective with treatment depends on patient or TMD specific factors.

I think that there's... That it's really powerful. I think it's got an amazing opportunity to help people. But I think at the moment, it's probably incredibly underutilized. People don't really know that it's something that we do and offer. So I think it's got the potential, just from my experience. Not a lot of people do TMJ, TMD work. It's quite a niche market. So I think it's got the opportunity to be really beneficial for people who have got their... That chronic pain, really, or hard to manage pain. (PA)

It depends on the influence of how much of it is musculoskeletal in terms of... Or how much is... If the cause is from dental issues, obviously we have a smaller role to play. If the cause is from habit or injury or bruxism, things like that, then we have a larger role to play. And the point at which we get involved in it, obviously it would be good if we could get involved a lot earlier I think in a lot of cases. (PB)

If you catch it early, absolutely, you can deal with it. You can give them the exercises, you can do the techniques. Absolutely. It's amazing. I think if it's been something that's been long lasting, then it's probably more of a multidisciplinary thing (PC)

When they respond to your treatment, they'll respond really well and their pain will go down and their function will go up, and then it feels a simple case, then it stays like that and everybody is happy. And if there are lots of predisposing factors, then after two or three days, we're back to square one. So pain management works really well. Function management is really, really good. So, and most of the patients I've seen with TMD couldn't... Where function was impacted, they recovered function usually within one or two treatments. And so, and that's practically without exception. (PD)

We don't expect our jaws to start hurting or not function properly. Pain management in terms of actually finding why the pain's there. And usually people respond to it really well and really quickly. So, I've not... Whereas in with other kind of presented complaints, there's usually a reasonably even spread along the line of "responds really well to treatment", "responds not at all to treatment." TMDs are usually all along the "responds really well to

treatment." How long they respond really well to treatment is what varies, because that's where the predisposing and the maintaining factors come. (PD)

As I say, I don't see a huge number of TMJs, but generally, you can get things to settle down, improve, even if you can't sort of fully resolve it.

I do think osteos do have a role to play and can be very beneficial for patients. So yes, that would, I think, be something that could be helpful to patients and, a gain, may be beneficial to dentists. (PE)

So, we have to always consider which type of disorder we are talking about. Because there are some... Some things that can be treated with osteopathy, some things that cannot be treated with osteopathy. So we can always give and help, aid with the different disorders. But at the same time, there are some that we cannot treat completely. (PF)

So for example osteoarthritis of the TMJ, we can work on it, but also there is a lot based on how developed the symptoms are, the pathology itself, because there is other osteoarthritis in other parts of the body. You cannot think about healing the pathology. You, in this specific case, can just reduce the symptoms and work to find a balance. (PF)

Some of the participants of the study also indicated where they felt that they were most effective for patients with TMD. It may be important to perceive these quotes through the lens of a TMD that the participant felt they could deal with, and not one that may fall outside their scope of practice.

Yeah. Yeah, I guess, it's just that stuff with being able to eat without pain or not having to take so many painkillers to manage it. Or a reduction in headaches. That would be the top three, I guess. So yeah, it's a way of reducing pain

without using, I guess, drugs or things like that to edit the symptoms. Well, often with TMJ pain, the drugs that people have been given aren't particularly effective often. (PB)

I mean, kind of the ones that come to mind particularly are the ones who couldn't, they couldn't achieve good jaw opening. So they couldn't yawn or they couldn't bite into something because they just couldn't open their jaw enough. And usually 50% of that was, or it was improved by at least 50% within 12 hours of the first treatment and 100% resolved by the second, usually. (PD)

So first of all, reduction of the pain, of the discomfort, improvement in what is the number of headaches that can be related to the TMJ, improvement of the stiffness that they can feel during the morning, the stiffness that they can feel on the neck, the discomfort that they can have on the muscle on the neck, improvement of their swallowing, improvement of what is also a lot of issues with the upper air, so like the nose, some recurrent rhinitis, sinusitis. It is something that osteos can help. Otherwise, the mouth opening, which is good also when they eat or swallow. And I think those are the main ones. (PF)

In those cases in which the patient is quite young, you can de-structure or start from a more functional base. So it's easier to have good results in less time. (PF)

This participant demonstrated an opinion that osteopaths would have higher efficacy, and patients would have lower financial burden and better outcomes if osteopathy was prioritized and if TMDs were caught earlier in their progression.

So if you as an osteo were to market yourself as being a TMJ expert kind of type of thing or TMD, sorry, expert, I would say, "Hey, for better outcome, if

you start [experiencing] pain, just don't delay. The longer you wait, the more practitioners are going to be involved. You might end up having acupuncture, which is another cost. If it's not your osteo doing it, then you might need to go see your doctor for some medication, so that's another fee. And then prescriptions are free nowadays, but then if it's really, really bad, you might just have to go see a dentist to make sure there's not like a grinding. And then because it's that, you might just end up having to wear a mouth guard. So that's another cost, you know?" So I think if you can catch it early, your outcome is absolutely amazing. (PC)

Many of the participants provided examples of patients that demonstrated whether or where osteopathic management had been beneficial for their patients and how. Below are the quoted examples from the participant transcripts. These examples range from patients who have managed to avoid surgery, general reduction or resolution of TMD symptoms, to cases where osteopathy was ineffective for TMD.

There's some that have managed it okay and they haven't had to come back for quite a while, so then I just leave it up to them to let me know when it's getting out of control. (PA)

So I have one that I've just discharged recently who was gonna have surgery and they're pretty happy with how she's progressing. So that's the one I've also been working with the maxillofacial surgeon, so they've been monitoring progress as well. And they're at a level where they're happy to leave them for the time being. Hopefully she's gonna be able to manage it herself and not need to go down that surgical road. So that would be awesome if that's the case. (PA)

Some mild, the most serious one, like I said, was that woman who couldn't move. whose jaw was locking. And there was never any question with... Never

any question with that one we'd be able to resolve it, but I had hoped we could reduce some of the symptoms, but really it was too much of a structural change. We couldn't make any difference at all with that. But yeah, mild to moderate. Definitely if not completely resolved, then certainly significant improvement. (PB)

So for example, I had this girl that was hit by a bull and she had this shooting pain, starting from the TMJ going up to her head every time she was talking, every time she was open too much her mouth. So also while she was eating, she had to be careful, while she was yawning, things like that. And with the treatment, especially by releasing the muscles like the masseter, the temporalis and the ligaments, I reduced totally her pain. She had no more pain, no more discomfort after two treatments. (PF)

Prevalence of TMD patients

This section focuses on the self-reported prevalence of TMD patients in the participants' day-to-day practice. This has been included within the paradigm of 'the role of osteopathy' as it speaks to the regularity with which the participants engage with TMD patients, and may provide a glimpse into the similarities and differences between individual practitioners. All participants reported engagement with, and treatment of, TMD patients. There was, however, variance in their descriptions regarding how commonly they saw TMD patients, and the possible reasons behind the particular rate of occurrence in their personal practices. One participant suggests that the prevalence of TMD has been increasing. The quotes reported have been taken after the researcher prompt: 'How regularly do you treat patients with TMD?'

I don't know that I could actually honestly put a number on it, because I'm old. So I've been doing this for a while. [chuckle] And my background prior to

coming here, I'd done a bachelor in neuromuscular therapy. So our third year, we did quite a lot on temporomandibular joints. So actually, I do quite a lot of intra-oral work from my training in that field, which is what I said to you might kind of blur the boundaries a little bit, 'cause my trainings are bit different from pure osteopathy. But... So over that time, and I've been probably doing that for maybe 15 years, maybe longer even. I honestly couldn't put a number on how many that I would've seen in that time. It's not the first... it's not like neck and back pain, of which we get hundreds of, thousands of. But it's regular. Yeah.

(PA)

Fairly regularly. And it seems to have been increasing, and I don't know if that's because of mask wearing, but people muck around with their jaws and things while they've got masks on to hold the masks in place. Or just that even the tensioning through the face of having the mask on all day. So I don't know if that's a thing or if it's just a tension thing 'cause everybody's kind of low key stressed because of COVID, all of that, but it does seem to be increasing. Yeah.

Yep. And like I say, I don't know why. It could just be as simple as a Google search because we are higher up the list of people searching for TMJ stuff and we pop up first. So it could just be as simple as that. (PB)

So at the moment, it's daily. I've got a bunch of people on my list at the moment with TMJ. It hasn't been like that before. So like I say, that's it's just over the last probably three or four months, I guess, that's really increased. (PB)

Yeah, so particularly in the past year and a bit, the practice I've been working in has kind of had a reasonably strong focus around jaw. As a practice not just individual practitioners and I've been treating jaws for quite some time. So that's kinda allowed me to accrue quite a few jaw management patients reasonably

quickly. So I'd say at the moment, probably usually have two, or three patients with TMD being managed or treated short or medium or long term at a time. In a month, for example, or in a two or three week period. (PD)

Not that regularly. As I say, a lot of people aren't aware that osteopaths treat jaws...And in saying that. It's osteopaths. I think you will find that you have runs of things. So you'll have a week where everybody seems to be coming with a neck or back, and I can recall one week where I had three TMJs in a week. So that would be huge for me. Yes. So it's not one of the more common presentations for me. (PE)

So strictly related to a TMJ? So they come to me because they ask to be treated at the TMJ, I will say at least once a month. That's fairly regular. So I have at least one patient a month that I treat for TMJ issues. (PF)

Roles of Dentists

This section will report quotations from the participant's transcripts where they outline their opinions and perspectives on the role of dentists in the management of TMD. The reasoning behind inclusion of this section within this particular theme is to help define what osteopaths believe is outside their role with regard to management. This should provide insight into where the participants feel the dentist role is more, less or partially appropriate in the management of a TMD patient. All participants provided varying opinions about dentists, with some osteopaths citing the importance of their role in treating more structural, tooth-related TMDs, others citing the capability of dentists for the diagnosis of TMDs and some indicating that certain dental procedures could impact the development or progression of TMD.

I would say they're probably the first protocol generally. Like they're usually the ones that pick up on it, start noticing it first in terms of wear and tear. I think they normally would have a shot at fixing it. So they'll talk to them about lifestyle stuff too, or build splints. And then if that stuff hasn't got the resolution that they hoped for, then it tends to get passed on. (PA)

[Their role is] huge, I would say, simply because I think they can impact the jaw and the jaw position. So if we are dealing with a jaw that is not in place, then obviously, having teeth and everything, and the opening, and every...

Sometimes, that's what you need, the jaw's too closed or too open. So absolutely, and they've got access to doing jaw x-rays, to be able to see what's going on, whether we've got some wisdom teeth impacting the whole joint and causing inflammation. So I think absolutely relevant. (PC)

Same with dentists. They've got all the tools to actually see how the jaw is positioned with the X-ray and that whole rotating x-ray machine thing too. Yeah. So I think it's just, yeah, very relevant. (PC)

It's patient specific, but it... There's kind of some common themes. So the first one is gonna be dental considerations. So either ongoing dental considerations, like bruxism or kind of malocclusion or overbites, underbites, wisdom teeth, impacted molars, all that jazz. As well as historical ones in terms of any orthodontic treatment that they might have had. And then looking essentially at the long term mechanical effects of what they had done to their teeth. It's usually what they had done to their teeth you can't undo. Their teeth are now straight. Good. But whatever... The braces is the main one, you can't expect to change tooth alignment and therefore draw function for two and a half, three years in a row without expecting the TMJ to do something weird in return. (PD)

And I think the other main exception to think about is the ones where the TMD is strongly down to orthodontic function. That's probably where the psychosocial component is smaller or even absent, so I've seen kind of maybe half a dozen patients by now where their TMD was primarily and almost exclusively driven by Jaw and Tooth Mechanics...Structure and function of their teeth... Their teeth and their jaw, in terms of their jaw bone and the physics of the their mandible to the their maxilla in respect of the their function, and so with those psychosocial factors would be a much smaller component, if at all, but in terms of, in terms of TMDs that are primarily driven by function instead of structure, then big, big part... (PD)

Yeah, absolutely. So, there's three kind of main categories that spring to mind and I've referred all three or two or three. So the first one is dentists or orthodontists. Because the main kind of driving factor was structural in terms of tooth mechanics, for lack of a better word. (PD)

People that go to the dentist. I've treated a couple of people following wisdom teeth removal or been stuck in the dentist chair with your mouth open for a long time. A number of patients that I have seen have come following having braces put on and having jaw pain following braces. (PE)

So we have to consider if, for example, if there is an anatomical alteration, we cannot change the anatomical alteration. So there will be needed the help of other healthcare givers that are more working on anatomy. So for example, in surgery, more or otherwise if the TMJ issue is caused by a teeth problem, like a de-closure, how the teeth are touching each other, then you... It's better to go to a dentist. (PF)

Now, so sometime, yeah, it happens to me that I had to refer my patients to other practitioner, because, for example, I had this boy that I treated a couple of times, but my treatment wasn't effective enough because he had a really important crossbite, so I needed to refer him to a specialist, dentist in this case, to assess the crossbite and to work more on the teeth and more on what is, yeah, anatomy that I can't change. (PF)

Sometime you can find a couple of teeth are touching before the other one, so the other one, so this can create some imbalance on the TMJ and you can work on the teeth singularly, but is more fair to find the type of things because usually it's hard to find them and will be good to have, for example, an X-ray in which you can see the fact that those teeth are touching more than others. Which a dentist would have access to. (PF)

Role of Surgeons

The inclusion of this sub-theme section under this overarching theme can be comparably justified by the reasoning of inclusion of the previous subtheme; the role of dentists. All of the participants in this study evoked perspectives about the role surgical intervention plays in the management of TMD, which provides additional information relevant to where they perceive the osteopathic role. Some of the reported quotes contain data that indicates where participants feel that they can assist patients who are undergoing surgery on their TMJ, help a patient avoid surgery or indicate when (preoperative or postoperative) they are seeing patients with TMD.

Normally if it's coming my way from a Maxillofacial surgeon, then it's usually pre surgery so they're trying to avoid going down that surgical road.

Sometimes afterwards it'll be post. If they... Once they've kind of got clearance and everything's settled down a little bit. (PA)

I think when things haven't been working great. So, again, those are the referrals that I get when they're just trying to avoid surgery. So it's kind of that sort of last stop really. (PA)

But I would say, that we're probably less likely as osteopaths to be sent a patient who will need surgery. We're probably most likely to be seeing a patient after they've been to a surgeon, compared to us needing to refer to a surgeon. And in my experience, we haven't seen people who were that bad with the TMJ that we had to refer to an oral surgeon. (PC)

Osteopathy will find that we wouldn't be dealing with like... The day-to-day, it's really the mild or the very, very discomfort... The very painful ones, but not to the point of needing massive surgery. Like jaw surgery, it's bloody horrible. So for someone, it's not like a knee replacement or anything like... Jaw surgery, you've gotta break the jaw, and it's not nice. Someone who needs a jaw surgery of reconstruction, they've got a lot of issues, generally. (PC)

Yeah. And the exception... So, I've had two patients who didn't respond well or didn't respond as well. The first was one where, we were essentially looking at kind of low key, 20 years' worth of jaw pain. And first time seeking treatment and just didn't respond and referred and they ended up having surgery because that's what their jaw needed. So, they were never gonna respond well because if their disc is torn to shreds and their cartilage is inflamed and torn and there isn't anything I can do that's gonna help that. (PD)

The referral to the surgeon had already been started. And then they came to see us by the time their appointment with the surgeon had come up, they'd had, I think two or three or four treatments, had had their symptoms decreased by about 60, 70%. So it was a case of going let's just hold fire and see what happens in the near future. (PD)

I think that there's probably a beneficial role. And you know what immediately springs to mind is possibly an elder person with degeneration, pain, dysfunction, so a corticosteroid injection might be something that's of benefit. But yes, so I do think that there is... And again, if there's sort of quite significant trauma that may need surgery, well, it's not going to happen on the osteopathic treatment table. So there's definitely a role and higher levels depending on what the issue is. (PE)

Other excerpts from the interview transcripts provide information about when the participants feel surgery is indicated. These opinions range from the age of a patient, the type of TMD, the severity of a TMD, to the general protocols that should be taken before surgical intervention is required.

If nothing else is working, surgery. Or particularly if it's articular cartilage that's been flipped in and out, you know, like there's some serious stuff going on then that's then yeah. That's where they'll end up. (PA)

I mean, obviously they're at the outer end of things. And I wouldn't expect to be having too much to do with them to be honest, even in an ideal scenario, because generally by the time people are needing orofacial surgery aside from the normal stuff that we can do post surgical. Just getting everything functioning again. Any kind of surgical after effects, but in terms of specifically referring from them.

Yeah, I wouldn't even say that they would be referring to us because people are too extreme by the time they need that kind of help. (PB)

So post-surgery, I think, we could have... It would be great if the surgeon were referring to us for that post operation type thing or if they were on the fence with a needed surgery or not. And we could actually reduce the symptoms by doing manual therapy. And if it was really not working, then we could go on to doing surgery. (PC)

The obvious answer is gonna be around severe joint dysfunction, structural... severe structural joint dysfunction. So I've mentioned intra articular disc problems, joint debridement, reconstruction of the joint. Repair of associated structures in terms of ligaments or muscles, post-trauma would be kind of the main ones or their involvement kind of fits into the first category but as part of the management plan of long-term dental biomechanics. So somebody who, for example, was born with quite severe jaw deformation or tooth dental issues and so their management plan spread over 15 years is, we're gonna do this to your teeth, and we're gonna do that to your teeth and at the end of it, you can go see the surgeon to fix what is left. (PD)

Theme 2: Management

The management of TMD was a theme identified from the recordings of the participant interviews. This theme looks at osteopaths' management of patients with TMD, the factors that are considered and practices that are employed. The subthemes of management are the techniques, aims of treatment, aims of management, and strategies for generating a management plan as reported by the participants of the study.

Techniques

This section reports the notion participants expressed surrounding specific techniques for TMJ dysfunction. The quotes below, taken from interview transcripts, elucidate the participants' individual clinical processes for treatment, including facial work, high velocity/low amplitude techniques (HVLA), Muscle energy techniques (MET), balanced ligamentous tension techniques (BLT), articulation techniques as well as just general soft-tissue technique. Most participants had some variation between them as to which particular techniques that they found most effective, with some targeting areas that could relate to TMJ function such as the upper spine, diaphragm or cranium rather directly targeting the TMJ's anatomical components themselves. Other participants expressed that they used combinations of both direct and indirect techniques.

Yeah, it's so different, but I would not ever just treat the jaw. So I would look at the bigger picture. So it's not unusual for me to start with the base of the neck, like the upper teeth is fine, making sure that's all free. So manipulating, if they're... If it's okay for them, if it's safe for them. And then any cervical spine restrictions that I find, I'll release them off too. (PA)

Like pin and stretch articulation under the diaphragm. Obviously, the rest are manipulation. I mean...HVLA if it's the thoracic and the C-spine, if it's indicative to them, if it's safe for them. So I run through all my regular tests to make sure it's okay for us to. And then I do... Really, depending on who they are, but as a broad kind of technique, I would do scalenes, I would do upper trapezius soft tissue or MET, open and stretch, and upper trapezius, loose cap, often through the ECM, to release all that area off. Do pterygoid, where I can get to it underneath here. And then, work on the masseter externally. So I do all the external stuff first. Sometimes I do fascial drag or release through the

ear. So I'll give it a good hold or I'll just pull everything that feeds into the TMJ fascially, so it's like an ear pull. (PA)

I'll get them to just open their jaw slightly so I can get into the little attachment sites and just push externally. Do the temporalis. Sometimes I do frontalis and I'll run the eyebrows as well, just to release up everything that feeds into any trigger points that might be in there, referring around there. And then, gloves on and then get into the mouth. So then I go and do masseter and pterygoids. Inhibition. If it's like... If there's trigger points in there that I can feel, I release them all off. So I just wait until it abates a little bit for them, then I'll do some deep longitudinal work in through there. Move the jaw over and get into the TMJ. So I do the inhibition and through there, I feel for temporalis insertion, just to make sure everything's all right in there. And also just while I'm in there, check the range like the cavity, how much space is in there, which is grabbing more than the other. So one side's often a much tighter fit than the other ones. So that kind of tells me how well that TMJ's moving. (PA)

But really, really gentle. And then you just wait for the softening and it releases up pterygoid, the masseter, everything is just incredible because it's very... You're not directly into the muscles, but you're getting... Those strong techniques, I feel can... So they do work sometimes, but they can kind of be a two-edged sword where you get that tensing back up because it's such a strong technique. A softer approach to the fascia around the muscles and releasing that off can actually have more of a reduction in muscle tone than healing the muscle itself. (PB)

I found the fascial approach to be the bee's knees. Yeah, there's just, yeah, basically any fascial stuff intra-orally. (PB)

I'm not an upper C-spine HVT person generally. I'll do it if it's needed, but it's not my first go-to. So yeah, articulation, just all the usual, the usual suspects.

(PB)

So how do I treat them? Literally... So locally, all the TMJs, all the muscles touching onto the hyoid and then obviously ECM scalings, suboccipitals, upper traps, peaks with that whole upper cross pattern kind of type thing.

Diaphragm, 'cause obviously, if you've got that kind of stressful component, so I do a lot of work on the diaphragm, T-spine manipulations, C-spine manipulations, METs of the jaw, inhibition. I do quite a lot of inhibition when it comes to the jaw on the masseters. So a lot of the inhibition. (PC)

I would say your HVTs, your external work. And then if you really want to, I think doing internal work through the jaw I think is fantastic. (PC)

If we were someone who's got TMJ because of the... Or TMD with dysfunction due to posture and things like that, then obviously, having T-spine manipulations will always be quite a nice thing to do. (PC)

I think if someone is stressed and they've got TMD because of stress, then I think working on the manipulation and the actual HVT will be really, really good and the same for someone who's coming in was TMD pain because of braces and things like that. (PC)

Yeah, so, usually inside a mouth I can do both or more structural techniques, or craniosacral techniques because, for example, more structural. You can work on the pterygoids muscle. You can work on the buccal floor. The inhibition techniques on the pterygoids. Yeah, it's more about direct inhibition. You can work on the ligaments, directly from the inside. You can work on the

masseter, not just compressing from the inside, but clinching from the inside. Like this. The same for the buccal floor. Another really good technique while you work on the TMJ is on the tongue. (PF)

So basically, there are a range of more structural techniques, which are implying muscle release, digastric release, ligaments release, articulatory techniques of the joints, of the condyle. Then you can have some adjustment of the joints. I don't tend to use them too much because I prefer to use articulatory techniques. I find them as effective as the adjustments, but less uncomfortable for the patient because the adjustment, especially with the direction that you give, can be perceived as a danger from the patient. Because it really seems that your jaw is just shifting away from you. (PF)

Though the participant quotes from above extrapolate more general approaches with specific techniques that they found had the most efficacy for TMD as a disease in their experience, these next excerpts demonstrate that most participants are making more patient oriented choices when deciding on techniques to use for an individual patient.

Just again, whatever, everything from HVTs to BLTs and everything in between, so... Yeah, just whatever works for that patient and whatever's appropriate for that patient. Even lots of METs. (PB)

In terms of frequency that the main one is probably gonna be MET. I use a lot of MET for the jaw and I keep it... To be honest, I keep it fairly straightforward with the jaw primarily because I've never needed to not keep it straightforward. So either I kind of side shift METs or depression METs usually tend to do the trick really well. And so when I say depression METs I mean ones where I encourage depression on relaxation phase. That's the main

techniques that I would use. And then inhibition or MET to the main muscles of mastication. So masseter, temporalis. (PD)

I wouldn't say that there is any particular technique. We highlighted it before, everybody is so individual and variable, not just in their presentation, but in their response to treatment. (PE)

So as I say, generally, I treat cranially because a lot... Just because you can treat, not just as a structure, you can treat the whole vault, you can treat the neck all at the same time. But I do, do a fair bit of intra-oral work, so inhibition of the pterygoids and I will very occasionally... I generally don't... I only very occasionally do sort of any articulation, sort of holding lower down and articulating, but you need to be really careful. It's a very sensitive joint so you just don't get in there like a bull. Occasionally I'll do some MET. (PE)

I always pick and choose the techniques that I think are better for that patient. I usually tends to use both cranial and structural techniques together on the same patient, but I change based on what I found, which one I think is more effective for my evaluation and for what I found. (PF)

I tend to use a lot of similar techniques because on the TMJ you have those structures that you have to check, you have to treat, but at the same time everyone has a personalized treatment. (PF)

Aims of treatment

This particular section compiles the participants' aims when delivering treatment to a patient with TMD. Most participants' treatment aims involved reducing pain for the patient, reducing symptoms or improving function of the TMJ itself. Some participants

also aimed to achieve functional symmetry between both of the TMJ joints in order to achieve the aforementioned result for their patients.

People remember that stuff and get really good relief from it, so...Hopefully, symptom relief is primarily what I'm going for. (PA)

First couple of treatments, I would usually suggest four treatments to start, just to... And I'm talking very generally here, but the first couple of treatments is to try and reduce some of the pain, given that it's usually pain that's driving them. (PB)

Yeah. It depends what stage we're at. Yeah, as always, trying to reduce pain and increase movement. (PB)

Yeah, I guess, it's just that stuff with being able to eat without pain or not have to take so many painkillers to manage it. Or a reduction in headaches. That would be the top three, I guess.(PB)

So usually it's quality of life, I would say and pain management as an osteo, that's where probably you would look at. (PC)

So pain, intensity, range of movement and then the quality of life, which obviously goes hand in hand with pain levels. So yeah, that's pretty much that what I would focus on. (PC)

I aim to achieve as much symmetry as possible. Because essentially, I view the... From a conceptual basis, treating the jaw is very much like treating the pelvis, you wanna make sure that all of the joints that contribute to the overall movement of the jaw are functioning equally well, in the same way that if you're treating the pelvis, you want to make sure that the and pubic

symphysis are all moving equally well, otherwise, you're just gonna keep repeating the same thing over and over again. And so with very few exceptions, those being ones where I know it's unachievable or it's contraindicated treatment-wise, getting the two TMJs moving as equally as possible is usually what I try and achieve. (PD)

I guess it is reduction in pain and better function. (PE)

It's more about increasing the shift of the joint to improve the movement, to reduce the friction in the joint, but [that's] more rare. And usually the main one used is about reducing pain itself, like a lot of medical approaches. (PF)

So usually because both TMJ are not working together, so one is working more, the other one is working less, and the aim is always to find the balance between the two condyles. But there is not a real typical TMJ patients because every patient has some structure in which you have to work more (PF)

So the aim of the treatment itself is about reducing the pain, the discomfort while they're using the joint, improve the functionality of the joint, reducing the alteration that the joint can have related with the C spine, with the body. (PF)

This second set of quotes from the interview transcripts reports on the more nuanced ideas expressed in parallel to the ideas reported above. It contains data that shows some patients believe the aim of treatment could change depending on presenting symptoms (pain or dysfunction), what the patient wants from treatment, and what the practitioner is aiming for in terms of empowerment, relief from stress, and long-term functional benefits for patients.

So all about increasing function movement of the TMJ and surrounding structures, muscles. So if somebody is posturally not on a good place, the jaw is not gonna sit in a good place. So it's not enough just to rub those orbitals, as you know, that's never the solution. So we can't just treat the jaw if we don't address why it's all coming in and happening in the first place. You'll know from your neck. If you're upright, you have a lovely space in your jaw. When you lean forward, it gets slammed shut. So you've gotta make sure that everything is happy along that pathway. (PA)

I go for where the most obvious stuff is first. So with TMJ, looking at cervical spine dysfunction, particularly the upper C-spine, you're looking at obviously the jaw itself... The TMJ itself and surrounding musculature. (PB)

And yeah, so treatment is usually in terms of what you're actually targeting is again C-spine TMJ. So whether that's directly targeting the joint or directly, or targeting the muscles, again, it's back to what's the primary driver for that person's presentation. (PB)

Yeah, one of the things I thought about that I sort of keep in mind, I guess, is, so your jaw muscles are some of the strongest muscles in your body, able to get incredible pressures at the same time as being incredibly reactive and sensitive because they also need to be able to take the feedback from your teeth. And if there's a grit, piece of grit in your food while you're biting down really hard, they need to be able to respond really reactively and stop you biting through this grits and wrecking your teeth. And to me, I would never ever prescribe any kind of strengthening issues for jaw muscles because they don't need it. (PB)

Good range because a lot of the time what tends to happen is you either get one of the two and joints that starts essentially being overused or overloaded in terms of compression and sheer amount of movement because the other side isn't doing its job. So you want the other side to move well or you have general function that's being impaired because the fact that the temporomandibular joints, aren't moving as well as they should and those will be the patients who can't open their jaw wide enough, or it hurts when they yawn, because they've got a problem with the intraocular disc or et etcetera, et etcetera. So restoring full range movement is usually top of the list where possible. (PD)

Symptoms and particularly function, because one of the things that... The main reason I think that pushes people with jaw pain to finally go from not seeking treatment to seeking treatment is either pain levels that finally exceed their tolerance. Which for jaw seems to be substantially higher than any other body part or function being affected. And so as soon as they lose the normal ability to talk, sleep, eat, drink, whatever, then that's suddenly when they knock on our door. So in terms of the role of OMT or osteopathic manual therapy, then symptom resolution, obviously. Yes. But also restoring function as much as is possible given what was happening with that joint. (PD)

Again, [the aim of treatment] depends on presenting symptoms. So if they're coming in for pain, if they're coming in for dysfunction. (PE)

Predominantly symptom relief, but also, it would... I don't... It will certainly help just in case the jaw is restricted and just help to keep things mobile, but I think it is also a form of empowerment. When people are in pain, some people want to do something, they don't just want to sit there. (PE)

To find the main cause of the alteration [that caused] the pain, you tend to follow... So personally, I tend to follow the... I found the structure that is giving pain and then I try to follow why. So the path there, the alteration of the posture that is leading that structure to work in a different way, in an altered way. (PF)

So it is always based on what the patient wants from my treatment, which is the aim, then about the condition itself. So, which is the condition that leads into the pain, which is the cause of the pain, of the discomfort itself, and also I tend to have like two, three treatments in which my aim is to have at least a reduction of the pain. If there is no reduction or the reduction is that low, there is not really changing anything, then I think that's the time to send to another practitioner, because my treatment especially on the TMJ, with the technique that I'm using, I know that after the first treatment, the patient need to feel at least some release. At least the TMJ and the function of the TMJ should have been improved. And the second treatment they have... So one week after, usually more or less, they have to have a reduction of pain. Maybe not completely, but at least a bit of reduction of pain. (PF)

Aims of management

This sub-theme looks at the participants' aims when managing a patient overall, after treatment. Common ideas expressed in the quotes below relate to the importance of patients taking responsibility for their own management, the importance of education surrounding what patients should and shouldn't do after treatments and the need to tailor management to be patient specific.

Again, it would be... The factors would again be determined by the patient and their needs. Right from the start, I'd be questioning to find out... 'Cause it

depends on the history of how they got there. It depends on the type of person they are. How distressing it is. For some people it's mildly annoying, for some people it's... They can't eat and they're losing weight. You've got a real range of things. That determines how urgently I would get them through for review with, say, a specialist or something if needed. Yeah, I can't really... I don't really do one size fits all. (PB)

Because as with all osteopathy, part of it is what we do to the patient, but most of it is what the patient does for themselves. From the kind of information we give them and the management. Yeah. So it's about... There is definitely a big element of their sort of self-agency in terms of whether their symptoms are gonna reduce. (PB)

The management, yes, will certainly be different depending on the course. Absolutely. But I do think that if it is more structural, like for example braces or ear infections, sinus infections, all of those, then yes, I think I'll be more structural in terms of saying to the patient, "Hey, do those exercises. Make sure you chew on a different side of your mouth. Make sure you're not always chewing. Pay attention to how you chew your food and do that tonight you will see you probably chew on your right side or your left side." And then if we have more of a lifestyle, if the TMJ is kinda more caused by lifestyle stress and yeah, life, I guess work related, then I would say that's what we will focus on, okay, maybe some mindfulness, some journaling, maybe reinstalling a little bit more exercise in their lives, diet. Just to kinda give them a little bit more of a refresh with their lifestyle to try to help with stress levels. (PC)

I think like any other, having a really good look at predisposing and maintaining factors. So the percentage of change that you can get with TMD

without looking at predisposing and maintaining factors, I think is substantially smaller than most other body areas, because it's just like the ribcage, we can't stop using it. And therefore, if there's anything that is inhibiting that function from happening properly, then that has to be addressed first. So more often than not, management is aimed at those rather than the findings around the TMJ. (PD)

So the first one is telling them we all do this, but I think with TMJs, it's really key. Telling them what to expect and what not to do in the first 12 hours after treatment. So not to test their jaw, not to go and eat something that's gonna particularly strain their TMJ or require a lot of muscle use. Because it just has the capacity to take everything you did in those 20 minutes and completely evaporate it. So that would be the first one, the second one, self exercises. So I have had patients do self-help or self-care quite a bit. I'm gonna loop in kind of self-management strategies for any of the predisposing maintaining factors. So that's their neck posture, their neck function, their breathing, all the other stuff that I've included in the treatment of them at the time that isn't direct jaw work. Because that forms a big part of what I do. Lifestyle modifications. So telling them not to chew their pen or stop chewing gum or whatever that might be. (PD)

Strategies for generating a management plan

Participants of this study also shared different strategies for generating management plans for their patients during their interviews. This section reports excerpts from the transcripts that show varying strategies between participants including the need to assess patients individually, their specific lifestyle factors, severity of their TMD. Some

participants also highlighted the importance of managing patient expectations and giving patients the tools to manage their TMD themselves.

Oh, so when you wanna... Sort out a management plan, what factors? So pretty much what we were talking about last time or just earlier, so lifestyle, work, stress level, sleeping positions, whether there's a family history of ear infection, sinus infections, whether the patients had braces, teeth issues, and whether they've had a history of trigeminal neuralgia. So issues with the nerves. So that's pretty much what I would consider as looking at the whole picture and establishing why they got TMJ in the first place and what are the factors that make it worse in a way. (PC)

They couldn't even open the jaw. So yeah, it was that locked. And so I said, "Well, cool. That's kind of what we wanna work on. So we're gonna write down a list of things that are difficult for you to do. And then next week we'll reassess. So we're gonna be working on range of motion and then pain intensity." (PC)

Sometimes just to kind of understand the severity of the problem, because then that means that that will change the management plan. If we're dealing with a massive tear, we're not gonna be doing the same exercises as a mild tear. So it's kind of giving us the chance to really give exactly what the patient needs. (PC)

Looking at and how much they use their jaw in day to day life. So in terms of what can be modified, but also in terms of expectations management. And so if you've got somebody, for example who works in a call centre, or who's a lecturer or uses their jaw a lot generally for their jobs, then going, okay, we can do this. We can treat this really well, but your prognosis is still not gonna

be great because we can't take this off. And that's just gonna slow things down. Managing expectations. (PD)

I often use the analogy of a set of old fashioned scales in terms of patient management. You wanna take stuff off the "negative maintaining predisposing" side of the scales and you wanna put stuff on the "will help recovery" side of the scales. TMD management is usually about taking stuff off the bad side. And putting stuff on the good side is most of the time hands on treatment, or looking at the secondary or tertiary reasons in terms of anxiety and depression or stress management or that kind of stuff. (PD)

Giving people tools to work with. And for some people that may have ongoing issues with their jaw, just having a few techniques may be the difference between a recurrence developing into something quite uncomfortable and being able to manage as things come along. (PE)

Occasionally, I'll give people self-management, such as sort of METs, self-MET, might be one or you can do a little bit of self-inhibition (PE)

Many of the participants included different strategies for managing psychosocial factors related to patients with TMD, and the different ways that they can generate a management plan that incorporates this for the overall benefit of their patients.

So, all of them I think have come about from lifestyle factors. Which is stress. And I think people don't even know they're doing it half the time, even just... Even people who probably don't perceive themselves as being stressed but are super busy at work and they just clench, and they don't even know they're doing it. So with them, I just start with... 'Cause the greatest way to change your habit is to have awareness of it that you're even doing it. So I don't even

give them homework. All we do is just say, I want you to be aware of when you're doing it. So go about your day as normal. When you're working, every now and then, just check in and see what you're doing with your jaw. And they're like, "Shit. I was just clenching. Constantly, I keep going back to clenching." And so with that awareness, they can now check in and go, "All right. So maybe I'll try and stop doing that so often." (PA)

Yeah, generally, like I said before, if it's a stress thing we try and look at options for what's gonna work for that person. Doesn't mean I necessarily do that work with them, but it's getting them to have that discussion and they're thinking about what their deal is on how to manage their stress. (PB)

So I've been looking more to self-management and just discussing with patients on what they could do. 'Cause obviously, for example, some people, meditation might be really helpful for more stressed patients. Other people like myself, if you even say the word meditation, it makes me want to scream. (PB)

You can have a real stressful life but if you've got great management skills of that stress, then you might not have TMJ. So that's why you really want to ask the patient, what do they do? Because being... Having a stressful life doesn't mean you're stressed. If you manage it really well you might just handle the stress really, really well. So I think focusing on what the patient is doing to manage the stress is far more important than knowing they've got a stressful life. (PC)

Theme 3: Collaboration

The third main theme identified from the recorded interviews looks at collaboration between osteopaths and professionals from other health disciplines regarding TMD patients. The participants of the study expressed views surrounding the ways in which referral is carried out, their reasoning when deciding whether to refer or not, and the perceived importance of collaboration for TMD patients.

Clinical decision making

This section reports on the professional opinions and processes that guide the participants when making decisions about patients with TMD in a clinical setting. Some of the quotes excerpted from the interview transcripts show what ideas they held about when or why they refer, who they refer to or whether they refer at all. Apart from abnormal or outlying situations, many of the participants expressed similar protocols where after 1-4 treatment sessions, patient symptoms would be evaluated, and referrals considered.

So from a prognosis side, we have a clinic philosophy that if we're not seeing changes within three to four treatments, we're gonna refer or consider other options. And we do that across the board, just because I want... Because I would expect to see something changing in that time, and if it's not, then I have to question if I'm on the right path or if I need to check in and make sure that I change my treatment plan if I need to, or if they need to go and see somebody else, then we refer them on. (PA)

So if we're not getting results within three or four treatments, we'll reconsider, 'cause I don't want anybody to ever feel like they're locked into two years of weekly payments. (PA)

So we're very big on that, again, and it's come back to that policy that we have; Two to three treatments, if you're not better and we've done all the tests, usually most of the time people are on ACC anyways, it's a little bit easier, yes, but more a bit more affordable for them. But regardless of their status, we're there for the patient. And if we feel like we haven't got the perfect diagnosis, then we just refer them for an x-ray and ultrasound to get that confirmation that we're dealing with exactly what we think it is. (PC)

But I think you should really have a policy that, okay, you've done two or three treatments, if you're not seeing a massive improvement within three appointments, you should be referring to a specialist or something like that. (PC)

And the first thing is, yes, identifying the issue and then before I actually referred anybody anywhere, unless there was something severely wrong, you'd treat. You'd treat two or three times and see what improvements or worsening you'd get if that was the case and then you would consider referring. (PE)

So it is always based on what the patient wants from my treatment, which is the aim, then about the condition itself. So, which is the condition that leads into the pain, which is the cause of the pain, of the discomfort itself, and also I tend to have like two, three treatments in which my aim is to have at least a reduction of the pain. If there is no reduction or the reduction is that low, there is not really changing anything, then I think that's the time to send to another practitioner. (PF)

And, so I usually tend to consider two, three treatments. And then it also depends a lot on the patient, because if the patient feels some benefits, like even a little reduction of pain and is okay with that, we can keep going with

the treatments. But I always tend to tell them, "Okay, we have... The treatment doesn't seem so effective, so it's better if you go and see with another practitioner to find maybe a different approach. (PF)

Many of the participants also expressed their decision making around when or why to refer. An idea that was expressed repeatedly included both TMDs that lay outside the osteopathic scope or skillset, and patients that did not gain benefit from osteopathy, and that these situations could be used as clinical indicators for referral.

I think it's really important to stay in your lane. So I never make claims that I can fix stuff that I know is a... Like a dislocated articular cartilage, for example, that's clicking in and out, I can't... I'm not Jesus so I can't fix that through touch. [chuckle] I can do my... I can have my best shot, but then in that role, I would work... I would facilitate. So I refer regularly to people who I've got a really good network around me. So I would refer to a maxillofacial surgeon, and it might be that I just do the prep stuff for surgery or work on them post-surgery, work together in that field. But I'm also realistic about what I can and can't achieve. So I'm not gonna tell them, I'm gonna be able to relocate that for them and that it's gonna stay in that place, if I know that's probably gonna require surgical intervention. (PA)

Yeah. So most commonly, if it's something that I can't deal with, then yeah, it would be through to a dentist if they need a... Yeah, either dental review or they need some kind of splint (PB)

Like I said before, then we'd start to look at what's been really resistant to change and what's needing a different approach. And that's when you come in to your psychosocial stuff or referral to some kind of dentist, whether it's an orthodontist or dentist. (PB)

So we're very big on referring and really realizing how much we can help with versus claiming that we can treat everything and then delaying the outcome, because I think... And I think that's the big problem with osteopaths at times, they think they are superheroes and they can treat everything. (PC)

If you catch it early, absolutely, you can deal with it. You can give them the exercises, you can do the techniques. Absolutely. It's amazing. I think if it's been something that's been long lasting, then it's probably more of a multidisciplinary thing, which I would say, "Cool, let's refer". (PC)

Now, so sometime, yeah, it happens to me that I had to refer my patients to other practitioner, because, for example, I had this boy that I treated a couple of times, but my treatment wasn't effective enough because he had a really important crossbite, so I needed to refer him to a specialist, dentist in this case, to assess the crossbite and to work more on the teeth and more on what is, yeah, anatomy that I can't change. (PF)

Another interesting excerpt was taken from one particular participant's transcript. This excerpt expresses the importance of ensuring quality care when referring a patient on.

I think it depends who you send them to. You gotta be really careful about where they go, that it's not just training. It needs to be for functional use as well. So I'm pretty fussy about all my referrals, all the people that I send people to are people that I know have got a good education and good reputation. (PA)

Referral pathways

This part of the findings reports on the nature, process and professional routes as perceived by the participants when referral occurs for a patient with TMD. Some of the

participants had strong professional networks that were utilized for patients, including dentists, maxillofacial surgeons, general practitioners, psychologists/counsellors and acupuncturists, whereas others relied more on general practitioners as a proxy for referral. These excerpts from the interview transcripts include quotes about referral to an osteopath, and referral from an osteopath and how it takes place. These quotes also refer to more direct interdisciplinary collaboration or communication.

So we have a reasonably good referral network from dentists and from maxillofacial surgeons. And they tend to send us the real curly ones that they're struggling with as well. And all The Face Place, I think it is, also does acupuncture into TMJ. We often get their patients. So we get all the too hard basket cases, and sometimes we're a last resort before they go and have articular cartilage surgery. For example, if they're needing to have a relocation of their disc. They wanna just really explore everything to see if we can help before then. (PA)

Yeah, we've had a couple of Maxillofacial surgeons who have supported our, our business again 'cause not many people do TMJ work. And probably also again, the conversation we just had about that trust thing, no one, you, you have to kind of know that you're not... I'm not gonna screw their patient over basically if it's not working and we'll... We stay in contact with each other, we just drop each other our emails and with the patients' permission to, to check in and see how they're tracking at either end. (PA)

So we do, we work with psychologists and counsellors. So depending on where their budget is and GPs. We usually refer them back to the GP so that they can get free access to counselling if they need to start there first and foremost. But we also have home and family counselling is near us and they

work on cohabitants 'cause a lot of people are struggling financially at the moment too. So we have them as an option as well. (PA)

Like in any industry probably I would've started accidentally just getting people coming through and then treating them and then they have gone back and talked to their provider about it. Whereas sometimes when I'm being good, I will directly communicate with those people and say, Hey, this is what I do. This is something that I have done training and you may not know about it. And that's just a way, so every now and then I'll do, like, I think twice now in my 15 years I've written to all the dentists and just say this is what I do. Which is helpful. But I think if you've... Particularly, if you've had a referral, if you write back and just explain what you've been doing. (PA)

Essentially they were referred to the surgeon via their GP before they came to see us. Then they learned to the fact that we could treat jaws. The referral to the surgeon had already been started. (PD)

They tend to come from the dentists. I guess, when that's not true. I would probably send them back if I thought that a splint was warranted, like if it was gonna help with the resolution of it. 'Cause it's all about... Well, it's a very complicated condition. (PA)

Yeah. So post-surgery, I think, we could have... It would be great if the surgeon were referring to us for that post operation type thing or if they were on the fence with a needed surgery or not. And we could actually reduce the symptoms by doing manual therapy. And if it was really not working, then we could go on to doing surgery. But I would say, less likely to be dealing with an oral surgeon from, "Oh, I couldn't really fix them. Can you try to see if they

need surgery?" Probably, that actually wouldn't happen. But the other way, probably a lot more. (PC)

A second category has included dentists, but usually it's counsellors or psychologists or GPs in terms of getting proxies and stress responses out of the way. And then the third is, or a surgeon. (PD)

Most of the participants mentioned self-referral as a common practice for TMD patients, and that most referrals were conducted by suggesting a patient try a health practitioner from another field rather than actually communicating between disciplines or engaging in collaboration. One of the reasons suggested for this as a mode of referral is that patients often already have some form of medical relationships with dentists, GP's or surgeons before they reach an osteopath.

Unless patients self-refer, the referral comes from other people who are working in that area. (PA)

If they need some kind of device or I suspect they do then yeah, that would be one reason. I don't get involved in... Unless someone's got tooth pain, [chuckle] like, then I would just more suggest to the patient get a dental review because things like malocclusion can contribute to this. (PB)

So sometimes there are GPs that are referring...Occasionally. Yeah. But again, just, check out an osteopath where for this it's like, I think they're a bit more vague, GPs will refer to us for other specifics. "Oh, you've got sciatic pain? Go to an osteopath." Whereas I think it's more for this kind thing, you could try an osteopath, they might be able to do something. Yeah. (PB)

Patients who usually need to be referred to surgeons, I would say, would have had long lasting issues with TMJ and... Or TMD, and therefore have had probably multiple referrals to doctors and everything prior to that. So I would say, if I've gotta refer them to a surgeon, then they either already seen one before, or the GP has missed something pretty big. (PC)

We've had a couple of GPs who referred to us and I wouldn't be able to pinpoint when it was 'cause I haven't treated a TMJ dysfunction in quite a while, actually, probably a couple this year, but not recent, super recent, but yeah. Some were self-referred and then the one profession that had referred was, yeah, a GP. (PC)

Not directly to a surgeon, but via their GP. Yes. So I've had quite a few indirect ones in terms of patients who have come to see me who were told by their physio or their massage therapist to go see an osteopath. So not me specifically, but an osteopath. (PD)

That's it, yeah, from a GP. Yeah. It wasn't anything formal, it was just sort of said to the patient, you could consider going to see an osteopath. (PE)

I think that could've been a self-referral. They would've investigated it and booked themselves, and yeah. A number of patients that I have seen have come following having braces put on. (PE)

So, not directly. So I haven't received like some email from some practitioner, but was more the patient that told me, "Oh yeah, I was told by my specialist to go to an osteopath." But those are really few cases. Those are that the specialist is sending you the patient, is more about the patient hearing from

friends, family, or just looking at the website that I'm treating TMJ, so they are like, "Oh yeah, why not just go and see". (PF)

One dentist and another one was more a surgeon for the injection itself. But it was not really my referral, was just telling my patient, "Okay, I think you have to go back to the injection." Because she already did the injection. (PF)

So sometimes you refer them to specialists, but is more likely that they already have their own dentist, they already heard or done something about it, so I tend to just tell them, "Go back to the previous practitioner." (PF)

Importance of collaboration

This part of the findings section includes quotes that indicate the opinions of the participants with regards to the importance of collaboration for TMD patients. Most of the participants felt that collaboration was an important part of the management for TMD, some of the ideas expressed were about collaboration as best care for TMD and its complexity, its ability to reduce pain and related symptoms with more effectiveness and efficiency, and the need for practitioners to position patients' well-being as a main focus when considering referrals.

So I don't think any one person is likely to fix it. I think it needs a combined effort. (PA)

Then you start to get the referrals coming through, but it can take time. And like I said, I've been in this industry for a really long time. So, and I sit on the board of sports medicine, New Zealand, because I'm a huge advocate for interdisciplinary collaboration towards kind of finding the best care that we can all provide as a unit. So I'm a huge, huge believer in that stuff. And so probably all of that stuff has helped with some of my referrals, but it's hard

because we definitely won't be the first protocol. Generally. It's super important because you inevitably are gonna be working with other people with the TMD patient. It's almost never just you. Or yeah, I, if it was just you doing it, I think you're being naive to your capabilities. It's just not that simple. It's not a simple condition, so it needs a wraparound support for it. (PA)

Often, when I see people for TMJ stuff, they've been to the dentist, they've been here, they've been here, they've done... Been there, done that, with a whole bunch of different things and it would've been good to get them earlier and it would've saved them a whole heap of time and money and pain. (PB)

Yeah. I was having that discussion with a patient the other day is it would be really cool if it was just like, I felt, it was just a thing, "Right. Oh, you're having this dental work done. Here's the local osteo's card," might just check-up. And it just becomes part of the same treatment essentially. So I don't know, like you go to the hairdresser and you get your hair cut by one person and dyed by another. It sort of becomes the same thing with your jaw and your teeth. (PB)

The cool thing about osteos is that even if a surgeon is dealing with it, you can still work on the pain management, because while you still have a treatment with a surgeon, you have a jaw surgery or whatever, you still have all that tension. So the osteopath is still relevant. It's not gonna cure your TMJ, but it's gonna be working on the associated symptoms that you have with that issue. So you can still refer, it doesn't mean that your treatment has to stop and then you've gotta be passed on to someone else. Is that you work alongside someone else who's gonna offer them the added on or the add-on treatment they need or management they need. (PC)

I don't know what the other osteopaths have said, but I do think that people need to stop thinking that they can solve the problem on their own. The more practitioners you have, it's that whole multidisciplinary aspect of things. I think people need to stop thinking they can fix everything and realize where their scope ends and make sure that they've got the patients at the centre of the consultation, and not thinking, "Oh, but if I pass on that patient, I'm not gonna make money." We don't care about this as long as the patient is getting better and is getting what they need. (PC)

It has in most, in most cases it was down to the diversity of techniques. So, the practitioners doing, both practitioners doing techniques that were quite different and therefore the patient got the most out of it. Sometimes it was around just having a different diagnostic lens. So, the treatment techniques were those that were known by the referring practitioner that kind of the diagnosis and the management plan that we ended up having was quite a bit different to what was originally set out. (PD)

You can reach just a certain level of improvement and... But you know that collaborating with another professional, you will be able to reach a complete remission of the symptoms, or at least you will be a lot more effective.

Because also for example, in situation in which you will need a surgery to replace the mandible, things like that, with the treatment, especially before, or even after, you can improve the outcomes of the surgery, you can reduce the discomfort on the patients after the surgery, you can ease the surgery itself, because if the muscle are released, there are no tensions on the ligaments. Also for the surgeon is a lot easier to have access to the joint, to replace the joint, to put it back in place based on what is needed. (PE)

The following excerpts further elucidate the thoughts of participants surrounding current practices of collaboration and whether they feel collaboration is being undertaken at a rate that would be considered appropriate according to its perceived importance. These quotes are all answers to a question posed in the interviews: *Is there too little, a good amount, or too much referral occurring for a patient with TMD?*

I'd say too little. People are... Not for me personally. But people are funny about referrals. Anyway. People... It's considered a failure if they can't fix people and your treatment's not gonna be everyone's jam and it's not a failure, it's just, it's not the right thing for that person. (PA)

In my experience. Yeah. Too little. (PB)

Yeah, I don't think there's too much, too little, or not. I think there's just too many people medicated and not actually getting treated for the... I feel a lot of people will come and say, "Oh yeah, I've tried everything, Voltaren and Codeine." And I'm just like, "That's cool, but your gut's wrecked and your TMJ is still rubbish. So I think the referral thing is probably not a problem, but it's more the medication side of things. Probably, people are too medicated. (PC)

Too little. The main reason, so the conclusion that I've come to, or that I can draw from my own anecdotal experiences and clinical practice is that there is a significant percentage of TMD that can be treated early and can be treated really well through manual therapy. And I'm gonna quite deliberately say manual therapy, not osteopathic manual therapy, because I think between us and physios massage therapist, it doesn't really matter. And most of the patient population has no knowledge of that. And most of the primary care practitioners who they might go to in the first instance also have no knowledge

of that. And so if they're lucky, if their symptoms are bad enough that they actually go to see their GP about it, the chances of them being referred to somebody who can do something to their jaw before it needs surgery is tiny.

(PD)

It depends. If I can't help and this is not just TMJs, but other issues as well, if I can't help somebody, you'll have an idea of... If you're going to get some change in two or three treatments. And if you're not getting any change, I don't hold onto patients. I'll then say to them, "Look, I haven't been able to help you, you could try x, y and z." I think it is tricky trying to work at the same time with other health professionals because then it's very hard to monitor treatment outcomes. So is it what I'm doing making the difference, or is it the acupuncturist, what they're doing, making the difference? So I'll sometimes say to patients is, "We'll either give this three or four treatments, see how we go. If we're not getting any changes, I'm gonna suggest that you go and see somebody else," or if they are seeing somebody else, if they've only gone once and expect everything to be cleared up, I'll say to them, "Maybe go and see the person another two or three times. If you don't get any results, come back." Especially if you're treating the same issue. If it's something like orthodontic, is, "Next time you have your braces tightened, come back after that." That would be more of a collaboration where you're not doing the same thing. But if you are treating the same dysfunction, I think it's quite tricky to do it at the same time just because you can't monitor the effect of treatment. (PE)

So for what I've seen until now, I think there are a few collaborations, but they're still a lot superficial. So it's more about, "Okay, I can't treat my patient, now it's your patient." So it's not too much about collaborating, but about sending the patient from one to the other, then to one again, to the other. So it's

more like, "Oh, I can't do anything else for you," I send you to another person. And then when that person think that cannot do anything else for you, is sending to someone else, but it's not a real interaction between the two practitioner. It's more about getting rid of the patient if it becomes...do I think collaboration would be better for the patient outcomes? Yeah. Definitely. (PF)

Occurrence of collaboration

This section follows on from the previous and can be used to overlay the findings of perceived importance of collaboration with the reported occurrence of collaboration practices in the real world. Many of the quotes in this section highlight the difficulties, clinical judgements or beliefs surrounding the process of referral in the health system. Other excerpts of the interview transcripts demonstrate who is referring to the osteopaths included in the study, and who the osteopaths are referring to when collaboration occurs if at all. Commonly seen in the below quotes is that most collaboration lacks communication between practitioners and their respective disciplines and that this leads to more of a duality of treatment processes rather than a cohesive management and treatment arrangement.

To be honest, I haven't been referring for any mental health stuff over the last wee while, because there's no point, because you can't get people in anywhere. Which is, I know, a terrible thing to say, but, yeah, there's just been the few people I have tried to refer over the last couple of years of just being spit out of the system. (PB)

So dentists occasionally, not to us specifically, but you should see an osteopath, that kind of comment. But, really, so, I have had a lot of patients with TMJ stuff say to me, because obviously a lot of the time it happens

after dental work. They're like, why didn't my dentist tell me that this was a thing and that if I got this kind of treatment, it would make everything better. (PB)

Only once have I had to refer through to the specialist. And like I said, it didn't really go anywhere, just not through any fault of mine or hers, just circumstances. (PB)

We tried to get her into a specialist, but through the public system was hopeless, and she couldn't afford private. So actually, I don't know what's happened to her. I spoke to her few months after I'd seen her, and she was still waiting to be seen through the public system. (PB)

I mean, we don't do a lot of referrals, but we definitely when we need to, absolutely. (PC)

And I think that's the beauty of osteopathy. I love physios and everything, but I would say if you go to a... Physios are more and more... To look at the whole picture, we've got amazing physios here in Hamilton and we refer to our physios here. So it's not a competition between professions. I think we all have our place in the management of patients. (PC)

It's very much me treating their body as it responds to the orthodontic treatment rather than collaborating with the dentist. I do, I know that my own personal dentist does refer for TMJ issues, but we work in two completely different parts of the city. So it's not as a referral pathway, it's never really going to work. (PD)

I think what's happening now is that you might have somebody who goes to a dentist and they can't open their jaw properly and the dentist either notices

that... Doesn't think they can do anything about it or doesn't notice, or notices and tells them... I don't know actually, I don't have an example for the third category and so nothing happens. (PD)

I have had a few patients who have come to see me because they went to their dentist for dental work, and they can't physically open their jaw wide enough for the dental work to happen. And so... But even then, it isn't a case of the dentist going, "Well, you can't open your jaw wide enough, go see the osteopath first then come back and see me." It's they suffered through a dental appointment where their jaw was further traumatised, because it was forced open for much further than it liked and much longer than they were able to and through external means, they learnt that from a friend of a friend of this friend of a sister of a cousin went to the osteopath. (PD)

I do co-manage a patient with a surgeon at the moment, but when I say co-manage, the patient had already seen the surgeon or was, had already been referred to the surgeon to start with when they came to see me. And so we're basically at the stage where both myself and the surgeon know the patient, we know of each other's existence, although we've never talked or communicated with each other. And it's basically a case of the patient deciding who they go to at which point in time, depending on how their jaw functions. (PD)

And I guess, something that sticks in my mind, I was once at a conference and was speaking to a dentist and she was saying that they don't even know what to do with a lot of their patients that have jaw issues. And so that automatically for me ruled out a referral to a dentist, for example. So I guess, if there was pain and ongoing dysfunction that was severely... That the person wasn't managing, I guess that you'd probably looking to refer to an oral surgeon, I

don't know, I haven't ever done that. So the furthest I've referred is for imaging. (PE)

So for what I've seen until now, I think there are a few collaborations, but they're still a lot superficial. So it's more about, "Okay, I can't treat my patient, now it's your patient." So it's not too much about collaborating, but about sending the patient from one to the other, then to one again, to the other. So it's more like, "Oh, I can't do anything else for you," I send you to another person. And then when that person think that cannot do anything else for you, is sending to someone else, but it's not a real interaction between the two practitioners. (PF)

Awareness of osteopathy

This section compiles excerpts from the participants' interview transcripts with regard to TMJ patients and non-manual healthcare disciplines. All of the participants in the study reported a lack of awareness towards the osteopathic role in TMD management, or even the osteopathic profession as a whole, and this was often offered as a reasoning behind low referral or collaboration rates between osteopaths and other health care practitioners. Some of the quotes also purport that this is having an effect on patient outcomes as patients and practitioners are unaware of osteopathic manual therapy as an effective option for TMD management.

I think it's got an amazing opportunity to help people. But I think at the moment, it's probably incredibly underutilised. People don't really know that it's something that we do and offer. So I think it's got the potential, just from my experience. Not a lot of people do TMJ, TMD work. It's quite a niche market. So I think it's got the opportunity to be really beneficial for people who have got their... That chronic pain, really, or hard to manage pain. (PA)

Osteo unfortunately is probably the least known profession, even though it's probably the oldest. I think in fact, I think it is the oldest, other than a massage, which has been around for thousands of years. I don't know. We are just really bad at marketing and I think people probably also think it's a weekend course and are often shocked when I say it's... Was a five year journey for me. (PA)

Yeah, not... I mean, collaboration. Yep. But just even information going out to patients. Okay. You're having all this dental work done. We're gonna be having your mouth open for quite some time while we are digging around in there. That potentially can lead to issues with jaw pain and headaches. If you experience those issues, then, it might be worth seeing an osteopath. It doesn't need to be any more complicated than that. (PB)

It could just be simple as a Google search because we are higher up the list of people searching for TMJ stuff and we pop up first. So it could just be as simple as that. (PB)

Once you're qualified and you've done a bit of work on the TMJ, out in practice and you've played around with things and found what works and what doesn't for you. And then doing a presentation at like a dental conference [chuckle] and making it really medical and in their own language. So that they're not thinking that we're a bunch of hippies, or anything that it's, this is anatomy and physiology. And, here's what we can do and, just spoon feed them, like when you have patients like this, send them to us because we can do this. (PB)

People are missing the... They're getting referred too much to GPs when they could be referred to manual therapists for release, I guess. (PC)

The main reason, so the conclusion that I've come to, or that I can draw from my own anecdotal experiences and clinical practice is that there is a significant percentage of TMD that can be treated early and can be treated really well through manual therapy. And I'm gonna quite deliberately say manual therapy, not osteopathic manual therapy, because I think between us and physios massage therapist, it doesn't really matter. And most of the patient population has no knowledge of that. And most of the primary care practitioners who they might go to in the first instance also have no knowledge of that. And so if they're lucky, if their symptoms are bad enough that they actually go to see their GP about it, the chances of them being referred to somebody who can do something to their jaw before it needs surgery is tiny. (PD)

Yes, but it depends again on the patient, people don't know that osteopaths deal with TMJ issues, so and GPs probably wouldn't, so they might well be... And dental surgeons. And so I'm guessing that there'll be a lot of referrals up the chain rather than down. (PE)

Yeah. One of my first questions with a new patient is, have you been to an osteopath before? And I'm still surprised at how many people never have. It's still interesting that there's still a degree physio because they're within the medical system, often referrals go there and yeah. (PE)

Other Themes of Interest

This theme covers two outlying sub-themes that were identified in the process of analysis. These sub-themes provide broader context to the perceptions of the participants and their role in the management of patients with TMD.

COVID-19

This section reports on two quotes from separate participants who identified Covid-19 as a factor to be considered when dealing with psychosocial-related TMDs. One of the participants indicates that Covid-19 may be leading to increased rates of these TMDs, possibly due to stress or other external factors, while the other participant places importance on a practitioner's consideration of how Covid-19 influences their day-to-day lifestyle with regards to their TMD.

[I see TMD patients] fairly regularly. And it seems to have been increasing, and I don't know if that's because of mask wearing, but people muck around with their jaws and things while they've got masks on to hold the masks in place. Or just that even the tensioning through the face of having the mask on all day. So I don't know if that's a thing or if it's just a tension thing 'cause everybody's kind of low key stressed because of COVID, all of that, but it does seem to be increasing. (PB)

So often you will see patients who have that diagnosis already made anyway. And if it hasn't been made, then you listen to their story, listen to what they do, and straight away I look into lifestyle. I don't even wait any further, I'm just like, "Okay, cool. What do you do for work? What was your... How you've been... " Especially more relevant at the moment, "How have you been coping during COVID, have you been able to work, were you working from home?"

All those kind of things can really give you information as to how the patient is doing day to day. Are they exercising? Are they the kind of people who bite their nails right up to there and are they A-type personalities? And you will kinda get an idea of who they are. And, usually, there's a type for people who get TMJ, but I got TMJ and I'm probably not a stressed person, but I'm quite a routine. So if I don't really have my routine, I get a little bit anxious. (PC)

Botox

Another sub-theme of interest was a participants mention of Botox as a therapeutic intervention for unresolving TMDs, explaining the caution surrounding choosing a qualified medical professional when referring for this treatment.

We work with people who do Botox if they're absolutely desperate. And sadly, I know that's been done a lot for vanity at the moment, but we only refer for the seriously clenching. I think it depends who you send them to. You gotta be really careful about where they go, that it's not just a cosmetic training. It needs to be for functional use as well. So I'm pretty fussy about all my referrals, all the people that I send people to are people that I know have got a good education and good reputation. (PA)

Summary

This section has reported and organised excerpts from the participants interviews into overarching themes; 'Osteopathic role', 'Management' and 'Collaboration'. This gives an insight into the participant's individual experiences, beliefs and perceptions which, most importantly, provides a dataset that can be digested and extrapolated further. The following section will aim to build a higher understanding of the data, by comparing and contrasting variances and similarities within the data, and discussing how they

interact with the current literature.

Discussion

This study aimed to generate an in-depth understanding of the role of manual therapy for osteopaths in the management of TMD. The participant interviews provided an insight into the opinions, perceptions and experiences of osteopaths on this topic, and have produced four main overarching findings that will be discussed.

Temporomandibular disorders can vary widely in terms of pain levels, symptoms, underlying cause, coexistent conditions and prognosis which can add layers of complexity when attempting to manage the disorder. The first part of the discussion focuses on the findings from participants relevant to complex TMD types and interprets their relevance to the research question. The second part centres around the concept of multidisciplinary collaboration for TMD, which is an approach that has been shown favour in both the literature and by the majority of participants in the study (Chisnoiu et al., 2015b; Garrigós-Pedron et al., 2019; Greene, 2001; Herrero Babiloni et al., 2020; Kafas et al., 2007; Mcneill, 1996; Wieckiewicz et al., 2015). This portion of the discussion considers the advantages/disadvantages of multidisciplinary collaboration and the barriers that are presented in its real-world application. The third part of this section considers the roles of health practitioners and their respective disciplines and aims to ventilate the participants ideas surrounding how these roles are defined. Finally, the effectiveness of osteopathic manual therapy is discussed with an aim of elucidating where, how and when it can be most effective and whether it is being optimally utilized in the current healthcare paradigm.

The Complexity of TMD

The term 'Temporomandibular disorder' is used as a blanket term for a wide range of disorders that affect the TMJ, and under its umbrella we find a myriad of conditions with symptomatological, etiological and epidemiological factors that overlap to form a

particular individual presentation (Chisnoiu et al., 2015a, 2015b; Goddard & Mauro, 2018; Greene, 2001; Kalamir et al., 2007b; Pigozzi et al., 2021; Sharma et al., 2011; Yadav et al., 2020). Many participants expressed understanding of this variance, extrapolating the differences between cause, presentation, and even investigating the proportion of influence that contributing factors like stress, bruxism, surgery, trauma, age and progression had in affecting the joint and, therefore, affecting its management strategy. Ultimately, though there seems to be no ‘one size fits all’ type management for a TMD patient, there does seem to be a spectrum, or even multiple spectrums on which individual TMDs can be identified. For example, physical traumas to the TMJ can be mild, to severe depending on significance and nature of the impact and could be considered as simple, if not easy, to manage. A relatively small impact, such as walking into a pole, may resolve quickly with manual therapy aiming to reduce pain and increase function, whereas a significant one such as from a head-on motor vehicle accident may need immediate surgery to relocate the anatomical structures of the joints. Between these two extremes lie many forms of structurally based TMDs. If we then compare the aforementioned spectrum with the consideration of a patient who has parasomnia bruxism, psychosocial stressors that exacerbate detrimental habit patterns and pain in the area, malocclusion of the teeth from grinding leading to poor TMJ kinematics, increased chance of arthritic changes in the joint as time progresses, then it becomes apparent that a simple approach to management is not applicable (Gil-Martínez et al., 2018b, 2018a; Jiménez-Silva et al., 2017; List & Axelsson, 2010a, 2010b; Murphy et al., 2013a, 2013c) Involved within that example, we have multiple disorders or diseases that lie within their own spectrums of mild to moderate, coalescing to form the overall picture of a ‘TMD patient’.

It seems that identifying and affecting the primary drivers of the disorder in each individual is vital to achieving optimal management. This may be easier said than done,

as though bruxism and psychosocial factors could somewhat overlap with the osteopathic scope, dysfunctions driven by psychology or stress are largely the wheelhouse of practitioners like counsellors or professionals who practice comparable healthcare. Similarly, treatment of malocclusion and grinding of the teeth fall largely outside of the capabilities of a manual therapist, and are best dealt with by a dentist or orthodontist. Furthermore, if the TMD has progressed significantly to the point of degeneration and arthritic change where surgery is indicated, it is logically evident that surgery is the best course of action for an optimal patient outcome. Outside of the aforementioned spectrums, dysfunctional movement and pain in the joint remain within the scope of osteopathy. Pain reduction and increased functioning of the joint were the two areas where osteopathy was shown to be effective in the literature, which also corresponded with the participants aims of treatment reported on in the findings section of this study (List & Jensen, 2017). Some of the participants in this study also suggested that manual therapy as an avenue for pain reduction in a patient was often overshadowed by the availability of pain reducing pharmaceutical interventions, and that this could obscure the importance of functional improvement and overall health restoration in the joint. Management should aim towards resolving as many contributing issues as possible within real-world constraints such as time, financial burden, geographical access to health facilities which are barriers to optimal healthcare in many fields (Gil-Martínez et al., 2018). On the surface it seems that best management of a TMD patient would lie in targeting the primary driver(s) of the TMD and referring a patient to the corresponding profession(s), and this was observed as common practice throughout the interviews of the participants included in the study. The presence of multiple driving or causal factors likely indicates that targeting multiple areas of contribution would achieve best results in terms of TMD resolution.

Multidisciplinary collaboration

A multidisciplinary approach provides the most comprehensive solution when aiming to target multiple driving factors present in many cases of TMD. Most of the participants echoed this sentiment which is also widely accepted in the literature (Garrigós-Pedron et al., 2019; Gil-Martínez et al., 2018b; Greene, 2001; Herrero Babiloni et al., 2020; Kafas et al., 2007; List & Axelsson, 2010a; Murphy et al., 2013c; Wieckiewicz et al., 2015), yet there was a general acknowledgement among the participants that actual collaboration rates were not sufficient for managing the disorder. Explanations were offered for this, including a lack of referrals, poor or slow referral methods and, probably of most substantial limitation, an overwhelming tendency to pass patients over to other disciplines without continued collaboration. It seems that though multiple disciplines are somewhat included in a TMD patient's management process, there is disconnection between disciplines when considering communication practices. This study found that osteopaths most common referral practice is to recommend a general health discipline to a patient, rather than directing them to a particular practice or practitioner. Though this may be the most efficient and practicable approach to referral, it lacks continued comprehension of a patient's TMD progression, undergone treatment and may fail to consider what another discipline's management goals may be. This could lead to mutually incompatible treatments, reduce treatment effectiveness, difficulty in identifying positive treatment outcomes and possible prolonging of TMD symptoms which could lead to further issues for a patient. This was of concern for the one participant who held the opinion that more multidisciplinary collaboration may not be indicated. Though this is a justifiable position to hold, it could be that the underlying issue is underdeveloped communication methods between disciplines, and that 'referral' rather than 'collaboration' is what is actually being practiced.

With the innovative acceleration of technology today, it is not hard to imagine a digital system where information on a patient's TMD could be collated, integrated and discussed by multiple practitioners in order to have more complete understandings of a complex TMD. This could provide a solution for building communication between professions that more closely resembles collaboration. Access to previous treatments, case findings and management goals would allow cohesion between disciplines and osteopathic manual therapy could be applied in a way that enhances treatment, or reduces any concomitant effects that more invasive approaches like surgery orthodontic appliances. Though technological solutions are available, the aim of increasing actual collaboration could be advanced with other approaches. For example, an increase in relationships built between these professions could see quicker and better directed referrals to practitioners who are better equipped to manage TMD and its individual patient characteristics. Many of the participants noted that referrals seemed to be misdirected, or at least not appropriately considered in terms of resolution of the TMD as patients who were failing to achieve optimal results would be referred back to a GP or shuffled around multiple disciplines allowing time for a TMD to progress. It is possible that promoting awareness about the overlapping competencies between osteopaths, dentists and orthodontists, and maxillofacial surgeons with a marketing campaign, and its inclusion into practitioner education and professional learning requirements could increase the agency of these professionals to build relationships within their communities. This could be a first step towards better collaboration, and more optimal patient outcomes.

Role definition between disciplines

The characteristics of a particular TMD can range in terms of aetiology, affected structure(s) and the functional condition of those structures, which logically designates

some disciplines as better placed for treating particular TMD patients considered within their scope rather than another's. For example, a TMD that is primarily driven by malocclusion of the teeth may glean more benefit from an orthodontic approach than they would from manual therapy, though some benefit may be drawn from each. The same can be said for a patient whose TMD is primarily driven by musculoskeletal dysfunction with regard to gaining most effective management from a musculoskeletal professional like an osteopath. This study indicates that there not only seems to be a lack of collaboration in general, but that patients seem to be referred to several disciplines that are unsuited for the patient's particular TMD characteristics before ending up with a practitioner that is best positioned to affect change. Not only does this cause unnecessary financial burden to a patient, but it also allows time for TMD symptoms to progress causing detriment to the patient's prognosis. This provides a significant barrier in terms of best management, as this study suggests that it contributes to increased severity and a resultant financial burden across the board. When considering what the cause of this barrier may be with regard to referral to the osteopathic discipline, participants offered insights which included the prescription of pain-relieving medication acting as a facile fix to a complex problem, another opinion cited a propensity for moving patients off to another professional with little consideration of to whom they were referring. The resounding notion however was that of a lack of awareness, or perhaps a poor understanding of who they can refer to and why. Though increasing collaboration is desirable and indicated in both the literature and by the participants, it seems that it will only be practically viable if professionals are aware of their role in managing the disorder, and importantly, the role of other disciplines (Garrigós-Pedron et al., 2019). If this type of awareness was common, referrals would be more targeted, the disciplines collaborating in patient management would be most appropriate, patient's prognosis would be benefited and this could lead

to a decrease in TMD morbidity rates (Garrigós-Pedron et al., 2019; Herrero Babiloni et al., 2020; Kafas et al., 2007).

The lack of awareness of the osteopathic profession in particular is highlighted in this study, which provides an area of opportunity for systemic improvement with regards to TMD management. Osteopathic professionals could increase networking, elevate their exposure within the medical field and educate other professionals about the benefits of osteopathic manual therapy through conferences, marketing and even info flyers sent to other discipline's practices. The effectiveness of these approaches would also be enhanced by further research into the efficacy of OMT with higher levels of evidence, broader scale studies of TMD types and their responses to OMT and proliferation of osteopathic TMD literature in this area as a whole. This will aid in justifying when and why a referral to an osteopath by a health professional of another discipline might be indicated as best management.

When is osteopathic manual therapy effective?

The data drawn from participant interviews indicates that osteopaths are effective at treating and managing TMD from within their particular scope, although it is almost wholly acknowledged that many patients can present with concurrent issues that fall outside of it. The answering of the research question of this study has been designed to enhance the understanding of when and why osteopathic manual therapy might be solely indicated for a patient, or utilised in conjunction with other management strategies. The current literature indicates two main areas of efficacy for OMT, namely the improvement of joint function and the decrease of pain symptoms (Armijo-Olivo et al., 2016; Cuccia et al., 2010; Kalamir et al., 2007). All of the participants included in the study cited these as the two primary aims of their treatment, providing examples of success in achieving these goals for some of their TMD patients. Of interest, many of

the aims of their management aligned with these treatment goals, with management strategies targeting predisposing, maintaining, lifestyle, postural, musculoskeletal or habitual factors that could be influencing the prognosis of their patient's TMD. The contrast between the unanimity of these additional management strategies and scarcity of literature for their effect on patients is something that could also be researched further, as this could further illuminate the role of osteopathic management.

Current literature does cite pain, symptomology and dysfunction as the main factors driving patients to seek healthcare for TMD (Chisnoiu et al., 2015) which seemingly situates osteopathic manual therapy categorically as an appropriate primary healthcare approach for a TMD patient, which is antithetical to the purported course of action for most patients. Overall, OMT seems to be well placed for effective management of simple musculoskeletal disorders, as well as an advantageous approach to be used in conjunction with other approaches for the management of complex TMDs that fall within the scope of multiple disciplines. The reduction of symptoms, pain and dysfunction can be beneficial pre-operatively by reducing the chance of further joint disruption and degeneration (Herrero Babiloni et al., 2020), and post-operatively by bettering the outcomes of surgery and relieving pain and dysfunction from locally affected tissues (Ferrillo et al., 2022), this was supported by some of the participants view in the current study. The osteopathic role could be expanded further also, by providing relief to many of the concomitant impacts that can manifest from more invasive occlusal, orthodontic or orthognathic approaches. For example, a patient undergoing occlusal interventions like braces to realign the teeth structurally for aesthetic or orthodontic functional purposes, may then experience functional or symptomatological abnormalities in their TMJ as a result. One participant described the experience with patients of this nature, and while the overall result of more invasive interventions is of benefit to a patient, outcomes could be enhanced by including the

pain reducing, function restoring and symptom relieving qualities of OMT alongside the patient's management. In summary, it seems that OMT is positioned well for the primary management of musculo-skeletally driven TMD. This study also indicates that the role of OMT has benefits on patient outcomes when used collaboratively and/or conjunctively, and that this is underutilised in the current healthcare paradigm.

Strengths and Limitations

Though every effort was made to minimize these, I acknowledge that there are limitations to the present study, these include that the data collection process of this study was conducted in the midst of COVID-19 lockdowns in New Zealand. Though the conversations held with the participants over Zoom were fluent and articulate and may have actually increased their comfort when reporting on their opinions and perspectives, some of the interpersonal interactions may differ from conventional face to face interactions across the course of the interviews. This acknowledgement, however, does not seem to detract from the validity of the data collected as a whole. All of the participants were able to participate in the study from the privacy of their homes or workplaces, and with negligible financial or travel time expenditure on their part.

A limitation that could also be acknowledged is the inclusion of 6 participants rather than 7, however, the richness of the data collected from the group of exceptionally experienced and dedicated practitioners lead to coherent theme generation and broad conceptual understanding which makes this limitation of little significance when considering its effects on the outcome of the study. Furthermore, the included conversations have led to innovative and evidence-based recommendations for further research, which will meliorate the current paradigm in the literature, advancing toward better outcomes for TMD patients in the future.

Conclusion

Osteopaths can, and do, play an important role in the management of temporomandibular disorders and this study provides support for their practice and can be used to guide more research in the area. Further research with higher evidence levels regarding the efficaciousness of specific manual therapy techniques and their applicability could provide better frameworks for practitioners and researchers alike when considering TMD management. Future studies could also inquire into the current referral pathways for TMD patients in New Zealand, and patient management-based systems parallel to the Diagnostic Criteria for Clinical and Research Applications (DC/TMD) (2014) could be developed to better manage patients between disciplines and streamline multidisciplinary collaboration for better patient outcomes. Patients and research could also be benefited by more specific research into role definitions for disciplines in the management of TMD, and the promotion of awareness about the osteopathic role and its particular expertise for both simple and complex patients. Practitioners from multiple disciplines are indicated as valuable for the management of TMD, and this study substantiates the contributions of osteopaths and their manual therapy practices.

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Appendices

Appendix A: SRQR

Standards for Reporting Qualitative Research (SRQR)

O'Brien B.C., Harris, I.B., Beckman, T.J., Reed, D.A., & Cook, D.A. (2014). Standards for reporting qualitative research: a synthesis of recommendations. *Academic Medicine*, 89(9), 1245-1251.

No. Topic	Item	Checked
Title and abstract		
S1 Title	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	The title summarises the research question and encompasses the topic in question, the management of temporomandibular disorders as well as the role of osteopathic manual therapy. It also includes that it is a qualitative study. See page (1-2).
S2 Abstract	Summary of key elements of the study using the abstract format of the intended publication; typically includes objective, methods, results, and conclusions	The abstract covering these elements can be found on page 3 of the study.
Introduction		
S3 Problem formulation	Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	The significance and prevalence of Temporomandibular disorder is described in the introduction (see page 6), and in greater depth in the literature review (see page 7). An extensive literature review was carried out, comprehensively describing the current knowledge in the literature. See page (10-19).
S4 Purpose or research question	Purpose of the study and specific objectives or questions	The research question is justified and then plainly laid out for

		reader comprehension alongside the project rationale and intent. (See page 27-29).
Methods		
S5 Qualitative approach and research paradigm	Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., positivist, constructivist/interpretivist) is also recommended	The nature of qualitative research is described, exploring different qualitative approaches (see page 30-37). The methodological composition and the rationale behind it is also plainly described (see page 38).

S6 Researcher characteristics and reflexivity	Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, or transferability	This can be found in the sections detailing qualitative rigour and the researchers background (see page 39-41).
S7 Context	Setting/site and salient contextual factors; rationale	Interviews with practitioners working in the context of the research question, details of the participants can be found on page 42 in the recruitment and participants section.
S8 Sampling strategy	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale	A section about sampling and data collection can be found on pages 32-33 and the rationale behind this study's methodological composition can be found on page 37.
S9 Ethical issues pertaining to human subjects	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and	Ethics approval was gained for the inclusion of participants of the

	data security issues	study and this can be found in the Appendix C.
S10 Data collection methods	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale ^a	The dates and methods of data collection can be found on pages 41 to 42 in the section entitled “data collection and management”. Further description of analysis, iterative process and other processes can be found on pages 42 and 43 under the ‘data analysis’ and ‘procedure’ sections.
S11 Data collection instruments and technologies	Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	This can be found in an interview schedule. Appendix D (page 108-110)
S12 Units of study	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	The characteristics of those included in the study are reported in the recruitment section on page 42.
S13 Data processing	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/deidentification of excerpts	The methods used in the study are reported throughout the methods section from pages 41-44.
S14 Data analysis	Process by which inferences, themes, etc., were identified and developed, including researchers involved in data analysis; usually references a specific paradigm or approach; rationale ^a	Description of the process involved in analyzing data is found on page 42 in the ‘Data analysis section’.
S15 Techniques to enhance trustworthiness	Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale ^a	This can also be found in the ‘data analysis’ section on page 42.
Results/Findings		
S16 Synthesis and interpretation	Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Excerpts of quotes from the participant interviews included in the study have been reported and

		summarised on pages 45-107 in the findings section. As well as justification and categorisations of developed themes.
S17 Links to empirical data	Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Evidence of the interview transcripts can be found on pages 45-107 in the findings section.
Discussion		
S18 Integration with prior work, implications, transferability, and contribution(s) to the field	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	All elements of this part of the checklist can be found in the discussion section from pages 111-117.
S19 Limitations	Trustworthiness and limitations of findings	A section detailing the strengths and limitations of the study can be found post-discussion on page 119.
Other		
S20 Conflicts of interest	Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Transparency with regards to influence or perceived influence can be found in the section entitled “the researcher” on page 41.
S21 Funding	Sources of funding and other support; role of funders in data collection, interpretation, and reporting	The source of student funding is reported in the methods section on pages 42-43.

Appendix B: Participant information



Information for Participants

Project Title: The Role of Manual Therapy for Osteopaths in the Management of Temporomandibular Disorders

Student researcher: Nathan McComish

Invitation: You are invited to participate in a research project to discuss the management of temporomandibular dysfunctions. Your knowledge and expertise will be a significant contribution.

What is the purpose of the study? The purpose of the study is to gather views and experiences from people in the Osteopathic community and will explore where Osteopaths see their role in the treatment and management of temporomandibular disorders.

How are people chosen to be asked to be part of the study? Participants are registered osteopathic practitioners, who self-identify as a practitioner that can provide treatment/management for the temporomandibular joint.

What happens in the study? Participants are invited to join a recorded 45-60 minute interview to gather views, experiences and opinions surrounding the treatment/management of a temporomandibular dysfunction. Key themes will be drawn from the transcripts and analysed with the aim of broadening the evidence of current practices in this area.

What are the benefits? Participants will make a valuable contribution to this topic, aspects of which may result in publication. Participants will be involved in enhancing and enriching the body of knowledge about the role of osteopathic treatment/management of temporomandibular disorders, which will help provide evidence to support their practice.

How will my privacy be protected? Participants are invited to engage in a conversational interview that stays within the normal expectation of members of a health and education related community. Participants will remain anonymous and all private data will be protected by the author and supervisor(s) of this project.

What are the costs of participating in the project? There are no costs attached to participating in this project.

Opportunity to receive feedback on results of research: You will be provided with a copy of the transcript to check accuracy. A copy of the report from the research thesis will also be made available to you.

Participant Concerns: Participation in this project is optional. You may withdraw at any stage up to the completion of data collection. Any concerns regarding the nature of this project may be conveyed to the research supervisor or to the UREC.

Research Supervisor

Contact

Details:

Dr Helen Anderson:

handerson@unitec.co.nz

UREC Contact Details

UREC REGISTRATION NUMBER: (2021-1041)

This study has been approved by the UNITEC Research Ethics Committee from *(27th October 2021)* to *(June 2022)*. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary on: (0064) 09 815-4321 ext 8551. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix C: Participant Consent



Participant Consent Form

Research Project Title: The Role of Manual Therapy for Osteopaths in the Management of Temporomandibular Disorders - A Qualitative Analysis

I have had the research project explained to me and I have read and I understand the information sheet given to me.

I have had an opportunity to ask questions.

I understand that I don't have to be part of this research project should I choose not to participate and may withdraw at any time prior to the completion of the data collection.

I understand the interview will be recorded for transcribing. I may ask for the tape to be turned off at any time.

I will be provided with my transcript for checking accuracy of my information

I understand that in any reports of this project my contributions will not be attributed to me, I will not be identified.

I understand that I will be invited to read and comment on the finished research document.

I have had time to consider everything and I give my consent to be a part of this project.

Participant Name:

Participant Signature: *Date:*

Project Researcher: *Date:*

UREC REGISTRATION NUMBER: (2021-1041)

This study has been approved by the UNITEC Research Ethics Committee from (27th October 2021) to (June 2022). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix D: Interview Schedule

Overview of main sections

Objective 1: To identify where Osteopaths see their role in the management of TMD

Objective 2: To collate technique approaches employed by manual therapists for the treatment of TMD

Objective 3: To identify the multidisciplinary referral patterns of Osteopaths and classify factors that affect referral

Objective 1

Where do you perceive the role of osteopathic manual therapy in the management of TMD?

How regularly do you treat/manage a patient with TMD?

How long have you been treating/managing patients with disorders of the temporomandibular joint?

What are the signs and symptoms that you would identify clinically in a patient in order to diagnose a patient with a Temporomandibular disorder?

What are the factors that contribute to the development of a management plan for a patient?

Is there a type of patient that typically presents with TMD? (e.g. gender, age, occupation, ethnicity)

Do you think that psychosocial factors play a factor in TMD and how?

Objective 2

How do you treat a patient with a Temporomandibular disorder and what do you aim to achieve by treatment?

Are there any specific techniques that you use regularly that have a positive benefit on patient outcomes?

What other management strategies might you employ for your patient: examples exercise prescription, sleep,

What are the benefits that a patient with TMD attains from manual therapy/osteopathic approaches? Could you provide an example?

Have you ever discharged a patient who's TMD has resolved as a result of manual therapy/osteopathic intervention? Do you have any examples?

Objective 3

Have you ever referred a patient with a temporomandibular disorder to a practitioner in another health discipline (e.g. a dentist, surgeon, counsellor)? Could you provide an example?

Has a practitioner from another discipline ever referred to a patient with temporomandibular to you as an osteopath? Could you provide an example?

If you have not been involved in multidisciplinary collaboration, do you consider this as an option for the management of TMD?

What factors would be considered for referral?

Do you feel there is too little, an appropriate amount or too much interdisciplinary referral with regards to TMD patient?

Where do you see the role of dentists in the management of TMD?

Where do you see the role of orofacial surgeons in the management of TMD?

Appendix F: Confidentiality Agreement



Research Project Title: The Role of Manual Therapy for Osteopaths in the Management of Temporomandibular Disorders - A Qualitative Analysis

Participant's Name:

Phone number:

Email:

I _____ *(full name - please print)*

Agree to treat in absolute confidence, all information that I become aware of during the course of participation in the above research project. I agree to respect the privacy of those involved and will not divulge in any form, information with regard to any participating person or institution and agree to not retain or copy any information involving the above project.

I am aware that I can be held legally liable for any breach of this confidentiality agreement and for any harm incurred by individuals or organisations involved, should information be disclosed.

Signature: Date:

.....

UREC REGISTRATION NUMBER: 2021-1041 This study has been approved by the UNITEC Research Ethics Committee from 27th October 2021 to June 2022. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix G: Scribie Confidentiality Policy

Maintaining confidentiality of all transcription files is our highest priority. Access to the files is restricted strictly on a need to know basis. Only our employees and contractors have access to the full audio. All our transcribers, employees and contractors are also bound by a confidentiality clause in the [Terms & Conditions](#). Furthermore, you have full control over your files. Once you delete the files, we remove it permanently from our servers. You can also delete your Scribie.com account anytime.

We also split up the file into smaller parts before we distribute it to our transcribers. That way they only have access to parts of the file. Nobody but our employees and contractors have access to the full audio file. We also use industry standard 256-bit SSL encryption on our website so that all communication between servers and browsers is encrypted.

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