

# Reviewing the Evidence: Can Cognitive Behavioral Therapy Improve Outcomes for Patients with Chronic Orofacial Pain?

**Vishal R. Aggarwal, PhD**

NIHR Clinician Scientist  
Oral Health Unit  
School of Dentistry

**Martin Tickle, PhD**

Professor of Dental Public Health  
Oral Health Unit  
School of Dentistry

**Hanieh Javidi, BDS**

5<sup>th</sup> Year Dental Student  
Oral Health Unit  
School of Dentistry

**Sarah Peters, PhD**

Senior Lecturer in Health Psychology  
School of Psychological Sciences

University of Manchester  
Manchester, United Kingdom

**Correspondence to:**

Dr V. R. Aggarwal  
Oral Health Unit  
School of Dentistry  
University of Manchester  
Oxford Road, Manchester M15 6FH  
Email: vishal.r.aggarwal@manchester.ac.uk

***Aims:** To review evidence for chronic orofacial pain management using cognitive behavioral therapy (CBT). **Methods:** Electronic databases were searched for randomized controlled trials in which CBT was compared either alone or in combination with other forms of therapy for management of chronic orofacial pain. The quality of trials was assessed blind by three authors using a validated scale that had been specifically designed to score the quality of randomized controlled trials for psychological interventions. Author agreement was assessed using interclass correlation coefficients. **Results:** Fourteen potentially relevant randomized controlled trials were identified. Seven trials were excluded, leaving seven for analysis; two studies were merged as they included the same trial and therefore six trials were used in the final analysis. All but one of the randomized controlled trials identified were based on temporomandibular disorders (TMD). Scoring of the trials showed that the three raters were in close agreement, with four trials performing well (scores of 22–35) whilst the remaining two trials were poor (scores < 18). Of the four trials, one did not show any improvement with CBT prior to conservative treatment whilst the other three showed that CBT alone or in conjunction with conservative treatment improved both short-term and long-term outcomes in functional, dysfunctional, and chronic TMD patients. **Conclusions:** CBT, either alone or in combination with biofeedback, conservative treatment and/or self-care, can improve outcomes for patients with TMD in secondary care. However, further research is needed to assess its effectiveness in primary care and in management of other chronic orofacial pain conditions. Further, the number of sessions needed, mode of delivery, and cost-effectiveness also remain unclear. J OROFAC PAIN 2010;24:163–171*

**Key words:** chronic orofacial pain, cognitive behavioral therapy, randomized controlled trials, review

It is widely accepted that medical and dental interventions should be based on strong evidence to optimize patient outcomes and justify resources. The strongest evidence is provided by systematic reviews of randomized controlled trials, randomized controlled trials themselves, and prospective population-based studies, in that order.<sup>1</sup> Weakest evidence is provided by case studies and expert opinion.<sup>1</sup> Judging the quality of evidence on which to base treatment decisions requires critical appraisal and an ability to interpret findings effectively. However, because of inadequacies in research training during undergraduate medical and dental education, not all clinicians have strong critical appraisal skills and may therefore find it difficult to appraise and implement evidence-based guidelines.

This is particularly important for conditions where training is limited and diagnosis, prognosis, and management are uncertain. One such condition is chronic orofacial pain for which there are no clear national or international guidelines on diagnosis and management.

These problems have been highlighted by previous studies which have examined the opinions of specialists with regards to the terminology, diagnosis, and treatment of chronic orofacial pain,<sup>2,3</sup> and which showed discrepancies amongst clinicians regarding all these areas.

The issue of classification and terminology of chronic orofacial pain has recently been addressed by Woda et al<sup>4</sup> and their evidence-based approach to classification showed that chronic orofacial pain encompasses a group of conditions: facial arthromyalgia (temporomandibular disorders), atypical facial pain, atypical odontalgia, and burning mouth syndrome (stomatodynia) which all cluster together into a single group, share similar characteristics, and can only be individualized by their topography.<sup>4</sup> It has also been recently shown that these chronic/unexplained orofacial pain conditions have common characteristics which can be used to establish an early diagnosis for chronic orofacial pain.<sup>5</sup>

However, despite some clarity in the terminology and diagnosis of chronic orofacial pain, there still remains disparity in the management of this condition and treatment tends to depend on the background of the clinician assessing the patient rather than being evidence-based. This has led to numerous interventions ranging from occlusal splints, physiotherapy, relaxation techniques, as well as pharmacological interventions.<sup>3</sup> Management of chronic orofacial pain by dentists often tends to focus on correction of mechanical factors such as teeth grinding and malocclusion that may be reported by patients with this condition. Dentists often embark on irreversible reshaping of teeth in order to correct malocclusions and use of splints to correct grinding. However, recent evidence in the form of Cochrane systematic reviews has shown little or no beneficial effects of therapies such as irreversible occlusal adjustments<sup>6</sup> and splints<sup>7</sup> that are targeted towards the correction of these factors.

There is also strong emerging evidence from population-based studies to show that chronic orofacial pain may have a psychosocial etiology<sup>8-13</sup> and that it coexists with other medically unexplained symptoms.<sup>8</sup> Epidemiological investigations have also shown that mechanical factors associated with chronic orofacial pain represent heightened awareness of body symptoms generally and are not specific to chronic orofacial pain.<sup>14</sup>

Given these strong psychological associations and a lack of evidence for mechanical factors, the sole use of extensive irreversible therapy in the management of chronic orofacial pain may be unjustified. These findings suggest that an alternative management paradigm is needed, and that focusing on both psychological and mechanical factors could have the potential to provide benefit without resulting in harm. Techniques such as Cognitive Behavioral Therapy (CBT) incorporate a range of interventions directly influenced by cognitive and behavioral perspectives and may assume two possible models for orofacial pain: (1) inactivity, where persistent physical symptoms of pain lead to patients learning to avoid physical activity due to fear of exacerbating their condition. In turn, these negative cognitive and behavioral responses prolong and intensify symptoms<sup>15</sup> and/or (2) over-activity, where emotional stress (anxiety, depression, anger) may increase pain by precipitating activity in psychophysiological systems that are also activated by noxious events and provoke substantial autonomic, visceral, and skeletal activity. The interactions among these biological systems are well illustrated by the “pain-anxiety-tension” cycle that has been proposed to account for some forms of chronic pain.<sup>16</sup>

CBT has proven effective in the management of other unexplained physical conditions<sup>17</sup> and its recognition as a useful management approach for the unexplained physical condition of chronic fatigue syndrome now forms part of the National Institute of Clinical Excellence (NICE) guidelines for management of this condition in the United Kingdom.<sup>18</sup> Currently, no clinical recommendations for management of chronic orofacial pain have been made. The purpose of this review was therefore to examine the strength of the evidence for chronic orofacial pain management using CBT which has proven efficacy for other unexplained conditions with which chronic orofacial pain coexists.

## Materials and Methods

### Inclusion Criteria and Outcome Measures

Only randomized controlled trials, in which CBT was compared concurrently to placebo or another form of therapy, were analyzed, ie, CBT was compared with another form of conservative treatment/placebo as the control intervention, or CBT in combination with another form of therapy was

compared with the same form of therapy (excluding the CBT) as the control intervention.

The participants had to be adults (aged 18 to 75 years) with chronic orofacial pain defined as any one of the following conditions: temporomandibular disorders (TMD), atypical facial pain, atypical odontalgia, burning mouth syndrome.

Outcome measures were pain intensity or pain relief, recorded using well-validated, standardized scales (eg, visual analog scales), and disability, including self-reported measures of physical, social, and psychological disabilities and interference with daily activities.

### Search Methods for Identification of Studies

The following databases were searched.

- Ovid MEDLINE(R) 1950 to February Week 2 2009
- EMBASE 1980 to 2009 Week 08
- COCHRANE CENTRAL: REGISTER OF CONTROLLED TRIALS (To present)
- THE COCHRANE DATABASE OF SYSTEMATIC REVIEWS (To present)

*Handsearching.* Any review articles regarding the topic were identified and the list of references examined for relevant primary studies.

*Search terms employed.* The search strategy was composed of terms for chronic orofacial pain and CBT, including MeSH terms and free text terms with truncations where necessary, using Medline, and was adapted accordingly for use in other databases. Search terms used included:

- Temporomandibular joint disorders, temporomandibular disorders, temporomandibular joint dysfunction syndrome, temporomandibular joint dysfunction, pain dysfunction syndrome, myofascial pain, myofascial pain dysfunction, myofascial pain, myofascial pain dysfunction syndrome, craniomandibular dysfunction, craniomandibular dysfunction, oromandibular dysfunction, mandibular dysfunction, mandibular stress syndrome, facial arthromyalgia, masticatory muscle disorder, masticatory myalgia, facial pain dysfunction, costens syndrome, costen's syndrome, TMJ syndrome, atypical facial pain, atypical odontalgia, burning mouth syndrome, stomatodynia
- Cognitive-behavioural therapy, cognitive-behaviour therapy, cognitive behaviour therapy, cognitive behaviour therapies, cognitive behavior therapy, cognitive behavior therapies, cognition

therapy, cognition therapies, cognitive psychotherapies, cognitive psychotherapy.

The limits applied to the searches were:

- Humans
- Adults
- Randomized controlled trials

The search history using the above terms is displayed in Table 1.

### Scoring of Trial Quality

The quality of the trials was measured using a validated scale that has been specifically designed to rate the quality of randomized controlled trials for psychological treatments.<sup>19</sup> This scale was constructed using statements generated from a Delphi panel and was shown to have good consensus and discriminant validity. In addition to including important domains pertaining to quality of study design, methodology, and adherence to CONSORT, this scale also included domains specific to psychological interventions such as measures of treatment quality and manualization of the treatment. All domains had a series of statements to assess adherence to the quality indicator specified in the domain and each statement was scored from 0 to 2 for the presence or absence of the item used to measure the quality. Following development of the scale, the authors selected 17 trials which were scored by expert consensus judgements and mean scores generated for excellent, average, and poor trials (22, 18, and 12, respectively). Therefore, the authors used the same criteria for this review and all trials meeting their inclusion criteria were scored using the scoring developed previously for this scale, ie, trials with scores of 22 and above, from a maximum of 35, were rated excellent, those with scores of 18 to 22 were average, and those below 18 were rated as poor.<sup>19</sup> Trials were scored blind and independently by three authors (VA, HJ, and SP). For the purpose of comparison, the Turner et al studies<sup>20,21</sup> were scored together as they were derived from one trial. Interclass correlation coefficients were used to determine interrater agreement, and this analysis was conducted using STATA 9 statistical software. These coefficients represent one-way analysis of variance (ANOVA) models which perform multiple-comparison tests to compare agreement between multiple groups.

**Table 1 Search History**

Search terms	No.
1 exp TEMPOROMANDIBULAR JOINT DISORDERS/	11,962
2 exp TEMPOROMANDIBULAR JOINT DYSFUNCTION SYNDROME/	4,391
3 temporomandibular joint dysfunction.mp.	4,600
4 temporomandibular joint dysfunction syndrome\$.mp.	4,398
5 pain dysfunction syndrome\$.mp.	407
6 myofascial pain.mp.	1,432
7 myofascial pain dysfunction.mp.	229
8 myofascial pain dysfunction syndrome\$.mp.	154
9 myofascial pain.mp.	68
10 myofascial pain dysfunction.mp.	30
11 myofascial pain dysfunction syndrome\$.mp.	16
12 craniomandibular dysfunction.mp.	129
13 cranio mandibular dysfunction.mp.	6
14 oromandibular dysfunction.mp.	5
15 mandibular dysfunction.mp.	277
16 mandibular stress syndrome\$.mp.	1
17 facial arthromyalgia.mp.	9
18 masticatory muscle disorder.mp.	4
19 masticatory myalgia.mp.	11
20 costen's syndrome\$.mp.	69
21 costens syndrome\$.mp.	69
22 exp TEMPOROMANDIBULAR DISORDERS/	11,962
23 exp FACIAL PAIN/	5,497
24 exp OROFACIAL PAIN/	5,497
25 chronic orofacial pain.mp.	150
26 chronic orofacial pain.mp.	7
27 orofascial pain.mp.	3
28 atypical facial pain.mp.	232
29 exp BURNING MOUTH SYNDROME/	519
30 burning tongue syndrome.mp.	1
31 glossodynia.mp.	111
32 glossopyrosis.mp.	16
33 oral galvanism.mp.	42
34 stomatopyrosis.mp.	13
35 stomatodynia.mp.	34
36 exp COGNITIVE THERAPY/	8,946
37 cognitive behavior therapies.mp.	14
38 cognitive behavior therapy.mp.	480
39 cognitive psychotherapy.mp.	66
40 cognitive psychotherapies.mp.	8
41 cognitive behavioral therapy.mp.	1,745
42 cognitive behavioral therap\$.mp.	1,850
43 33 or 32 or 21 or 7 or 26 or 17 or 2 or 1 or 18 or 30 or 16 or 27 or 25 or 28 or 20 or 14 or 24 or 10 or 31 or 35 or 11 or 22 or 13 or 23 or 29 or 6 or 3 or 9 or 12 or 15 or 8 or 4 or 34 or 19 or 5	17,711
44 42 or 38 or 39 or 40 or 36 or 37 or 41	9,577
45 43 and 44	55
46 limit 45 to randomized controlled trial	15
47 limit 46 to (humans and "all adult (19 plus years)")	14

§ = truncation; exp = explode; mp = mapping alias

## Results

### Summary of Studies

The search results (Table 1) yielded 14 individual studies. These were examined for exclusion and inclusion criteria. Seven<sup>22-28</sup> failed to meet the criteria and are summarized in Table 2. The seven remaining randomized controlled trials were deemed relevant, all of which varied greatly in their study design. Two studies<sup>20,21</sup> were merged as they included the same trial and therefore six trials were used in the final analysis. All but one<sup>29</sup> of the randomized controlled trials identified were based on TMD. A summary of the identified studies and components of CBT as well as outcomes and results are summarized in Table 3.

One study provided CBT prior to conservative TMD treatment,<sup>30</sup> while three others<sup>20,21,31,32</sup> provided CBT in combination with conservative TMD treatment and one study tested the effectiveness of CBT alone as a method of treatment, comparing it to a control group receiving conservative treatment.<sup>33</sup>

Other variations in the studies included the number of sessions and length of time spent delivering CBT, ranging from a minimum of two 2-hour sessions<sup>23</sup> up to 4 biweekly sessions.<sup>20,21</sup> Studies also differed in the types of patients selected to be part of the study, with two studies focusing on dysfunctional patients,<sup>31,33</sup> one study focusing on functional patients,<sup>32</sup> and another study focusing on chronic TMD patients.<sup>20,21</sup> In the different studies, the CBT was provided either by trained psychologists or dental hygienists, and treatment was provided in a secondary or tertiary care setting. All six studies had a range of outcome measures which were relevant in determining the effectiveness of CBT.

### Quality Assessment and Effect Size for CBT in Studies

The validated scale (see Methods) used to score the trials showed that the three raters were in close agreement of the quality of studies (Table 4) and the interclass correlation coefficient was high (0.94, 95% confidence interval [CI] 0.85-1). Quality of the treatment and design components of the trials was variable. Four of the six trials performed well and were deemed excellent whilst the remaining two trials were poor (Table 4). Of the excellent trials, one did not show any improvement with CBT prior to conservative treatment<sup>30</sup> in the short term although in the long term (3 to 12 months follow-up), the CBT group compared

**Table 2 Studies Excluded From Search Results**

Study	Reason for excluding study
Stowell et al, 2007 <sup>22</sup>	Intervention tested was CBT combined with another behavioral therapy; only acute pain included
Gatchel et al, 2006 <sup>23</sup>	Intervention tested was CBT combined with another behavioral therapy; only acute pain included
Aaron et al, 2005 <sup>24</sup>	Study intervention was not CBT
Turner et al, 2001 <sup>25</sup>	Study intervention was not CBT
Komiyama et al, 1999 <sup>26</sup>	Study intervention investigated was posture correction, not CBT
Gramling et al, 1996 <sup>27</sup>	Study intervention was not CBT
Flor and Birbaumer, 1993 <sup>28</sup>	Patient group not patients with chronic orofacial pain
Total	7

to the usual treatment group continued to show improvement in pain intensity ( $P = .015$ ) and pain interference although this was not statistically significant ( $P = .066$ ). The trial by Turner et al<sup>20,21</sup> showed that the CBT group performed much better than the self-care group for mean differences measured for a number of outcome areas: pain intensity ( $-0.92$ , 95% CI  $-1.70$  through  $-0.14$ ), depression ( $-2.93$ , 95% CI  $-5.35$  through  $-0.50$ ), masticatory limitations ( $-0.13$ , 95% CI  $-0.19$  through  $-0.07$ ), non-masticatory jaw limitations ( $-0.06$ , 95% CI  $-0.11$  through  $-0.01$ ). The odds of reporting no activity interference at 12 months were four times greater in the CBT group (odds ratio [OR] = 4.2, 95% CI  $-1.7$  through 10.2). Both groups continued with treatment as usual with the dentist.

The study by Dworkin et al<sup>32</sup> that used CBT for dysfunctional TMD patients integrated into their usual care found that the CBT group in comparison with usual care alone performed better at 12-month follow-up with respect to pain intensity ( $P = .02$ ) and ability to control pain ( $P < .001$ ).

Finally, the study by Dworkin et al<sup>33</sup> that examined CBT versus usual care also found that the CBT group performed better at 12-month follow-up with respect to pain intensity ( $P = .036$ ), pain-related activity interference ( $P = .001$ ), and number of painful extraoral masticatory muscle sites ( $P = .002$ ).

## Discussion

The results of this review have shown that CBT can be an effective treatment for secondary care patients with chronic orofacial pain conditions such as TMD. CBT, alone or as an adjunct to other treatments, resulted in improved outcomes for patients with these conditions particularly in relation to pain intensity, pain-related activity interference, and ability to cope with pain. However there are methodological considerations in interpreting

the combined results of the four trials which showed significant improvement with CBT.<sup>20,21,32,33</sup>

Firstly, the high-quality trials focused on one type of chronic orofacial pain condition (TMD) and the conclusions are therefore restricted to TMD pain. It therefore remains unclear whether such techniques can benefit other chronic orofacial pain conditions which share similar characteristics with TMD pain and have been shown to cluster together into a single group with this condition.<sup>4</sup> There is therefore the need for further trials that explore the use of CBT for all chronic orofacial pain conditions although it should be noted that TMD pain represents the vast majority of reported chronic orofacial pain.<sup>34-36</sup> Secondly, there is no clear protocol for the number of sessions over which CBT should be delivered and how best it should be delivered. The trials examining the effect of CBT alone<sup>32,33</sup> used different numbers of sessions although both showed positive results. Further, only one study tested the effects of CBT alone compared with usual treatment whereas the others examined this in combination with conservative treatment and so it is difficult to assess whether CBT needs to be delivered in conjunction with conservative treatments to have any positive effects. Furthermore, there was too much clinical heterogeneity to pool the studies together and therefore a meta-analysis was not possible as not only were the interventions different (combination of CBT or CBT alone and CBT differed in mode of delivery, number of sessions, and who it was delivered by) but so were the comparison groups (usual treatment, self-care, conservation). In addition, because the effect sizes for each study were not presented in a standardized and consistent way (some used  $P$  values, others ORs with CIs, and others mean differences with CIs), it was difficult to make comparisons between studies and also with other studies that have examined the effect of CBT on other unexplained symptoms.

**Table 3 Descriptive Overview of Studies**

Author, date, country	Patient group	Intervention details	Outcome variables	Key findings
Dworkin et al, 1994, <sup>30</sup> USA	185 participants with TMD	1. Group cognitive behavioral (CB) intervention prior to conservative treatment group therapy by dentist and psychologist concerning education for TMD, self monitoring TMD signs and symptoms, cognitive and behavioral stress coping strategies. 2. Usual treatment (UT) (conservative treatment) including occlusal splints, NSAIDs, jaw exercises, modification of parafunctional habits, jaw exercises and use of heat/cold packs.	Unassisted mandibular opening without pain Maximum assisted mandibular opening Characteristic pain intensity Pain interference Stomatization Depression	Differences found to be statistically significant between the CB & UT group and favoring CB intervention were: Self-rating change in TMD condition & response to treatment: More UT than CB patients reported no improvement or worsening of their condition at 12-month follow-up.
Bergdahl et al, 1995, <sup>29</sup> Sweden	30 participants with BMS	1. Cognitive behavioral intervention (TG) 2. Attention/placebo (APG)	Intensity of burning mouth symptoms (BMS): visual analog scale	BMS intensity was statistically further reduced in the TG group at the 6-month follow-up while the BMS intensity in the APG group remained at the same level.
Turk et al, 1996, <sup>31</sup> USA	48 participants with TMD	1. Intraoral appliance (IA) + stress management with biofeedback (SM) + non-directive, supportive counseling (SC). 2. IA+SM+ cognitive therapy (CT)	Muscle palpation pain index TMJ palpation pain index Unassisted mandibular opening without pain Maximum unassisted mandibular opening Total score from short form of the McGill Pain Questionnaire Total score from the Beck Depression Inventory The Pain Catastrophizing Scale from the Coping Strategies Questionnaire The Interference Scale from the Multidimensional Pain Inventory The Oral-Parafunctional Habits Scale Self-reported use of medication Self-reported use of health care resources for TMJ pain during the follow-up phase.	Differences found to be statistically significant between the CT and SC group and favoring CB intervention were: Self-reported use of medication: at 6-month follow-up, CT group using significantly less medication than SC group.
Dworkin et al, <sup>32</sup> 2002, USA	117 participants with TMD	Comprehensive care (CC) : six individual sessions based on CBT in combination with conservative treatment. CBT included patient education, self-care, training in coping with maladaptive responses to pain, training in relaxation, discussion of relapse prevention and long-term maintenance gains achieved by treatment. Modules to assess somatization and depression Usual TMD treatment (UT) (conservative treatment)	Range of vertical mandibular motion Number of extra- and intraoral masticatory muscles painful to palpation. Characteristic pain intensity, Primary outcome Chronic pain grade SCL-90 depression and somatization scales Days in pain Ability to control pain Helpfulness & satisfaction	Differences found to be statistically significant between the CC and UT group favoring CC intervention were: Reduction in Characteristic Pain Intensity: post-treatment (PT) Increase in Ability to Control Pain: PT Increase in Helpfulness of Treatment: PT

<p>Dworkin et al,<sup>33</sup> 124 participants with TMD</p>	<p>Self-care Intervention (SC): three individual sessions of SC with two telephone calls in between over a 2.5-month period with a registered dental hygienist. Focused on education on biopsychosocial aspects of TMD, guided relaxation using breathing and muscle relaxation, self-monitoring of parafunctional oral behaviors and maintenance of treatment. Usual TMD treatment (UT) (Conservative treatment)</p>	<p>Range of vertical mandibular motion Number of extra- and intraoral masticatory muscles painful to palpation. Characteristic pain intensity; Primary outcome Pain interference score; Primary outcome Chronic pain grade SCL-90 depression and somatization scales Days in pain Number of pain sites Pain-related visits Process of care ratings Coping and perceived control</p>	<p>Differences found to be statistically significant between the SC and UT groups and favoring SC intervention were: Reduction in characteristic pain intensity: 1-year follow-up Reduction in pain-related activity interference: 1-year follow-up Reduction in number of sites painful to palpation: 1-year follow-up Reduction in depression: 1-year follow-up Decrease number of pain-related visits: Between PT &amp; 1-year follow-up. Increase in helpfulness of treatment: PT Satisfaction &amp; helpfulness of treatment: 1-year follow-up</p>
<p>Turner et al,<sup>20,21</sup> 158 patients with TMD</p>	<p>CB pain management training (PMT) + normal treatment from dentist at the Orofacial Pain Clinic. CBT delivered by psychologists on negative aspects of pain, relaxation, coping with pain flare-ups and relapse prevention. Self-care management (SCM) + normal treatment from the dentist at the Orofacial Pain Clinic. Delivered by TMD educators and included education, completing study measures, and attention.</p>	<p>Activity interference Characteristic pain intensity Jaw use limitations Negative moods Control Harm Disability Catastrophizing Cognitive coping Activity reduction Relaxation</p>	<p>8-week analyses: Differences between PMT &amp; SCM groups found to be statistically significant and favoring PMT intervention were: Perceived control over pain Harm Catastrophizing Cognitive coping Relaxation</p>

Finally, the participants within the trials were recruited from secondary- or tertiary-care clinics and therefore may represent the most severe and intractable cases of symptoms that have been selectively referred from primary-care settings. The effect of early intervention with CBT within a primary-care setting therefore remains unclear although recent work has shown that early intervention using CBT in combination with biofeedback can improve acute TMD symptoms in secondary care patients.<sup>37</sup> Furthermore, such studies do not provide any evidence for the effectiveness of CBT in the hands of general dental practitioners (GDPs) in a primary-care clinic where cases of orofacial pain can potentially be managed early to prevent progression to a chronic condition, when it can become seriously debilitating and disruptive to everyday life.<sup>38</sup> The feasibility of CBT in the hands of GDPs warrants further research to explore the barriers involved in delivering such interventions in a primary-care setting.

### Implications for Clinical Practice and Future Research

The main areas for further research arising from this review are the need for primary-care research to (1) examine effectiveness of CBT in different chronic orofacial pain conditions, (2) test different amounts of CBT to see how much is needed, (3) examine different ways of delivering it (who, eg, dental/allied professional or psychologist, where [primary or secondary care], and how [group or individual CBT]), (4) to examine the cost-effectiveness of CBT, and (5) develop a “tailor-made” CBT program that targets process variables that mediate CBT such as catastrophizing and control, disability, harm beliefs, and most importantly self-efficacy for managing pain and related problems that has been identified as having a unique mediating effect on CBT when delivered to TMD patients.<sup>39</sup>

Furthermore, the current review focused exclusively on CBT and has the potential to be widened to explore other psychological interventions for chronic orofacial pain. There is also need for qualitative work to assess the feasibility, acceptability, and barriers to management of chronic orofacial pain using such interventions that have the potential to be noninvasive and provide the most benefit for the least harm. The views of patients and clinicians need to be sought in light of the above evidence to determine whether, and how, psychological therapy is best implemented in the usual care of chronic orofacial pain. Ideally, such techniques

**Table 4 Comparison of the Three Raters' Assessments of the Quality of Identified Trials**

Studies	Total scores		
	VA	HJ	SP
Dworkin et al, 1994 <sup>30</sup>	25	26	24
Bergdahl et al, 1995 <sup>29</sup>	10	13	11
Turk et al, 1996 <sup>31</sup>	14	12	16
Dworkin et al, 2002 <sup>32</sup>	26	27	28
Dworkin et al, 2002 <sup>33</sup>	29	29	24
Turner et al, 2005, 2006 <sup>20,21</sup>	29	26	27

would benefit from being delivered in a primary-care setting so that management is appropriate at the outset and thus helps prevent the development of chronicity.<sup>38</sup> Focus should be on development and testing the effectiveness of such interventions and implementation in a primary-care setting. Psychological techniques such as CBT are generic and can be applied throughout the health service (primary, secondary, and tertiary care) and have the potential to be delivered by a number of health-care professionals following minimal training. This is particularly important for chronic orofacial pain as recent research<sup>40</sup> has shown that about 75% of patients with chronic orofacial pain present to their general medical practitioner compared to 25% who initially consult their dentist for the same problems. Any interventions may therefore need to be implemented not only by GPs but also by general medical practitioners or at the very least be available to them as services to which patients can be referred.

Overall therefore, the future challenge is to implement the above evidence into clinical care of patients with chronic orofacial pain. This will involve not only development of a psychological intervention but its implementation thereof which will include education and training at both undergraduate and postgraduate levels and the development of multidisciplinary links particularly in psychology. This will require challenging the professional autonomy of doctors and dentists who are likely to be resistant to changing their practice in a market-based environment where current management of chronic orofacial pain tends to be mechanistic and usually provided privately. However, it is unethical not to implement evidence-based practice particularly where it aims to improve patient outcomes and substitute invasive, irreversible, and expensive management with non-invasive behavioral therapy which has the potential to be applied across health-care services and aims to provide maximum benefit for least harm.

## Acknowledgments

This work was produced by Vishal Aggarwal under the terms of a Clinician Scientist Award issued by the NIHR – grant number CS/2008/08/001. The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the National Institute for Health Research, or the Department of Health in the United Kingdom.

## References

- Greenhalgh T. Assessing the methodological quality of published papers. *Br Med J* 1997;315:305–308.
- Elrasheed AA, Worthington HV, Ariyaratnam S, Duxbury AJ. Opinions of UK specialists about terminology, diagnosis, and treatment of atypical facial pain: A survey. *Br J Oral Maxillofac Surg* 2004;42:566–571.
- Pfaffenrath V, Rath M, Pollmann W, Keeser W. Atypical facial pain: Application of the IHS criteria in a clinical sample. *Cephalalgia* 1993;12(13, suppl):84–88.
- Woda A, Tubert-Jeannin S, Bouhassira D, et al. Towards a new taxonomy of idiopathic orofacial pain. *Pain* 2005; 116:396–406.
- Aggarwal VR, McBeth J, Zakrzewska JM, Macfarlane GJ. Unexplained orofacial pain. Is an early diagnosis possible? *Br Dent J* 2008;205:E6.
- Koh H, Robinson PG. Occlusal adjustment for treating and preventing temporomandibular joint disorders. *J Oral Rehabil* 2004;31:287–292.
- Al-Ani Z, Gray RJ, Davies SJ, Sloan P, Glenny AM. Stabilization splint therapy for the treatment of temporomandibular myofascial pain: A systematic review. *J Dent Educ* 2005;69:1242–1250.
- Aggarwal VR, McBeth J, Zakrzewska JM, Lunt M, Macfarlane GJ. The epidemiology of chronic syndromes that are frequently unexplained: Do they have common associated factors? *Int J Epidemiol* 2006;35:468–476.
- Macfarlane TV, Gray RJM, Kincey J, Worthington HV. Factors associated with the temporomandibular disorder, pain dysfunction syndrome (PDS): Manchester case-control study. *Oral Dis* 2001;7:321–330.
- Macfarlane TV, Blinkhorn AS, Davies RM, Ryan P, Worthington HV, Macfarlane GJ. Orofacial pain: Just another chronic pain? Results from a population-based survey. *Pain* 2002;99:453–458.
- Macfarlane TV, Kincey J, Worthington HV. The association between psychological factors and orofacial pain: A community-based study. *Eur J Pain* 2002;6:427–434.
- Macfarlane TV, Blinkhorn AS, Davies RM, Kincey J, Worthington HV. Predictors of outcome for orofacial pain in the general population: A four-year follow-up study. *J Dent Res* 2004;83:712–717.
- John MT, Miglioretti DL, LeResche L, Von KM, Critchlow CW. Widespread pain as a risk factor for dysfunctional temporomandibular disorder pain. *Pain* 2003; 102:257–263.
- Aggarwal VR, McBeth J, Zakrzewska JM, Lunt M, Macfarlane GJ. Are reports of mechanical dysfunction in chronic orofacial pain related to somatisation? A population based study. *Eur J Pain* 2008;12:501–507.



15. Gheldof EL, Vinck J, Van den Bussche E, Vlaeyen JW, Hidding A, Crombez G. Pain and pain-related fear are associated with functional and social disability in an occupational setting: Evidence of mediation by pain-related fear. *Eur J Pain* 2006;10:513–525.
16. Wall PD, Melzack R. *Textbook of Pain*, ed 4. Edinburgh: Churchill Livingstone, 1999.
17. Kroenke K, Swindle R. Cognitive-behavioral therapy for somatization and symptom syndromes: A critical review of controlled clinical trials. *Psychother Psychosom* 2000;69: 205–215.
18. Baker R, Shaw EJ. Diagnosis and management of chronic fatigue syndrome or myalgic encephalomyelitis (or encephalopathy): Summary of NICE guidance. *Br Med J* 2007;335:446–448.
19. Yates SL, Morley S, Eccleston C, de C Williams AC. A scale for rating the quality of psychological trials for pain. *Pain* 2005;117:314–325.
20. Turner JA, Mancl L, Aaron LA. Brief cognitive-behavioral therapy for temporomandibular disorder pain: Effects on daily electronic outcome and process measures. *Pain* 2005; 117:377–387.
21. Turner JA, Mancl L, Aaron LA. Short- and long-term efficacy of brief cognitive-behavioral therapy for patients with chronic temporomandibular disorder pain: A randomized, controlled trial. *Pain* 2006;121:181–194.
22. Stowell AW, Gatchel RJ, Wildenstein L. Cost-effectiveness of treatments for temporomandibular disorders: Biopsychosocial intervention versus treatment as usual. *J Am Dent Assoc* 2007;138:202–208.
23. Gatchel RJ, Stowell AW, Wildenstein L, Riggs R, Ellis E. Efficacy of an early intervention for patients with acute temporomandibular disorder-related pain: A one-year outcome study. *J Am Dent Assoc* 2006;137:339–347.
24. Aaron LA, Turner JA, Mancl L, Brister H, Sawchuk CN. Electronic diary assessment of pain-related variables: Is reactivity a problem? *J Pain* 2005;6:107–115.
25. Turner JA, Dworkin SF, Mancl L, Huggins KH, Truelove EL. The roles of beliefs, catastrophizing, and coping in the functioning of patients with temporomandibular disorders. *Pain* 2001;92:41–51.
26. Komiyama O, Kawara M, Arai M, Asano T, Kobayashi K. Posture correction as part of behavioral therapy in treatment of myofascial pain with limited opening. *J Oral Rehabil* 1999;26:428–435.
27. Gramling SE, Neblett J, Grayson R, Townsend D. Temporomandibular disorder: Efficacy of an oral habit reversal treatment program. *J Behav Ther Exp Psychiatry* 1996;27:245–255.
28. Flor H, Birbaumer N. Comparison of the efficacy of electromyographic biofeedback, cognitive-behavioral therapy, and conservative medical interventions in the treatment of chronic musculoskeletal pain. *J Consult Clin Psychol* 1993;61:653–658.
29. Bergdahl J, Anneroth G, Perris H. Cognitive therapy in the treatment of patients with resistant burning mouth syndrome: A controlled study. *J Oral Pathol Med* 1995;24: 213–215.
30. Dworkin SF, Turner JA, Wilson L, et al. Brief group cognitive-behavioral intervention for temporomandibular disorders. *Pain* 1994;59:175–187.
31. Turk DC, Rudy TE, Kubinski JA, Zaki HS, Greco CM. Dysfunctional patients with temporomandibular disorders: Evaluating the efficacy of a tailored treatment protocol. *J Consult Clin Psychol* 1996;64:139–146.
32. Dworkin SF, Turner JA, Mancl L, et al. A randomized clinical trial of a tailored comprehensive care treatment program for temporomandibular disorders. *J Orofac Pain* 2002;16:259–276.
33. Dworkin SF, Huggins KH, Wilson L, et al. A randomized clinical trial using research diagnostic criteria for temporomandibular disorders-axis II to target clinic cases for a tailored self-care TMD treatment program. *J Orofac Pain* 2002;16:48–63.
34. Von Korff M, Dworkin SF, Le Resche L, Kruger A. An epidemiologic comparison of pain complaints. *Pain* 1988; 32:173–183.
35. Von Korff M, Le Resche L, Dworkin SF. First onset of common pain symptoms: A prospective study of depression as a risk factor. *Pain* 1993;55:251–258.
36. Lipton JA, Ship JA, Larach-Robinson D. Estimated prevalence and distribution of reported orofacial pain in the United States. *J Am Dent Assoc* 1993;124:115–121.
37. Gatchel RJ, Stowell AW, Wildenstein L, Riggs R, Ellis E, III. Efficacy of an early intervention for patients with acute temporomandibular disorder-related pain: A one-year outcome study. *J Am Dent Assoc* 2006;137:339–347.
38. Von Korff M, Ormel J, Keefe FJ, Dworkin SF. Grading the severity of chronic pain. *Pain* 1992;50:133–149.
39. Turner JA, Holtzman S, Mancl L. Mediators, moderators, and predictors of therapeutic change in cognitive-behavioral therapy for chronic pain. *Pain* 2007;127:276–286.
40. Bell GW, Smith GL, Rodgers JM, Flynn RW, Malone CH. Patient choice of primary care practitioner for orofacial symptoms. *Br Dent J* 2008;204:669–673.