

Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) Pain Drawing: Survey of Use,
Barriers, and Potential Modifications

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Oral Medicine

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Abstract

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Barriers, and Potential Modifications

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Background: The Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) introduced the DC/TMD pain drawing to assess pain location and the presence of widespread pain, providing a valuable visual representation of a subjective experience. Using the DC/TMD pain drawing is recommended for routine use in dental practice, especially for individuals experiencing TMD or orofacial symptoms. As a useful component of the DC/TMD for over a decade, there hasn't been a specific study examining its utilization in both clinical and research domains. Key inquiries include identifying potential challenges or barriers associated with its application that may prevent healthcare providers from fully utilizing and benefiting from DC/TMD pain drawings in clinical and research settings.

Aims: The primary aim of this study was to investigate the utilization of the DC/TMD pain drawing and identify associated barriers to its use. The secondary aim was to determine the

necessity for and recommendations for modifying the current DC/TMD pain drawing. The last aim was to develop a new pain drawing with a visual representation of instructions based on findings from Aims 1 and 2 with the objective of enhancing pain location identification.

Methods: This mixed-methods cross-sectional survey study was conducted using RED Cap© to address aims 1 and 2 completed in Spring 2024. The first survey was purposively distributed to an estimated 500 current members of the American Academy of Orofacial Pain and the IADR-INFORM DC/TMD translations group. The second survey was purposively distributed to 62 individuals who have published or worked on pain drawings within the last 10 years and the IADR-INFORM DC/TMD translations group. Surveys included single, multiple-choice, and open-ended questions to collect different perspectives on using and improving the DC/TMD pain drawing. Analyses included descriptive statistics, means, and standard deviations; the open-ended responses were summarized by the themes, and the frequency of unique individuals mentioning a theme was recorded. Results were compared between raters for agreement.

Results: 49 participants completed Survey 1 and 21 completed Survey 2 (response rate=33.9%). Overall, Survey 1 had 45 participants (91.8%) familiar with the DC/TMD pain drawing. The top three ways mentioned of using the DC/TMD pain drawing are to visualize specific pain locations (n=32, 65.3%), as a screening tool for pain (n=27, 55.1%), and to visualize pain referrals (n=23, 46.9%). The top three concerns with using the DC/TMD pain drawing are no digital version (n=27, 55.1%), patients do not accurately draw their pain locations (n=22, 44.9%), and anatomical locations are not detailed enough to differentiate pain location (n=17, 34.7%). The survey 2 study indicates nearly 72.0% agreement that some modification could improve the DC/TMD pain drawing; for our improvement suggestions, 71.4% agreed on a visual

representation of instructions (n=15), 66.6% agreed on adding a three-quarter view to replace the lateral views of the face (n=14), and 95.2% agreed to add a larger view of the back of the head (n=20). In addition, 52.4% agreed creating a new pain drawing should include pain characteristics (n=11), and only 23.8% (n=5) agreed with a color-coded system to represent pain quality. Based on the results of aim 1 and 2, our research team developed a new version of the pain drawing, which includes the additional enlarged front and back head view with the extension of neck region, bilateral $\frac{3}{4}$ face view, and the improved intraoral view by increasing the anatomical area, with a new page of visual instruction to help patients to draw all their pains on it.

Conclusion: The DC/TMD pain drawing is being used by both clinicians and researchers despite barriers encountered, such as lack of digitalization/integration, concerns about accuracy, and desire for additional anatomical details. Using a priori team-developed suggestions and those from participants of this study, our research team has created and proposed a beta version of a derivative supplemental pain drawing with additional frontal, back of the head, three-quarter face, and extended neck views along with visual instructions to meet the needs of the stakeholders surveyed.

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Dedication

This work is dedicated to my beloved family, my greatest mentors, and all orofacial pain patients all over the world.

Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) Pain Drawing: Survey of Use, Barriers, and Potential Modifications

Introduction

Orofacial pain is a prevalent problem affecting approximately 10-16% of the adult population in the world and ranks as the fourth leading cause of chronic pain after back, neck, and knee pain. [1, 2] According to the International Classification of Orofacial Pain (ICOP), orofacial pain involves dentoalveolar and anatomically related tissues, muscle pain, temporomandibular joint pain, neuropathic pain affecting cranial nerves, pain resembling primary headaches, and idiopathic pain in the orofacial region. [3] The most common causes of orofacial pain are temporomandibular disorders (TMDs), with an annual cost estimated at \$4 billion in the USA. [4] Because pain is a subjective experience, and the orofacial region is complex with overlapping anatomical structures and pain referral, the evaluation, diagnosis, and treatment of orofacial pain present formidable challenges for both patients and healthcare providers. [5]

Pain drawings, also referred to as “pain diagrams” or “pain maps,” are valuable self-report tools that enable patients to transcend linguistic limitations and communicate pain location by drawing on a manikin outline. [6] Pain drawings have generally been found to have good test-retest reliability in different settings. [7-9] Most pain drawings in clinical practice include the front and back of the body but do not have a detailed anatomical view of the orofacial region, an area that occupies the largest portion of the sensory homunculus and is highly susceptible to pain referral patterns. [10] Various types of pain drawings have been used to: assess pain location and referral patterns, screen for widespread pain, evaluate the effects of therapy, differentiate between pain conditions, correlate pain extent with other clinical or psychological characteristics, or as pain dairies. [10-17]

In 1992, the original Research Diagnostic Criteria for Temporomandibular Disorder were first presented by Dworkin and LeResche, and the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) pain

drawing (Figure 1) was introduced as a self-report instrument which includes a front and back full-body view, two lateral views of the head, and a depiction of the oral cavity in 2014. [18, 19] The instrument was designed to screen for widespread pain using full-body diagrams and to facilitate Axis I TMD diagnoses (physical assessment/diagnoses) using detailed views of the face. [19] The DC/TMD pain drawing has been used in research to correlate pain extent with other clinical or psychological features. [14, 20] It has also been recommended to be used in dental practice for individuals with TMD or dental pain, particularly when symptoms last greater than 6 months or treatments have failed. [9, 21]

The DC/TMD, along with the pain drawing, have been translated into approximately 34 different languages and are available for use throughout the world. [22] Despite the pain drawing being widely available, it is not known to what extent it is used and the barriers to its use. It is likely that the pain drawings have similar patient-, clinician-, and practice-level barriers as other patient-reported measures. [23] For example, common patient-level barriers to use include difficulty following instructions and limited capacity to accurately draw pain locations or to localize the complex pain experience, which may be further hindered by physical limitations or cognitive impairments. [24, 25]

Our research team has had extensive experience using the DC/TMD pain drawing and has noted several minor challenges during its use. We have identified potential modifications as solutions to these challenges and wanted to gain a better understanding for the support of the apriorist suggested modifications, as well as gather additional suggestions from experts worldwide. An additional objective of this study was to gain an understanding from a broader set of stakeholders of how the DC/TMD pain drawing is used and the challenges impacting its use. Specifically, the aims of this study were to:

- i) Determine how the DC/TMD pain drawing is being used by clinicians and researchers and the barriers to its use.
- ii) Determine the need for and recommendations for modifying the DC/TMD pain drawing.
- iii) Use data from Aim 2 to inform the creation of a supplemental pain drawing to the original DC/TMD pain drawing.

Methods

Research Team Experience with the DC/TMD Pain Drawing: Observations and Suggestions

The routine use of the DC/TMD pain drawing with both new and follow-up patients presenting for a pain concern has been successfully implemented at the University of Washington School of Dentistry (UWSOD) since 2015. Clinicians and researchers at UWSOD who had extensive experience using the instrument generated a list of common challenges encountered when using the existing DC/TMD pain drawing, based on clinical observations. These challenges included: (i) errors in laterality, (ii) perceived patient challenges with following instructions, (iii) imprecise markings based on the color of pen (i.e. black), (iv) desire for a larger back of the head/neck view given its influence on orofacial pain referral, (v) omitted pains, and (vi) no predefined time interval (e.g. pain in the last 30 days). Based on this the research team drafted a priori solutions to these challenges and designed Aim 2 of this study to understand the support for these suggestions and gather additional input from experts in the field of pain drawings.

Research Team and Setting

Our research team was multidisciplinary and consisted of a dental student, an oral medicine graduate student, oral medicine specialists, epidemiologists and psychologists from UWSOD and the University at Buffalo. Some members had a role in publishing the Research Diagnostic Criteria for TMD and the DC/TMD, including the original DC/TMD pain drawing. The study was conducted through the UWSOD Oral Medicine Department.

Study Design

We designed two cross-sectional surveys that included both closed and open-ended questions; Survey 1 addressed Aim 1 and Survey 2 addressed Aim 2. The study team reviewed the surveys for content and clarity and pilot-tested them with Oral Medicine colleagues and students in the department. Feedback was collected on the understandability of questions. Changes were made to refine the surveys before finalizing and administration. Both surveys were hosted online using Research Electronic Data Capture (REDCap®). Redcap at The Institute of Translational Health Sciences (ITHS) is supported by the National Center for Advancing

Translational Sciences of the National Institutes of Health under Award Number UL1 TR002319. The Institutional Review Board at the University of Washington's Human Subjects Division deemed the surveys exempt (IRB ID STUDY 00019274).

Participant Selection and Recruitment

Convenience sampling was used for participant recruitment for Survey 1. Invitations to complete the electronic survey were distributed one time by e-mail to the members of the American Academy of Orofacial Pain (AAOP) and individuals involved in DC/TMD translations, with additional recruitment efforts (e.g. QR code of survey link on a printed flyer available on a table in the main conference hall) during the annual AAOP meeting (May 9-12, 2024). The survey was available from December 14, 2023, through May 19, 2024.

Participation was voluntary, and there was no incentive provided. Inclusion criteria were: (i) 18 years old or older, able to read/write in English; (ii) able to use a computer to access the online survey; (iii) and had treated individuals with orofacial pain in the last 5 years and/or been involved in human subjects' research on pain in the last 5 years.

For Survey 2, the research team purposefully selected individuals who have published on pain drawings within the last 10 years through a PubMed search or were the contact person for the DC/TMD translation group, prioritizing those who have published on the DC/TMD pain drawing specifically yet also including several that have published on other pain drawings. This approach was chosen for the intentional recruitment of individuals who were both invested in and had extensive experience with pain drawings to facilitate the collection of the detailed responses needed to achieve Aim 2. Up to three e-mails (i.e., 2 reminders) inviting individuals to participate were sent using REDCap©. The survey participation period was from December 14, 2023, to the end of April 2024. Participant inclusion criteria were: (i) 18 years old or older; (ii) able to read/write in English; (iii) able to use a computer to access the online survey; (iv) have published on pain drawings in the last 10 years.

Survey Instruments and Data Collection

Survey 1 (Appendix 1) consisted of 10 multiple-choice questions that addressed the following topics: experience in clinical/research practice, participants' familiarity with and use of the DC/TMD pain drawing in

clinic and research settings, and barriers to and concerns about its use. An additional six open-ended questions asked about what makes it difficult to use the pain drawing in research/clinical settings and what would make it easier, along with suggestions for improvements. Demographic data queried included age, gender, race, educational training, primary practice setting, and workplace location.

Survey 2 (Appendix 2) consisted of nine multiple-choice and nine open-ended questions as well as demographic questions querying age, gender, race, educational training, primary practice setting, and workplace location. Survey 2 questions included samples of the proposed change to the DC/TMD pain drawing recommended by the research team, with prompts querying participants' support and feedback. The proposed changes came from a list of previously identified potential areas for modification to the DC/TMD pain drawing based on the research team's clinical and research experience using the current version of the drawing.

Data Analysis

All survey results were downloaded from REDCap as an Excel spreadsheet. For closed-ended questions, descriptive statistics (i.e., Mean, standard deviation, percentage) were calculated by Excel. Three members independently (JL, MC, DK) reviewed responses to all open-ended questions and coded and analyzed them using thematic analysis methods common in qualitative research. [26] The research mentor (MC) resolved any discrepancies, and a full agreement was reached among the team members.

Excluded Participants

Surveys that were missing more than half of the responses (not including demographic data) or were not able to be classified as being completed by clinically oriented, research-oriented, or clinical and research-oriented participants were excluded. For Survey 1, 62 individuals opened the survey; 12 did not complete any questions beyond the consent, and 1 could not be classified as clinical, research or both, and thus was excluded. For Survey 2, 25 individuals opened the survey and provided consent; 4 did not complete any questions beyond the consent and were excluded.

Aim 3 Methods

The research team reviewed and discussed the results from Survey 1 and 2. For Survey 2, the proposed changes that received >70% agreement in closed-ended questions were incorporated into a new pain drawing. A second version of the pain drawing was created with items that received >60% agreement. Survey 2 open-ended responses with suggested changes to the DC/TMD pain drawing were prioritized by most commonly mentioned themes if they were feasible given a paper mode of administration, and if they were broadly applicable to a research and clinical audience and would likely improve the validity and reliability of the instrument.

Results

Demographics

For Survey 1, invitations to participate were sent to an estimated approximately 500 AAOP members and 38 International Network for Orofacial Pain and Related Disorders Methodology individuals listed as DC/TMD translation team members. Forty-nine participants (9.1%) were included in the analysis, as they completed all essential elements of the questionnaires (demographic information missing for 5 participants). Among the participants, 61.2% were male (n=30) and 28.6% were female (n=14), with a mean age of 56.7 years (SD 13.72). The majority were White (n=31; 63.3%), trained in Orofacial Pain (n=36; 73.5%), employed at an academic institution (n=20; 40.8%), located in North America (n=29; 59.0%), and had 20 or more years of professional experience (n=25; 40.8%). Sample demographics for Survey 1 respondents are reported in Table 1.

For Survey 2, 62 individuals were invited to participate, and one-third of them completed the survey (N=21; 33.8%). The participants had a mean age of 54.19 years (SD 9.61), with 42.9% being female (n=9) and 52.4% male (n=11). The majority were white (n=19; 90.5%) and had training in Orofacial Pain (n=19; 90.5%). Most were employed in community clinics (n=20; 95.2%). Over half of the participants worked in Europe (n=12; 57.1%), and a third in North America (n=6; 28.6%). The majority (n=12; 57.1%) had 20 or more years of professional experience. Sample demographics for Survey 2 respondents are reported in Table 1.

Pain Drawing Familiarity and Use

For Survey 1, participants were classified into one of three groups based on the setting in which they reported working: clinic only (n=26), research only (n=14), and both clinic and research (n=19). In the clinic-only group (n=26) a high percentage, 92.3% (n=24), were familiar with the DC/TMD pain drawing. Of these, 73.1% (n=19) utilized any pain drawing in clinical practice, and within this subgroup, 53.9% (n=14) employed the DC/TMD pain drawing with either “nearly all” or “select pain” patients. In the research-only group (n=4), 75.0% (n=3) were familiar with DC/TMD pain drawing, used any pain drawing in research, and used the DC/TMD pain drawing in their research. In the group involved in both research and clinical practice (n=19), 94.7% (n=18) were familiar with the DC/TMD pain drawing. Among them, 89.5% (n=17) used any pain drawing in a clinical setting, and within this subgroup, 68.4% (n=13) used the DC/TMD pain drawing in the clinic for nearly all or selected pain patients; 78.9% (n=15) employed any pain drawing in research and 63.2% (n=12) utilized the DC/TMD pain drawing in their research.

The three most common ways the DC/TMD pain drawing was reported as being used by participants were the same across all three groups (clinic only, research only, and both). These included: (i) to visualize specific pain locations; (ii) a screening tool for pain; and (iii) to visualize pain referrals. However, there were more individuals in the combined group of clinicians/researchers who used the DC/TMD pain drawing “to visualize pain referral” (n=13, 68.4%) than in the clinic-only group (n=9, 34.6%). For additional information on familiarity with and use of pain drawings please see Table 2.

Concerns and Barriers to Using the DC/TMD Pain Drawing in Clinical and Research Settings

The top three concerns about using the DC/TMD pain drawing were the same across all groups. The most common concern was that there is no digital version (n=27; 55.1%), followed by the belief that patients do not accurately draw their pain location on the DC/TMD pain drawing (n=22; 44.9%), and the belief that the DC/TMD pain drawing's anatomical locations are not detailed enough to differentiate pain location (n=17; 34.7%). A greater proportion of individuals in the research-only (n=1, 25%) and clinic/research groups (n=4, 21.1%) were concerned that it “has not been validated” compared to the clinic-only group (n=2, 7.7%). Additional information on concerns about using the DC/TMD pain drawing are presented in Table 2.

Open-ended responses about barriers to pain drawing administration were separated into clinically relevant barrier questions/responses and research-relevant barriers/responses. Eighty-four percent (n=38) of participants responded to the open-ended questions regarding the barriers to using DC/TMD pain drawing in the clinical setting. Sixty-five percent (n=15) responded to open-ended questions on research-relevant barriers. The clinically relevant barrier responses fell into one of four broad themes of instrument, patient, clinician, or practice factors while the research-relevant barriers fell into instrument, patient, and analysis factors. The subthemes identified as barriers were similar to the close-ended responses for top concerns with using the DC/TMD pain drawing (Table 2), allowing for triangulation of the data. For a summary of themes, subthemes, and sample quotes see Tables 3 and 4 for clinically relevant and research-relevant barriers, respectively.

The "instrument factors" theme encompasses barriers related to the DC/TMD pain drawing's design and technological integration. Among the clinically relevant and research-relevant barriers, the absence of a digital platform was one of the most mentioned, such as by participants who desired a digital platform that could integrate into the electronic health record or could measure change across time or referral extent. While clinically relevant barriers included the lack of certain views, such as "a large frontal view of the face to indicate mid-face pain." The research-relevant barriers at the instrument level focused on the desire for defined areas for comparison in research and additional pain measures to be captured.

The theme "patient factors" includes the perceived challenges that arise from the patient's perspective when using the DC/TMD pain drawing tool in clinic or research. The subthemes were similar between the clinically relevant barriers and research-relevant barriers, including patient interpretation of instructions and variable drawing abilities. An additional barrier in the clinical setting was patient understanding of the rationale for using a pain drawing.

The "clinician factors" theme includes barriers at the provider level. One subtheme is the tool's low perceived value in differentiating diagnosis, management, and prognosis, as one clinician succinctly noted, "[the DC/TMD pain drawing] does not differentiate diagnosis and management technique and prognosis." Another

barrier is that, even with pain drawing data, clinicians still need to obtain additional information and place a higher value on the interview and examination process.

The theme of "practice factors" includes operational challenges that impact the integration and use of the DC/TMD pain drawing in clinical settings at the practice level. Time constraints, storing/scanning paper files, and lack of integration with the EHR were subthemes. The lack of a "quick and easy digital version" prevented one participant from using the drawing for follow-up patients but used it for new patient intake only due to the administrative burden.

The "analysis factors" theme includes barriers encountered in processing and interpreting data from the DC/TMD pain drawing for research purposes. The subthemes that emerged included that it is the difficulty in quantifying pain drawing data, challenges with data entry/aggregation of paper files, and lack of a standard measurement unit for analysis. For a summary of themes, please see Tables 3 and 4, and Figure 4.

Perceived Accuracy and Need for Modifications to the DC/TMD Pain Drawing

In Survey 2, the perceived accuracy of the DC/TMD pain drawing to allow patients to indicate pain locations was assessed. For oral pain locations, 76.2% of the participants (n=16) rated the pain drawing as somewhat or very accurate. In contrast, when assessing the accuracy of identifying pain in the head, neck, and facial areas, 90.5% of the participants (n=19) deemed it somewhat or very accurate, and only 4.8% (n=1) found it somewhat inaccurate.

Perceived Need to Improve the DC/TMD Pain Drawing and Agreement with Suggestions for Improvement

In Survey 2, 71.4% of participants (n=15) agreed that the DC/TMD pain drawing needs to be improved with strong (n=6, 28.8 %) or some agreement (n=9, 43.2%), while the minority either disagreed (n= 2, 9.6 %) or were neutral (n=4, 19.2 %). Of the proposed changes, the most supported modification was the addition of a larger view of the back of the head, receiving strong or somewhat agreement from 95.2% of respondents (n=20), with a strong agreement of 57.1% (n=12). Providing a visual sample of the instructions was supported by 71.4% of participants (n=15), who chose strongly/somewhat agree. There was moderate support for replacing the lateral views of the face with a three-quarter view, with 66.6% of participants (n=14) strongly or

somewhat agreeing with this modification. The least supported changes were 52.4% of participants (n=11) strongly/somewhat agreed to create a pain drawing that could capture other pain characteristics, and the proposal for a color-coded system to represent pain levels was also undesirable, with a combined 71.4% of participants (n= 15) responding as neutral or somewhat/strongly disagree.

Additional Suggestions to Improve the DC/TMD Pain Drawing

In Survey 2, individuals were invited to make additional suggestions for modifications to the DC/TMD pain drawing. Themes emerged around 3 main areas, including anatomical views, instructions, and pain drawing administration

The "anatomical views" theme included any modifications proposed to the views or anatomical representations in the DC/TMD pain drawing. This theme was further subdivided into mouth/intraoral, head/neck, three-quarter face, full body, and other views. Most modifications under these subthemes recommended adding anatomical details to the oral cavity and expanding views to include the back/front of the head and upper shoulder. Some suggestions focused on adding specific anatomies such as the TMJ or muscle delineations, creating discrete regions and the midline of the spine. The most commonly mentioned theme from these was to include a back/front of the head and shoulders. Other suggestions were more general, such as enlarged body drawings or a gender-neutral face and neutral expression. There were concerns that excessive details might lead to confusion, three-quarter views may lead to redundancies, or that new modifications should be tested.

The "instructions" theme includes comments associated with the DC/TMD pain drawing instructions, patients following instructions, or administration of the instrument. Suggested modifications included the need to delineate the time frame of pain (e.g., pain in the last 30 days) and enhance patients' ability to follow instructions and accurately mark all relevant pain areas. Some participants shared suggestions of how they have tweaked the instruction of the pain drawing to aid them in their practice, such as by differentiating the chief concern from other pains and identifying the area of highest pain intensity. Lastly, standardization of instructions and protocols for verification of the drawn locations were suggested. There were concerns that

highlighted a preference for trying to keep the form simple and not too complicated so that it can remain user-friendly.

The “pain drawing administration” theme covers suggested changes designed to improve the administration of the DC/TMD pain drawing tool. Digitalization was the most common subtheme with suggestions to convert the tool into digital and 3-D formats and integrate it with electronic health records (EHR). However, concerns arise that current instructional elements may prove challenging to adapt to these digital formats. In the analytics subgroup, suggestions were made to build in the ability to extract defined metrics to enhance the tool’s analytical utility. The additional capabilities subtheme encompassed suggestions of adding features to capture diverse pain characteristics such as intensity and interference over time, although there was a concern that incorporating too much data might lead to confusion.

Throughout the open-ended responses, there was a recognition for both wanting additional details and functions yet a competing interest to maintain simplicity expressed by many participants. For a summary of all themes please see Table 6.

New Supplemental Pain Drawing with Additional Instruction

The research team created and reviewed several iterative designs of a new pain drawing. The a priori suggested changes by the research team that were supported by more than 60% were incorporated into a new pain drawing including: (i) enlarged back views of the head, (ii) three-quarter views, and (iii) providing a visual set of instructions. Additional modifications were made based on open-ended responses and included: (i) adding a frontal view of the face, (ii) extending the neck to incorporate bilateral upper shoulders, and (iii) demarcating the central spine in the neck. We created two pain drawing versions, one with lateral face views (Figure 5) and another with three-quarter views (Figure 6). We also made minor adjustments, including adding more soft tissue to the mouth and marking the left and right sides. Instructions were adjusted to reflect a 30-day time frame consistent with other DC/TMD diagnostic criteria and measures. The visual set of instructions can be seen in Figure 7.

Discussion

The DC/TMD pain drawing has been used for nearly 10 years in clinical and research settings. [18] The aims of this study were to gain stakeholders' perspectives on how the DC/TMD pain drawing is used, barriers to its use, and suggestions for modifications. The main findings of this work are that: (i) the majority of participants are familiar with and use the DC/TMD pain drawing in clinical and/or research settings; (ii) it is most commonly being used to visualize specific pain locations, screen for pain, and identify pain referral; and (iii) the most common barriers are a lack of a digital version and patient drawing accuracy. Furthermore, the majority felt the DC/TMD pain drawing could use some minor modifications. The most common suggestions for refining the DC/TMD pain drawing included adding (i) additional views of the head/neck, (ii) instructions for administration, and (iii) a digital version.

Many participants, regardless of their clinical or research roles, were familiar with the DC/TMD pain drawing and have used it in clinic or research. Sixty-eight percent of participants involved in clinical and research work utilized the DC/TMD pain drawing in the clinic compared to the clinic-only group (53.8%). It is possible that being engaged in research may increase the perceived utility of the instrument or comfort with using and analyzing standardized measures in clinical practice. Furthermore, it is possible the clinic/research group is using clinical practice to facilitate research. The research-only group and the clinic/research group showed high adoption rates for using DC/TMD pain drawings in research settings (n=3, 75.0%) and (n=15, 78.9 %), respectively. All three groups were more likely to endorse using any pain drawing in both clinical and research settings compared to specifically using the DC/TMD pain drawing, implying that some participants use other pain drawings. Various body templates for pain drawings have been developed for pain assessment. [10] There are specialized pain drawings to meet specific clinical needs, such as the DC/TMD pain drawing for closer views of the face/oral cavity [26], outlines of the female body [27], dermatome pain drawing [28], template for headaches [29], pregnant body [30], and 3D and pseudo-3D options. [26, 30-32] For the screening of widespread pain, any full-body pain drawing is likely sufficient. However, finer granularity drawings with

unique views, such as the DC/TMD pain drawing, may be more useful for additional uses, such as localization and visualization of pain referral patterns for orofacial pain, compared to a generic full-body-only drawing.

The three most common uses of the DC/TMD pain drawing among survey participants were to visualize specific pain locations, screen for pain, and visualize pain referrals. As a multifunctional tool, pain drawings have been used in the literature to (i) assess pain location and referral patterns [33], (ii) screen for widespread pain [34], (iii) evaluate the effects of therapy [35], (iv) differentiate between pain conditions [35], (v) correlate pain extent with other clinical or psychological characteristics [36], or (vi) as pain diaries [37]. Interestingly, more participants involved in both clinical and research settings (68.4%) used the DC/TMD pain drawing to visualize pain referrals compared to 34.6% of those engaged in clinical practice only. Pain referral is an important phenomenon in the head/neck region and should be important to both specialists and general dentists. Masticatory and head/neck muscles can refer pain to the teeth, leading to nonodontogenic tooth pains that pose challenges in diagnosis and at times unwarranted dental treatments. [38] The DC/TMD pain drawing should be used by dentists or endodontists to screen for craniofacial pain when there is no clearly identifiable cause of chronic odontogenic pain and may prompt additional evaluations to check for pain referral. [26]

Among the top three concerns was the lack of a digital version. The existing DC/TMD pain drawing and the additional drawings created as part of this study are in a digital PDF format and can be used printed with pen and paper or in an electronic format with an interface that allows for digital drawing on a PDF document. Various digital technologies offer innovative platforms for pain drawings using tablets and smartphones. [39] From both a practice perspective and research perspective, there appears to be a desire for easier electronic administration and analysis of the DC/TMD pain drawing. Digitizing pain drawings has allowed image processing algorithms to extract fundamental metrics like pain extent and location, with the potential for utilizing advanced analyses such as clustering analysis, principal component analysis, and artificial neural networks. [40] More advanced digital platforms can also facilitate layering additional pain characteristics onto a pain drawing and could help healthcare providers differentiate between types of pain (like sharp or dull, deep or superficial) and identify pain patterns. Thus, integrating these features could assist patients in conveying their

symptoms more thoroughly, aiding in diagnoses. [41, 42] This requires programming applications to be built and EHRs that can integrate data from different sources. There was little support for additional features in this study due to the complexity that they present for paper-and-pen drawing and patients in daily practice and were more favored by researchers. Applications have been successfully built for research and clinical purposes that integrate and analyze pain location with pain characteristics data, such as PainTrek at the University of Michigan and the Collaborative Health Outcomes Information Registry body map. [39] Working together with existing groups may be one way to get components important from the DC/TMD pain drawing into an existing program or de-novo programs may be created but require time, funding and unique skills. While digitalization aims to modernize the tool and make it more comprehensive, it is important to balance the inclusion of detailed data with the need to maintain a straightforward and user-friendly interface. These barriers and suggestions highlight the need to evolve the pain drawing tool to better meet the needs of both clinicians and researchers while ensuring it remains effective and easy to use.

Among the top three concerns with the DC/TMC pain drawing was that patients may produce inaccurate drawings, and a common barrier was the perception that patients do not follow instructions. These concerns are not unique to the DC/TMD pain drawing. [39] The most common patient inaccuracies in pain drawings are omitted pains, patient inability to recall pains, interpretations of body regions on a drawing, and confusing laterality. [7, 9, 43] Despite the risks of inaccuracies, pain drawings have been found to be reliable and valid measurement tools with good test-retest reliability. [39] Suvinen and colleagues (2016) found that DC/TMD pain drawings effectively identify comorbid pains and guide comprehensive assessment and treatment planning for TMD patients in Finland. [44] Another study by Pitance and colleagues (2021) demonstrated the high reliability of digital DC/TMD pain drawings for pain location and extent in TMD. [20] Creating a step for clinicians to verify pain locations by written survey, interview, or exam areas may increase the accuracy of pain drawings when higher levels of accuracy are needed. Two suggestions have the ability to potentially reduce inaccuracies in pain drawings: the incorporation of a visual representation of the instructions (Figure 4) and a standardized administration protocol. The creation of a standardized administration protocol is currently being

pursued by the research team. Both recommendations will have to be piloted and tested with both clinicians and patients for comprehension, ease of use, and perceived benefits.

Even though most participants in Survey 2 agreed that the DC/TMD pain drawing has high accuracy for indicating pain locations, over 71% advocated for some improvements. This study has created additional pain drawings with prior suggested changes that garnered sufficient support and new modifications suggested in Survey 2. The greatest support was for the a priori suggested addition of a back of the head view. This finding was not surprising and is supported by previous studies that report few patients with TMD have pain isolated to the face and jaw, with additional pain in the head, neck, or other locations. [45, 46] The most frequently indicated pain areas by patients with TMD were the cervical spine (92.85%) and the scapular region (50%). [45, 47, 48] Open-ended responses further emphasized the importance of detailed anatomical depictions while also noting potential challenges such as excessive detail causing confusion. These insights suggest a balanced approach is needed to enhance the DC/TMD pain drawing while keeping it user-friendly. New drawings should be piloted and cognitively tested with patients to understand if they can interpret body areas correctly.

Strengths and Limitations

The limitations of achieving Aim 1 were mostly related to the low response rate and small sample size, which may mean that study data do not represent all stakeholders that could use the DC/TMD pain drawing. A low response rate is common with healthcare provider sampling. However, for Aims 2 and 3, a qualitative approach was taken with purposive sampling, and theme saturation is more relevant. Saturation means few new details or insights about the phenomenon under investigation were discovered with additional responses. Both surveys predominantly featured white participants with extensive professional experience, potentially limiting the generalizability of the findings to more diverse populations and less experienced clinicians. The greater representation from North America in Survey 1 and Europe in Survey 2 might also introduce regional biases, affecting the applicability of the feedback to other geographical areas. These demographic limitations should be considered when interpreting the results and implementing suggested modifications to ensure the DC/TMD pain drawing meets the needs of a broader and more diverse user base. On the other hand, the extensive experience

of those surveyed allowed us to capture individuals who have extensive experience with using pain drawing in both clinical and research settings, allowing for meaningful insights and suggestions for improvement from end users. This study is the first of its kind and provides important new information about familiarity with DC/TMD pain drawing use, as well as barriers and suggestions for modifications. These findings were used to form beta versions of pain drawings to fulfill stakeholder needs.

Future Directions

A standardized protocol for administering the new pain drawing is currently in development. Cognitive interviews will be conducted with patients and healthcare professionals to assess whether the instructions, standardized protocol, and new pain drawing views are comprehensible, easy to use, and relevant to stakeholders. The reliability and validity of the existing or new pain drawing instruments could also be assessed in the future.

Conclusion

This study used a mixed methods approach to understand how the current DC/TMD pain drawing is utilized, the barriers faced, and the potential areas for improvement. The DC/TMD pain drawing is being used by both clinicians and researchers despite barriers encountered, such as lack of digitalization/integration, concerns of accuracy, and desire for additional anatomical details. Using a priori team developed suggestions and those from participants of this study, our research team has created and proposed a beta version of a derivative supplemental pain drawing with additional frontal, back of head, three-quarter face and extended neck views along with visual instructions to meet the needs of the stakeholders surveyed.

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Table 1 Demographics: Survey 1 Pain Drawing Use/Barriers and Survey 2 Pain Drawing Modifications

Demographics	S1: PD Use/Barriers (N=49)	S2: PD Modifications (N=21)
	M ± SD or n (%)	M ± SD or n (%)
Age	56.68 ± 13.72	54.19 ± 9.61
Gender		
Man	30 (61.2)	11 (52.4)
Woman	14 (28.6)	9 (42.9)
Non-binary	0 (0.0)	0 (0.0)
A gender not listed here	0 (0.0)	0 (0.0)
Prefer not to answer	0 (0.0)	1 (4.8)
Missing	4 (8.2)	0 (0.0)
Race		
White	31 (63.3)	19 (90.5)
Black or African American	0 (0.0)	0 (0.0)
Asian or Asian Indian	8 (16.3)	1 (4.8)
Middle Eastern/ North African	0 (0.0)	0 (0.0)
Mixed	3 (6.1)	0 (0.0)
Native Hawaiian / Other Pacific Islander	0 (0.0)	0 (0.0)
American Indian/ Alaskan Indian /Alaskan Native	0 (0.0)	0 (0.0)
Other	1 (2.0)	1 (4.8)
Prefer not to answer	1 (2.0)	0 (0.0)
Missing	4 (8.2)	0 (0.0)
Training¹		
Oral Medicine	7 (14.3)	5 (23.8)
Orofacial Pain	36 (73.5)	19 (90.5)
Physical Therapy	4 (8.2)	3 (14.3)
Psychologist	1 (2.0)	0 (0.0)
Medical Doctor (MD/DO)	1 (2.0)	1 (4.8)
Allied Health Professional	1 (2.0)	9 (42.9)
PhD	5 (10.2)	1 (4.8)
Other ²	3 (6.1)	1 (4.8)
Missing	5 (10.2)	0 (0.0)
Primary Practice¹		
Academic institution	20 (40.8)	2 (9.5)
Private practice solo	12 (24.5)	1 (4.8)
Private practice group	9 (18.4)	0 (0.0)
Group dental service organization	4 (8.16)	1 (4.8)
Community clinic†	1 (2.0)	20 (95.2)
Hospital	7 (14.3)	3 (14.3)
Other	3 (6.1)	0 (0.0)
Missing	6 (12.2)	0 (0.0)
Workplace Region		
North America	29 (59.0)	6 (28.6)
Central/South America	2 (4.1)	2 (9.5)
Europe	9 (18.4)	12 (57.1)
Africa	0 (0.0)	0 (0.0)
Asia	2 (4.1)	1 (4.8)
Oceania	0 (0.0)	0 (0.0)
Missing	7 (1.3)	0 (0.0)
Years of Experience		
Less than 5 years	5 (10.2)	0 (0.0)
5 to < 10 years	4 (9.1)	2 (9.5)
10 to < 15 years	8 (16.3)	2 (9.5)
15 to < 20 years	2 (4.1)	4 (19.0)
20 or more years	25 (51.0)	12 (57.1)
Missing	5 (0.0)	1 (4.8)

¹: Individuals could select more than one answer; categories are not mutually exclusive. 1 retired from private practice, 1 retired following injury, 1 in large medical/dental health organization of specialty clinics.

²: S1: 3 Dentist, 2 Oral Maxillofacial Surgery, 1 Motor control, 1 Pediatric dentistry.

²: S2: 3 TMD, 1Prosthodontic, 1 Muscle pain, 1Epidemiology

†: Community clinic may be interpreted differently by participants based on regional variance.

S1: Survey 1, S2: Survey 2, PD: Pain Drawing

Table 2 DC/TMD Pain Drawing Familiarity, Use, Concerns: Survey 1(N=49)

	Clinic only N=26 n(%)	Research only N=4 n(%)	Both N=19 n(%)
Familiar with DC/TMD pain drawing			
Yes	24 (92.3)	3 (75.0)	18 (94.7)
No	2 (7.7)	1 (25.0)	1 (5.26)
Missing	0 (0.0)	0 (0.0)	0 (0.0)
Using any pain drawing in clinic			
Yes	19 (73.1)	-	17 (89.5)
No	5 (19.2)	-	2 (10.5)
Missing	0 (0.0)	-	0 (0.0)
Question not presented ¹	2 (7.7)	4 (100.0)	0 (0.0)
Frequency of DC/TMD pain drawing use in clinic?			
With nearly all pain patients	10 (38.5)	-	11 (57.9)
With select pain patients	4 (15.4)	-	2 (10.5)
A few times, did not continue using it	2 (7.7)	-	1 (5.26)
Never used it	1 (3.8)	-	2 (10.5)
Missing	0 (0.0)	-	0 (0.0)
Question not presented ¹	9 (34.6)	4 (100.0)	3 (15.8)
Using any pain drawing in research			
Yes	-	3 (75.0)	15 (78.9)
No	-	1 (25.0)	4 (21.1)
Missing	-	0 (0.0)	0 (0.0)
Question not presented ¹	26 (100.0)	0 (0.0)	0 (0.0)
Used the DC/TMD pain drawing in research?			
Yes	-	3 (75.0)	12 (63.2)
No	-	0 (0.0)	2 (10.5)
Missing	-	0 (0.0)	0 (0.0)
Question not presented ¹	26 (100.0)	1 (25.0)	5 (26.3)
Ways currently use the DC/TMD pain drawing			
To visualize specific pain locations.	14 (53.8)	2 (50.0)	16 (84.2)
As a screening tool for pain.	13 (50.0)	2 (50.0)	12 (63.2)
To visualize pain referral.	9 (34.6)	1 (25.0)	13 (68.4)
To document pain intensity by location.	7 (26.9)	1 (25.0)	7 (36.8)
As a diagnostic tool.	6 (23.1)	1 (25.0)	7 (36.8)
To track therapeutic outcomes.	3 (11.5)	1 (25.0)	6 (31.6)
To document pain quality (i.e. burning etc.)	1 (3.8)	0 (0.0)	2 (10.5)
Other.	0 (0.0)	0 (0.0)	2* (10.5)
Missing.	1 (3.8)	0 (0.0)	0 (0.0)
Question not presented ¹	7 (26.9)	1 (25.0)	2 (10.5)
Top 3 concerns with using the DC/TMD pain drawing			
There is no digital version.	11 (42.3)	3 (75.0)	13 (68.4)
Patient do not accurately draw their pain location.	10 (38.5)	3 (75.0)	9 (20.9)
Its Anatomical locations are not detailed enough to differentiate pain location.	8 (30.8)	2 (50.0)	7 (36.8)
Instructions are not clear for patients to understand.	5 (19.2)	1 (25.0)	3 (15.8)
Does not measure pain characteristics I am interested in.	4 (15.4)	1 (25.0)	2 (10.5)
Has not been validated.	2 (7.7)	1 (25.0)	4 (21.1)
Others.	5 (19.2)	0 (0.0)	0 (0.0)
	1 (3.8)	0 (0.0)	2 (10.5)

The specific anatomical region I am interested in is not represented.	3 (11.5)	0 (0.0)	2 (10.5)
Missing.			

¹Question was not presented based on branch logic built into the survey based on previous responses.

*Other responses: to correlate the information with medical history and the patient's narrative; to identify other sites beyond the head that a patient may be prompted to comment on that did not come up in the history.

-3 individuals were moved into the clinic only category based on information provided, however due to their selections may not have received all the same questions based on branch logic.

Both: both involve clinic and research group

Table 3 Barriers to Using The DC/TMD Pain Drawing in Clinical Practice: Survey 1
n=38/45 (84.4%)

Categories	Themes	Sample quotes
Instrument factors	<ul style="list-style-type: none"> • Lack digital platform • Lacks program to aggregate data across time • Lack certain views 	<p>“Digital version is not available for EHR”</p> <p>“Digital app for change across time and measuring referral extent”</p> <p>“There is no large frontal view of the face to indicate mid-face pain”</p>
Patient factors	<ul style="list-style-type: none"> • May not follow instructions • Ability to draw pain areas accurately • Do not understand rationale 	<p>“Difficulty for some participants to clearly understand and follow all the instructions”</p> <p>“Patients often provide inaccurate data and descriptions I place greater value on a descriptive questionnaire”</p> <p>“The rationale for using the whole-body map is not well understood by patients”</p>
Clinician factors	<ul style="list-style-type: none"> • Low perceived diagnostic, management or prognostic value • Limited value due to need to obtain additional information (e.g. interview, exam) 	<p>“Does not differentiate diagnosis and management technique and prognosis”</p> <p>“The drawing is only useful on a non-specific or precise level. More specific information must be obtained through the interview process”</p> <p>“I put very little value on where the patient indicates their pain is and far more value on where I can provoke their pain by palpation.”</p>
Practice factors	<ul style="list-style-type: none"> • Time • Storing/scanning files • Integration with EHR 	<p>“I want to minimize the amount of paperwork patients need to complete prior to their appointment.”</p> <p>“The need to scan it in”</p> <p>“No digital version to integrate with my EHR. I use the pain drawing for every new patient intake (paper) questionnaire. But I don't use it for follow ups because there's no "quick and easy" digital version.”</p>

EHR: Electronic Health Records

**Table 4 Barriers to Using The DC/TMD Pain Drawing in Research: Survey 1
n=15/23 (65.2%)**

Categories	Themes	Sample quotes
Instrument factors	<ul style="list-style-type: none"> • No defined areas for comparison • No digital version • Lacks additional measures (i.e. Pain frequency, pain quality) 	<p>“No defined areas to compare among patients”</p> <p>“Lack of digital version”</p> <p>“Hard to capture the frequency of symptoms across time and patient”</p>
Patient factors	<ul style="list-style-type: none"> • Ability to draw • Accuracy of drawing • Ability to follow instructions 	<p>“Patient's drawing ability & accuracy”</p> <p>“Difficulty for some participants to clearly understand and follow all the instructions”</p>
Analysis factors	<ul style="list-style-type: none"> • Data quantification • Data entry • No standard measurement unit • No built-in ability to aggregate data 	<p>“Difficult to quantify”</p> <p>“Due to the lack of a digital version, one has to ask the participants to mark on the hard copy and then upload on redcap”</p> <p>“Absence of a standardized measurement”</p> <p>“It does not facilitate data aggregation”</p>

Table 5 Agreement with DC/TMD Pain Drawing Modification Suggestions: Survey 2 (N=21)

	n (%)
To what extent do you agree the DC/TMD pain drawing could be improved by some modifications?	
Strongly agree	6 (28.8)
Somewhat agree	9 (43.2)
Neither agree nor disagree	4 (19.2)
Somewhat disagree	1 (4.8)
Strongly disagree	1 (4.8)
Agreement with adding a larger view of the back of the head as an additional view to the pain drawing.	
Strongly agree	12 (57.1)
Somewhat agree	8 (38.1)
Neither agree nor disagree	0 (0.0)
Somewhat disagree	1 (4.8)
Strongly disagree	0 (0.0)
Agreement with creating different versions of the pain drawing that could capture other pain characteristics.	
Strongly agree	6 (28.8)
Somewhat agree	5 (23.8)
Neither agree nor disagree	4 (19.0)
Somewhat disagree	4 (19.0)
Strongly disagree	1 (4.8)
Missing	1 (4.8)
Agreement with providing a visual representation of the instructions to improve the pain drawing as an instrument.	
Strongly agree	5 (23.8)
Somewhat agree	10 (47.6)
Neither agree nor disagree	3 (14.3)
Somewhat disagree	3 (14.3)
Strongly disagree	0 (0.0)
Agreement with replacing the lateral views of the face with a three-quarter view.	
Strongly agree	4 (19.0)
Somewhat agree	10 (47.6)
Neither agree nor disagree	1 (4.8)
Somewhat disagree	4 (19.0)
Strongly disagree	2 (9.5)
Agreement with a color-coded system to represent pain quality.	
Strongly agree	2 (9.5)
Somewhat agree	3 (14.3)
Neither agree nor disagree	4 (19.0)
Somewhat disagree	6 (28.8)
Strongly disagree	5 (23.8)
Missing	1 (4.8)

Table 6 Summary of Open-ended Responses for DC/TMD Pain Drawing Modifications: Survey 2

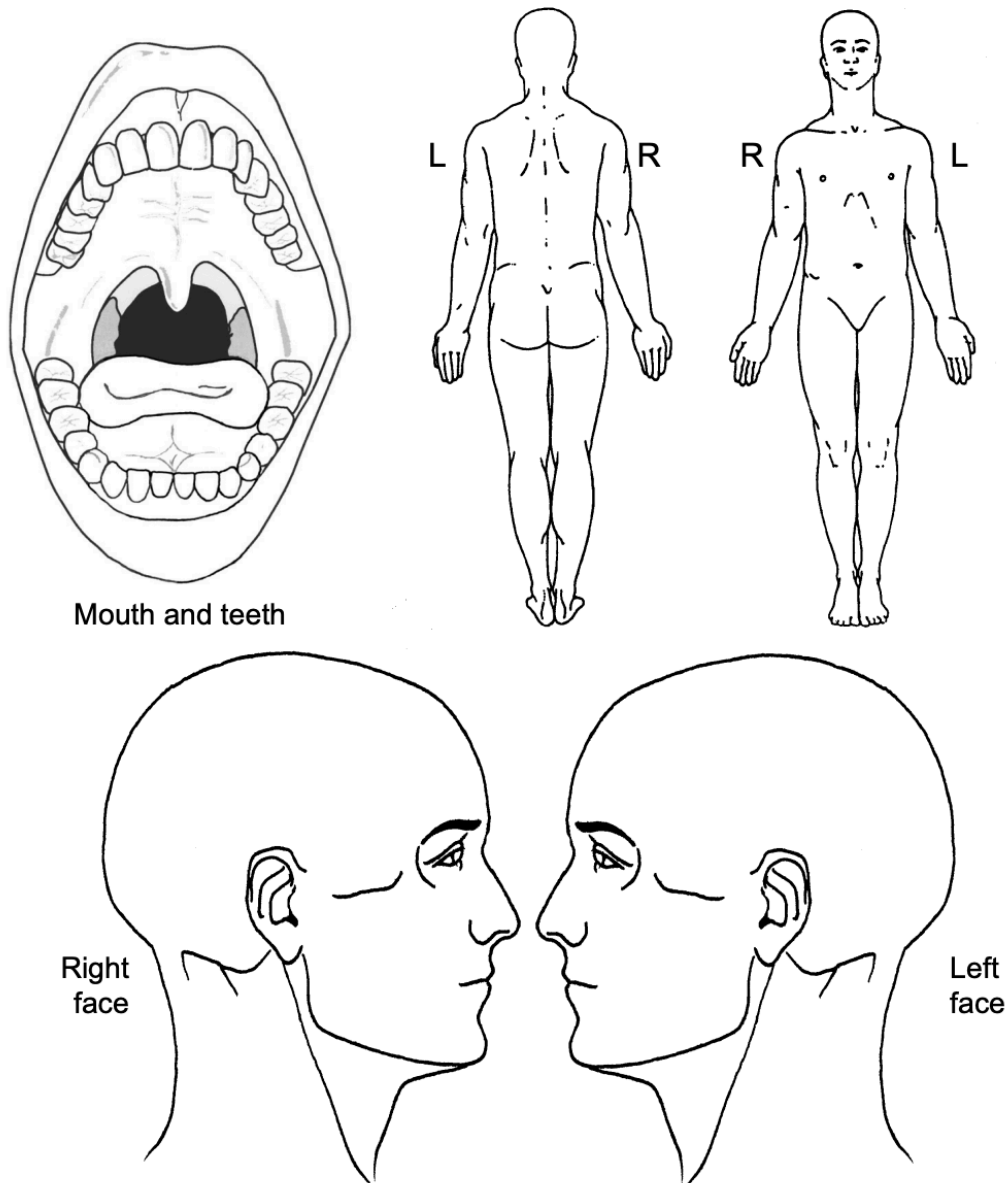
	Suggested modifications	Concerns
Anatomical views		
Mouth/intraoral view	<ul style="list-style-type: none"> Specify right and left sides Add more anatomic details 	<ul style="list-style-type: none"> Too many details may cause confusion
Head and neck view	<ul style="list-style-type: none"> Add frontal, back of head, midline of spine view Extend neck to shoulder, trapezius, Create a gender-neutral mannequin with neutral facial expression 	
Three-quarter view of the face	<ul style="list-style-type: none"> Will allow patients to draw areas such Trapezius muscle area. 	<ul style="list-style-type: none"> Redundancy Less precise for mandibular angle Needs to be tested
Full body view	<ul style="list-style-type: none"> Enlarging body drawings improves detailed examination, more thorough assessments, add GI details in abdomen 	
Others	<ul style="list-style-type: none"> Add muscle and TMJ delimitations Add labels for specific locations Add discrete regions 	
Instructions		
	<ul style="list-style-type: none"> Delineate time frame (e.g. pain in the last 30 days, current etc.) Improving ability of patients to follow instructions and mark all areas of pain is important. Differentiate chief complaint from other pains Identify the area with highest pain intensity Standardize instructions Instructions and verifications should be standardized for research 	<ul style="list-style-type: none"> Any changes of instruction might complicate the form, making it less user-friendly for patients.
Pain drawing administrations		

Digitalization	<ul style="list-style-type: none"> • Digital format • 3-D format • Integration with EHR 	<ul style="list-style-type: none"> • Aspects of current instructions may be challenging in a digital format
Analytics	<ul style="list-style-type: none"> • Build in ability to extract defined metrics 	
Additional capabilities	<ul style="list-style-type: none"> • Add ability to capture other pain characteristics (i.e. intensity, interference time etc.) 	<ul style="list-style-type: none"> • Too much data is confusing – prefer to keep it simple.

Figure 1 DC/TMD Pain Drawing

PAIN DRAWING

Indicate the location of ALL of your different pains by shading in the area, using the diagrams that are most relevant. If there is an exact spot where the pain is located, indicate with a solid dot (●). If your pain moves from one location to another, use arrows to show the path.



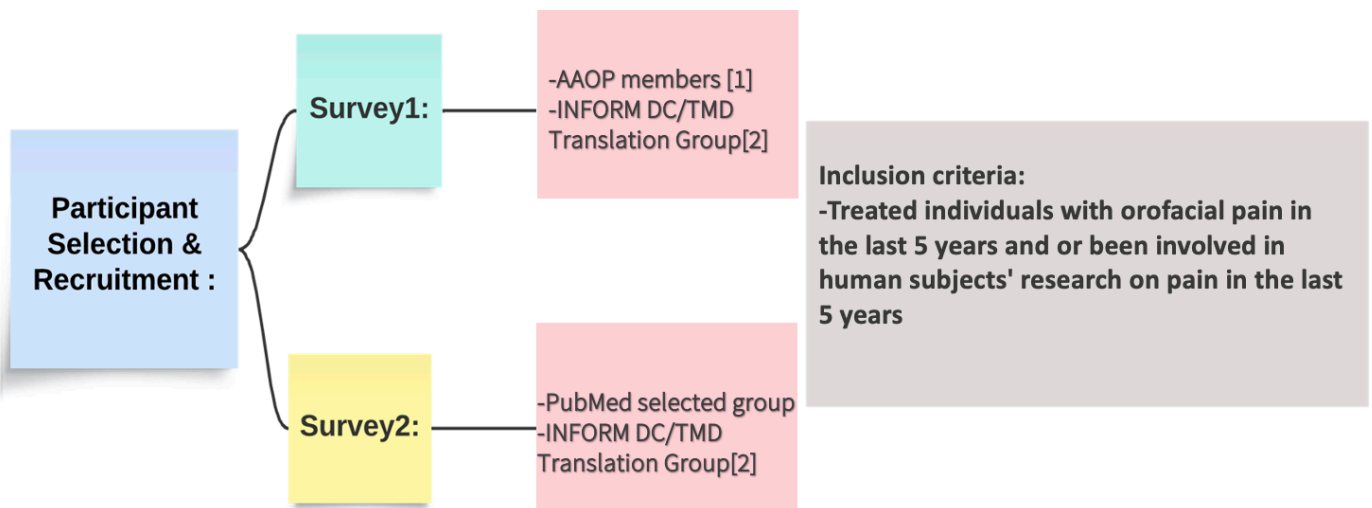
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Figure 2 Axis II Assessment Protocol of DC/TMD

Recommended Axis II Assessment Protocol

Domain	Instrument	No. of items	Screening	Comprehensive
Pain intensity	Graded Chronic Pain Scale (GCPS)	3	✓	✓
Pain locations	Pain drawing	1	✓	✓
Physical function	Graded Chronic Pain Scale (GCPS)	4	✓	✓
Limitation	Jaw Functional Limitation Scale-short form (JFLS)	8	✓	
	Jaw Functional Limitation Scale-long form (JFLS)	20		✓
Distress	Patient Health Questionnaire-4 (PHQ-4)	4**	✓	
Depression	Patient Health Questionnaire-9* (PHQ-9)	9**		✓
Anxiety	Generalized Anxiety Disorder-7 (GAD-7)	7**		✓
Physical symptoms	Patient Health Questionnaire-15* (PHQ-15)	15		✓
Parafunction	Oral Behaviors Checklist (OBC)	21	✓	✓

Figure 3 Flow Chart of Participant Recruitment



[1] The American Academy of Orofacial Pain

[2] International Network For Orofacial Pain and Related Disorders Methodology

Figure 4 Barriers to Using DC/TMD Pain Drawing: Survey 2

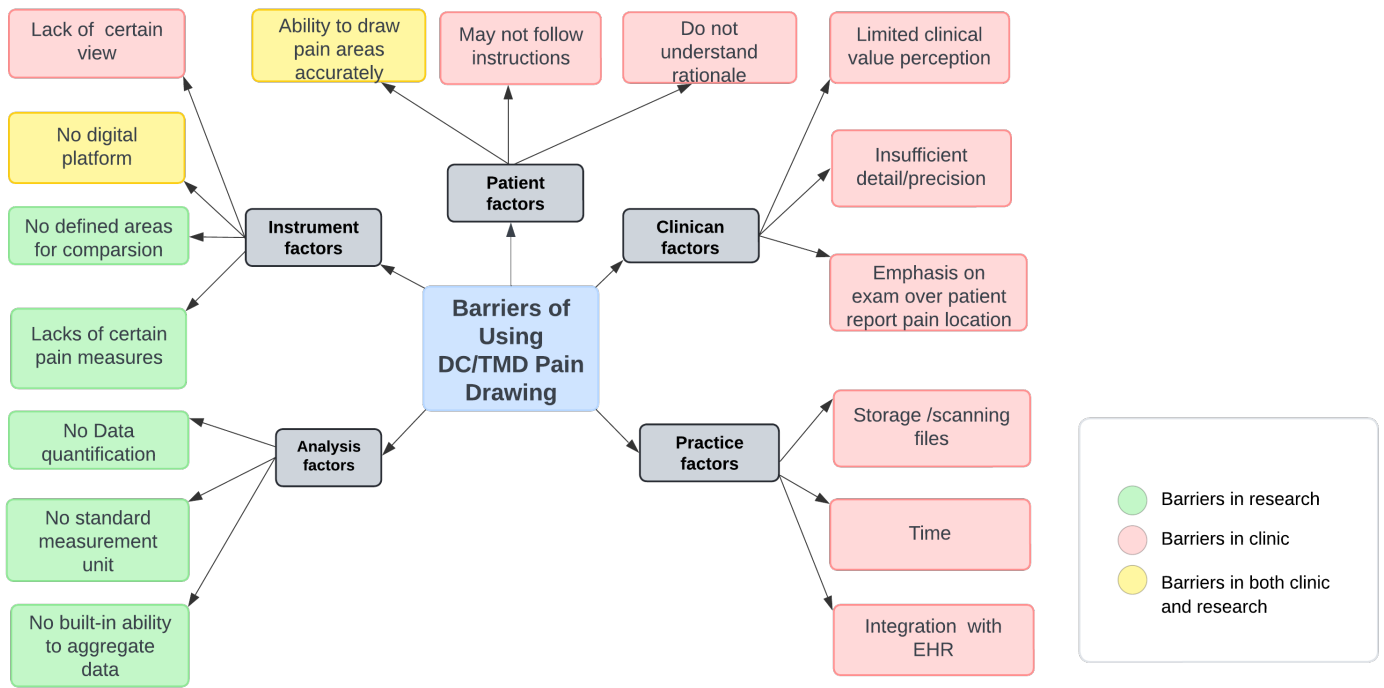


Figure 5 Addition Head Views Pain Drawing Version 1

Date: ____/____/____

Additional Head Views Pain Drawing

Drawing #: _____

Name: _____

Shade all the areas you experienced pain in your body in the last **30 days**.

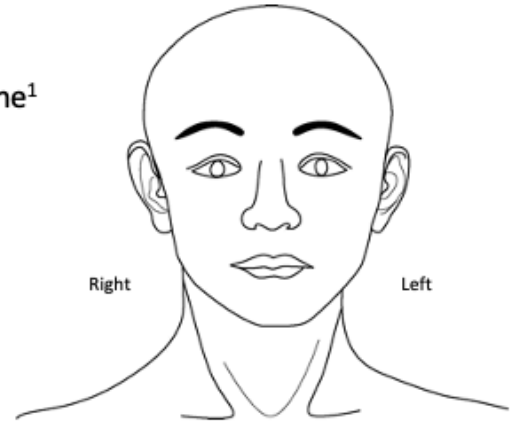
Use a **solid dot** if there is an exact spot the pain is located.

Time : _____

Use arrows to show the path of the pain if it moves from one location to another.

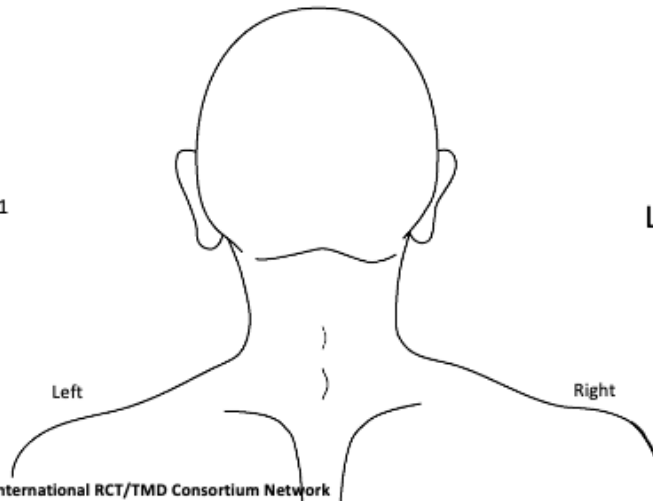
Front and back
whole-body outline¹

Mouth and intraoral outline¹



Right later face view¹

Left later face view¹



1. Suggest using it by permission from copyright International RCT/TMD Consortium Network

Figure 6 Addition Head Views Pain Drawing Version 2

Date: ____/____/____

Additional Head Views Pain Drawing

Drawing #: _____

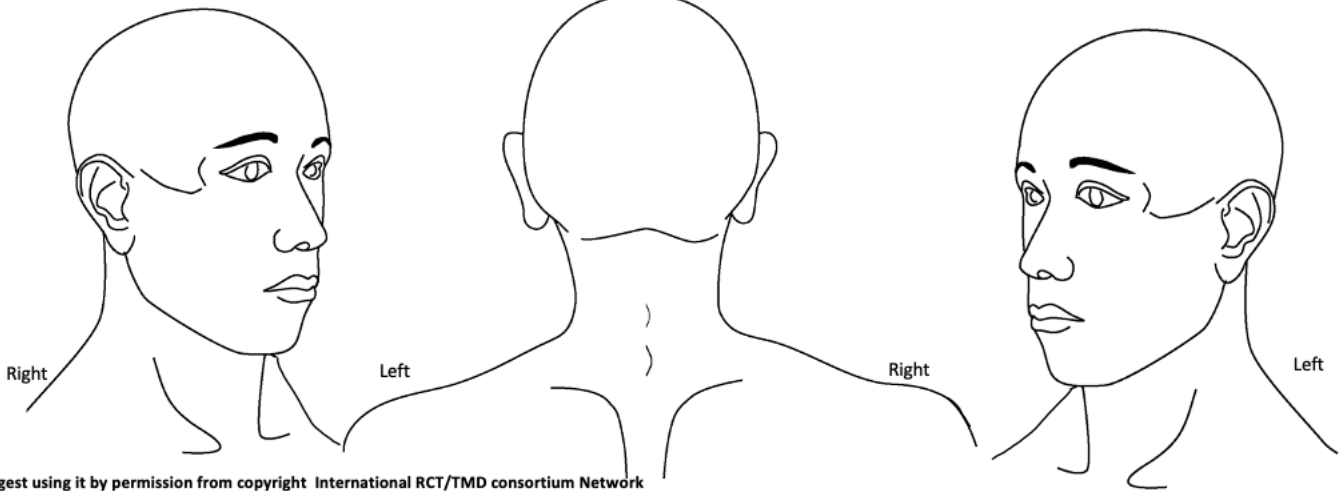
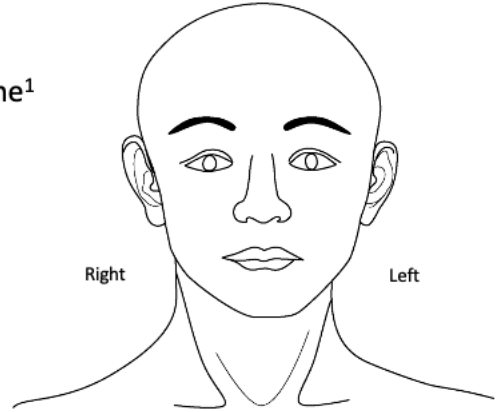
Name: _____

Shade all the areas you experienced pain in your body in the last **30 days**.
Use a **solid dot** if there is an exact spot the pain is located.
Use arrows to show the path of the pain if it moves from one location to another.

Time : _____

Front and back
whole-body outline¹

Mouth and intraoral outline¹



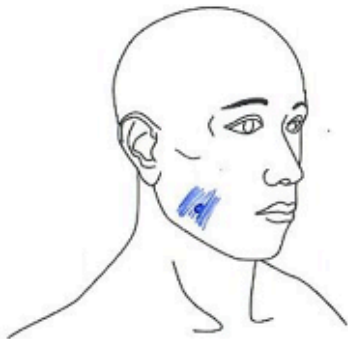
1. Suggest using it by permission from copyright International RCT/TMD consortium Network

Pain Drawing Instructions

Sample



Shade all body areas you had pain in the last **30 days** using the appropriate diagram.



Use a **solid dot** to indicate if there is an exact spot the pain is located.



Use **arrows** to show the path of the pain if it moves from one location to another.

The first several questions are about you and your familiarity with and use of pain drawings.

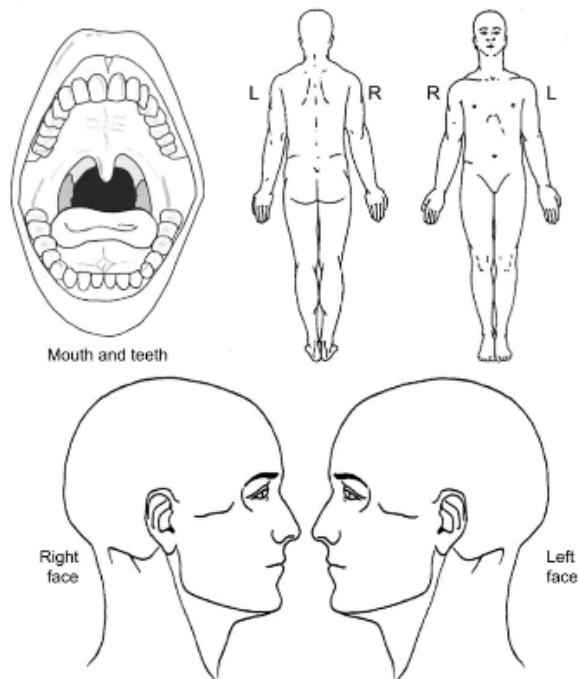
Do you practice clinically? Yes No

Are you involved in research? Yes No

A pain drawing is a picture of the human body onto which individuals mark the location of their pain. Below are several examples of pain drawings.

PAIN DRAWING

Indicate the location of ALL of your different pains by shading in the area, using the diagrams that are most relevant. If there is an exact spot where the pain is located, indicate with a solid dot (•). If your pain moves from one location to another, use arrows to show the path.



Mouth and teeth

Right face

Left face

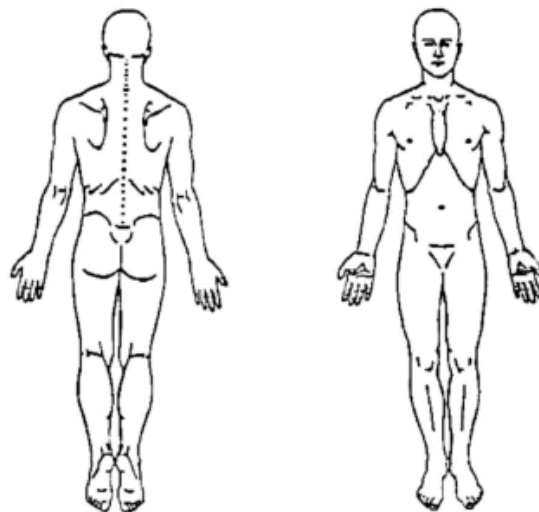
Copyright International ICD/TMD Co-ordinator Network. Available at <http://www.icdandtmdinternational.org> Version 12/2003/15. No permission required to reproduce, translate, display, or distribute.

INSTRUCTIONS

Indicate where your pain is located and what type of pain you feel at the present time. Use the symbols below to describe your pain. Do not indicate areas of pain, which are not related to your present injury or condition.

Key

/// Stabbing XXX Burning 000 Pins and Needles == = Numbness



Do you use any pain drawing in your clinical practice? Yes No

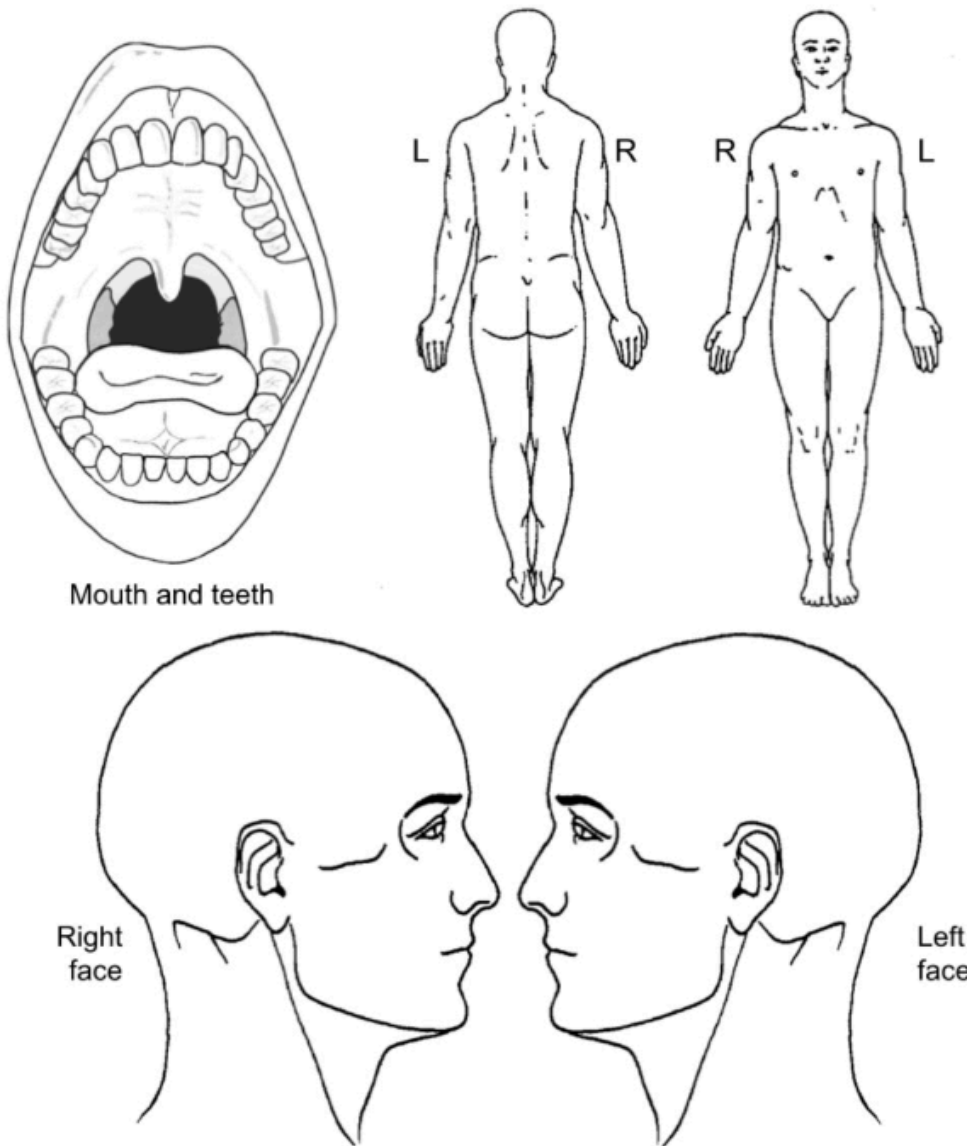
Have you used any pain drawing in research? Yes No

Are you familiar with this specific pain drawing in the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) known as the "DC/TMD pain drawing"? Yes No

The DC/TMD pain drawing is shown below.

PAIN DRAWING

Indicate the location of ALL of your different pains by shading in the area, using the diagrams that are most relevant. If there is an exact spot where the pain is located, indicate with a solid dot (•). If your pain moves from one location to another, use arrows to show the path.



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How frequently do you use the DC/TMD pain drawing in clinical practice with orofacial pain patients?

- With nearly all pain patients
- With select pain patients
- Tried it a few times but did not continue using it
- Never used it

Have you used the DC/TMD pain drawing in research?

- Yes I have used the DC/TMD pain drawing for research
 No but I have thought about incorporating the DC/TMD pain drawing in future research
 No and I do not plan to incorporate the DC/TMD pain drawing in the near future

Select ALL the ways you currently use the DC/TMD pain drawing.

- as a screening tool for pain
 as a diagnostic tool
 to track therapeutic outcomes
 to visualize specific pain locations
 to document pain intensity by location
 to document pain quality (i.e. burning, aching, shooting)
 to visualize pain referral
 other

For what other purposes do you use the pain drawing?

If you were to use the pain drawing, select the top 3 reasons you would be likely to use it.

- as a screening tool for pain
 as a diagnostic tool
 to track therapeutic outcomes
 to visualize specific pain locations
 to document pain intensity by location
 to document pain quality (i.e. burning, aching, shooting)
 to visualize pain referral
 other

Specify "other" from response above

Select your top 3 concerns with using the DC/TMD pain drawing.

- Patients do not accurately draw their pain location on the DC/TMD pain drawing.
 Instructions for the DC/TMD pain drawing are not clear for patients to understand.
 The DC/TMD pain drawing's anatomical locations are not detailed enough to differentiate pain location (e.g., muscular vs. joint pain)
 The specific anatomical region I am interested in is not represented (specify the region) _____
 There is no digital version
 Does not measure pain characteristics I am interested in
 Has not been validated
 Other

Please specify the specific anatomical region that you are interested in that is NOT currently represented on the DC/TMD pain drawing.

What other concerns do you have with using the DC/TMD pain drawing?

The next several questions are about the barriers and facilitators to using the DC/TMD pain drawing.

What makes it difficult to use the DC/TMD pain drawing in clinical practice?

What makes it difficult to use the DC/TMD pain drawing in research?

What would make it easier to use the DC/TMD pain drawing in clinical practice?

What would make it easier to use the DC/TMD pain drawing in research?

This is an opportunity for you to share your thoughts on how to improve the DC/TMD pain drawing (below).

How would you improve the existing DC/TMD pain drawing?

Demographics

What is your training in? (check all that apply)

- Oral Medicine
- Orofacial Pain
- Physical Therapy
- Psychologist (please specify type) _____
- Medical Doctor (MD/DO) (please specify specialty if available) _____
- Allied Health Professional (please specify) _____
- PhD (please specify field) _____
- Other (please specify): _____

Please specify "other" from answer above

How many years of experience do you have in your field (excluding training)?

- Less than 5 years
- 5 to < 10 years
- 10 to < 15 years
- 15 to < 20 years
- 20 or more years

Which of the following describe(s) where you primarily work? Check all that apply.

- Academic institution (e.g., dental school)
- Solo private practice
- Group private practice
- Group dental service organization
- Community clinic
- Hospital
- Other (please specify) _____

Please specify "other" from answer above

What region is your workplace located in?

- North America
- Central/South America
- Europe
- Africa
- Asia
- Oceania

What is your age?

With what gender do you identify with?

- Man
- Woman
- Non-binary
- A gender not listed here
- Prefer not to answer

With what race or ethnicity do you identify? Select all that apply.

- White
- Black or African American
- Asian or Asian Indian,
- Middle Eastern or North African
- Mixed
- Native Hawaiian or Other Pacific islander
- American Indian or Alaskan Indian or Alaskan Native
- Other
- Prefer not to answer

Improving the Pain Drawing for Orofacial Pain - A Survey of Stakeholders

Researchers at the University of Washington School of Dentistry are conducting this research in partnership with colleagues from University at Buffalo. This work is part of an oral medicine graduate student's master's thesis.

We are interested in the perspectives of individuals who currently treat pain or conduct research in pain.

Participating in this study involves completing a 5- to 10-minute or less questionnaire about the pain drawing used in the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) and ideas for how to improve it. The data collected will inform a project to improve the pain drawing commonly used in orofacial pain treatment and research. Your responses will be anonymous and confidential.

Participation in research is always optional and you may choose to stop at any time. There are no consequences if you choose to not participate in this research.

This study has been reviewed and determined to be exempt by the University of Washington's Institutional Review Board.

If you have any questions before, during or after your participation, you may contact the Principal Investigator Milda Chmieliauskaite DMD, MPH; mildac@uw.edu

Thank you from the research team for your willingness to participate and your valuable perspective!

Drs. Milda Chmieliauskaite, Jing Li, Divya Kannapan, Nicholas Sotak, Cameron Randall, Richard Ohrbach, Mark Drangsholt.

To take this survey you should have:

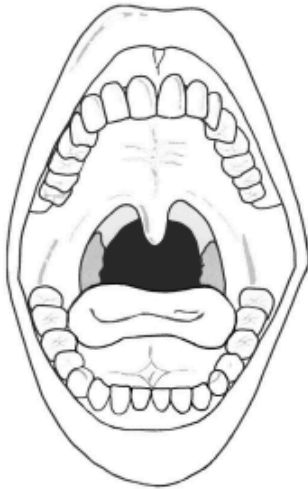
Treated individuals with orofacial pain in the last 5 years And/Or been involved in human subjects research on pain in the last 5 years By clicking Yes below you consent to participate in this survey.

Yes No

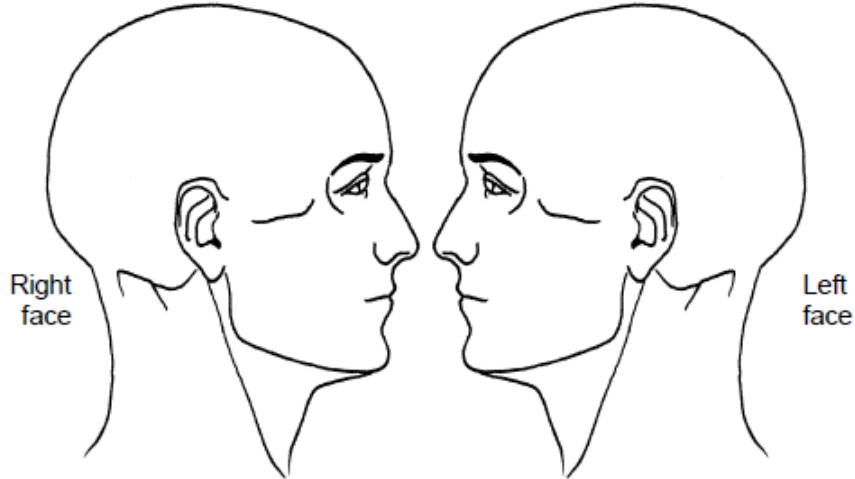
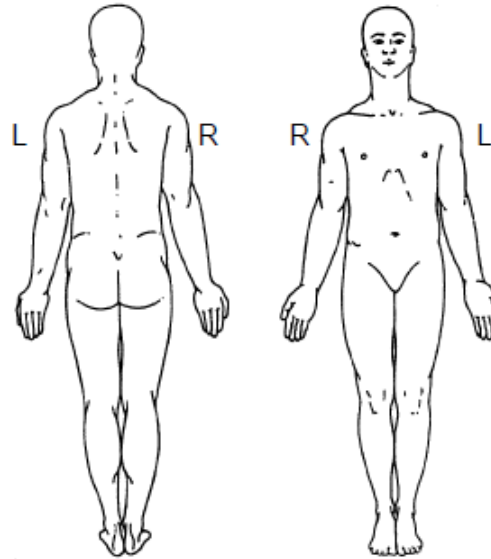
The questions in this survey are about the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) pain drawing (below).

PAIN DRAWING

Indicate the location of ALL of your different pains by shading in the area, using the diagrams that are most relevant. If there is an exact spot where the pain is located, indicate with a solid dot (●). If your pain moves from one location to another, use arrows to show the path.



Mouth and teeth



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The questions in this survey are about the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) pain drawing (below).

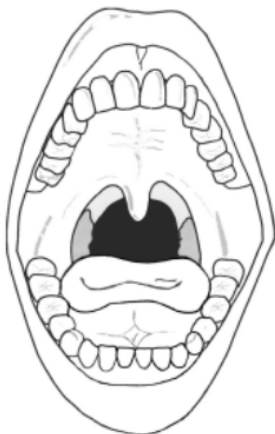
To what extent do you agree that the DC/TMD pain drawing could be improved by some modifications?

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

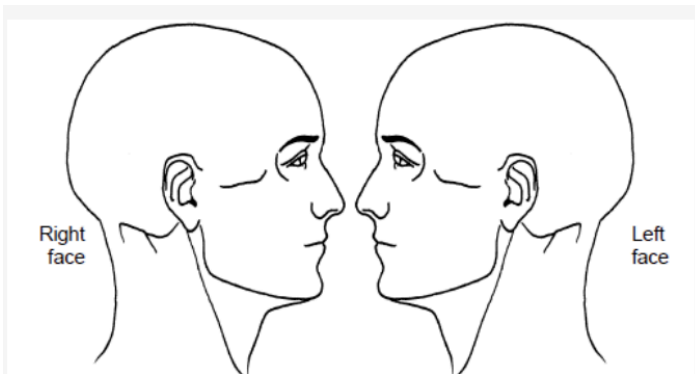
If you selected "strongly" or "somewhat AGREE", in what ways would you modify the pain drawing to improve it?

If you selected "neither agree or disagree", please describe the current characteristics that you find particularly useful.

If you selected "somewhat" or "strongly" DISAGREE, please describe the current characteristics that you would not want to see changed.



Mouth and teeth



For the next 2 questions, consider pain in the craniofacial and oral region.

To what extent does the DC/TMD pain drawing allow the patient to accurately indicate all oral pain locations?

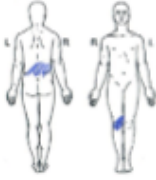
- Very accurately
- Somewhat accurately
- Somewhat innacuratley
- Not at all accurately

How would you change the oral pain diagram to improve the indication of oral pain locations?

To what extent does the DC/TMD pain drawing allow the patient to accurately indicate all head, neck and facial pain locations?

- Very accurately
- Somewhat accurately
- Somewhat innacuratley
- Not at all accurately

How would you change the pain diagram to improve the indication of head/neck/facial pain location?

Sample of shading	Instructions
	Shade all pain areas on the diagrams provided using a blue color pen.

Based on a literature review and extensive clinical use, several minor modifications are being considered to the DC/TMD pain drawing. The next several questions will ask you about your agreement with these changes.

Current Pain Drawing Instructions

Modification Being Considered:

A visual representation of what the instructions are asking of the patient would be included in a cover page. Below, we illustrate one example.

How much do you agree this modification of providing a visual representation of the instructions would improve the pain drawing as an instrument?

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

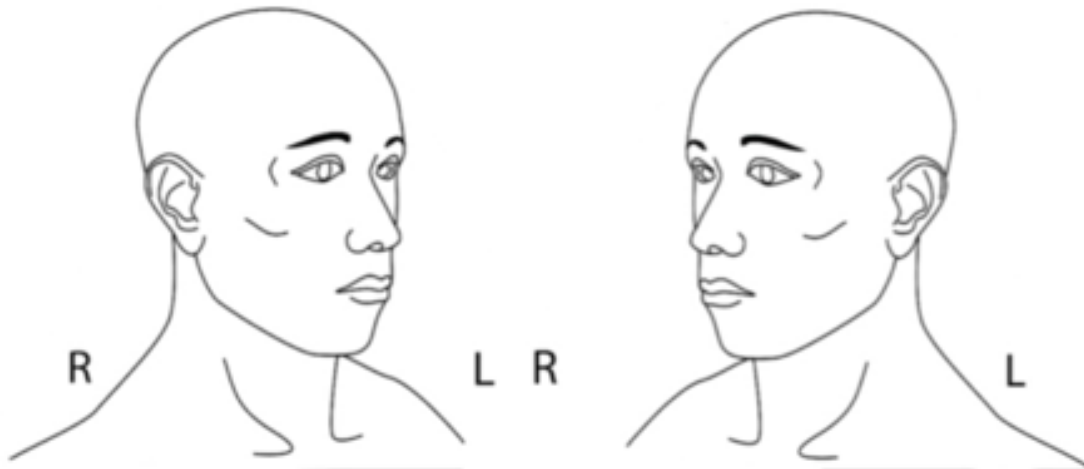
If you "neither agree nor disagree," what do you find particularly useful about the current instructions?

If you "disagree" please describe what you would not want to see changed from the original instructions.

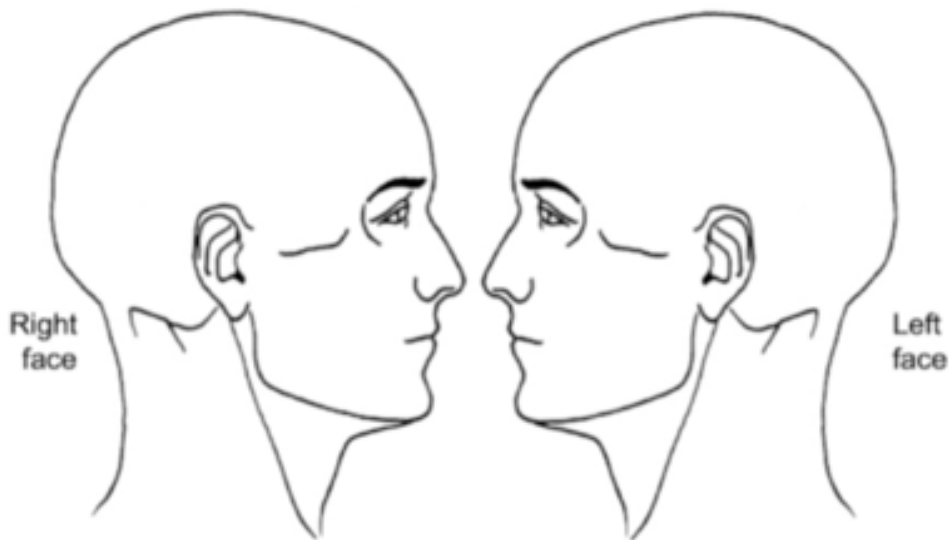
What other suggestions do you have for the instructions and/or administration to improve the pain drawing as an instrument?

The next questions are about the facial views of the pain drawing.

A sample of the pain drawing replacing the lateral views of the face with a three-quarter view is included below.



Alternative - Three-quarter view



Current - Flat view

To what extent do you agree with replacing the lateral views of the face with a three-quarter view? See the example above.

- Strongly agree
 - Somewhat agree
 - Neither agree or disagree
 - Somewhat disagree
 - Strongly disagree
-

If you chose "disagree" from the statements above, please describe the aspects of the lateral views of the face you would you not want to see changed.

If you chose "neither agree nor disagree" what do you find particularly useful about the current lateral face views? _____

What other suggestions do you have to improve capturing pain locations in the face? _____

The next questions are about the back of the head views.

The current pain drawing has a small view of the back of the head on the full body diagram.

Below is a sample incorporating a new view of the back of the head.

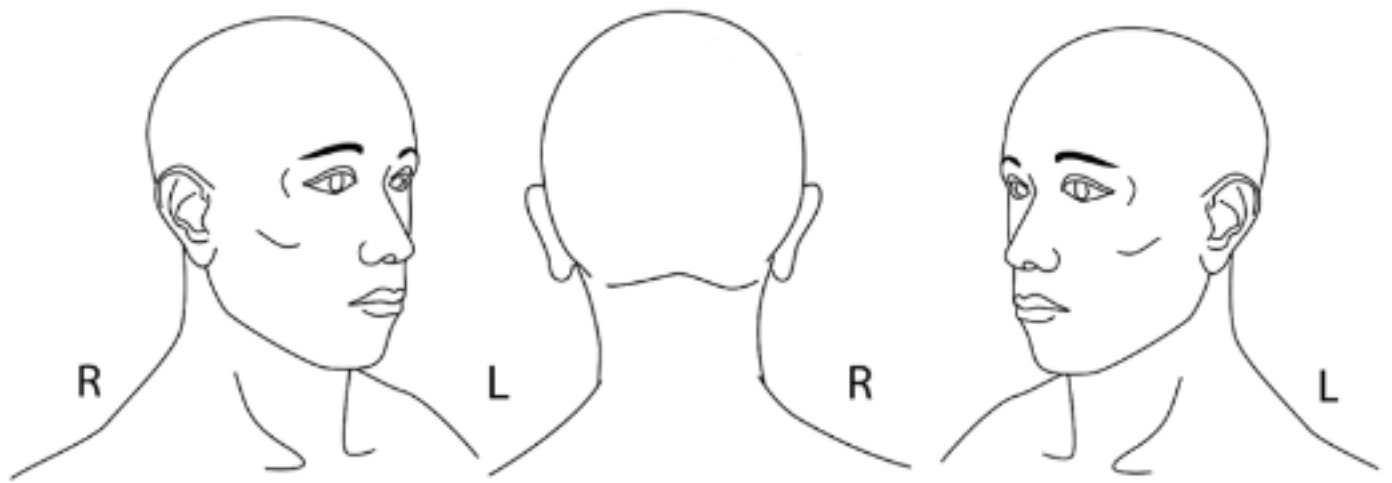
To what extent do you agree with adding a larger view of the back of the head as an additional view to the pain drawing.

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

If you selected "neither agree nor disagree" what do you find particularly useful about the back of the head view on the full body drawing? _____

If you selected "disagree" please describe what you would not want to see changed in the original back of head diagrams. _____

What other changes would you suggest to improve the ability to capture pain locations in the back of the head/neck? _____



The next few questions are about creating a family of pain drawing instruments, some of which would include capturing other pain qualities beyond location.

How much do you agree with creating different versions of the pain drawing that could capture other pain characteristics?

- Strongly agree
 Somewhat agree
 Neither agree or disagree
 Somewhat disagree
 Strongly disagree

Select all the optional pain characteristics that you think should be included on a pain drawing.

- Pain intensity by location (0-10 scale)
 Pain descriptors by location (throbbing, dull ache, shooting, burning etc)
 Pain temporality by location (e.g intermittent, continuous)
 None of the above

What other information do you think should be captured on pain drawings?

If pain descriptors are considered to be included in an optional instrument, how much do you agree that a color-coded system should be used to represent pain quality?

- Strongly agree
 Somewhat agree
 Neither agree or disagree
 Somewhat disagree
 Strongly disagree

For example: red to represent sharp shooting pain, blue for dull aching pain, green for burning pain etc.

What are the 4 most important pain descriptors that you would recommend to capture on a pain drawing for orofacial pain?

Please provide any additional comments or suggestion you may have for the DC/TMD pain drawing.

Demographics

What is your training in? (check all that apply)

- Oral Medicine
 Orofacial Pain
 Physical Therapy
 Psychologist (please specify type) _____
 Medical Doctor (MD/DO) (please specify specialty if applicable) _____
 Allied Health Professional (please specify) _____
 PhD (please specify field) _____
 Other (please specify): _____

Please specify "other" from answer above

How many years of experience do you have in your field (excluding training)?

- Less than 5 years
 5 to < 10 years
 10 to < 15 years
 15 to < 20 years
 20 or more years

Which of the following describe(s) where you primarily practice? Check all that apply.

- Private practice, solo
 Private practice, group
 Dental service organization
 Community clinic
 Academic institution (e.g., dental school)
 Hospital
 Other

Please specify "other" in the response above

What region is your workplace located in?

- North America
 Central/South America
 Europe
 Africa
 Asia
 Oceania

What is your age?

With what gender do you identify with?

- Man
 Woman
 Non-binary
 A gender not listed here
 Prefer not to answer

With what race or ethnicity do you identify? Select all that apply.

- White
 Black or African American
 Asian or Asian Indian
 Middle Eastern or North African
 Mixed
 Native Hawaiian or Other Pacific Islander
 American Indian or Alaskan Indian or Alaskan Native
 Other
 Prefer not to answer