

Mind the Gap: A Systematic Review of Implementation of Screening for Psychological Comorbidity in Dental and Dental Hygiene Education

Birgitta Häggman-Henrikson, EwaCarin Ekberg, Dominik A. Ettlin, Ambra Michelotti, Justin Durham, Jean-Paul Goulet, Corine M. Visscher, Karen G. Raphael

Abstract: The biopsychosocial model is advocated as part of a more comprehensive approach in both medicine and dentistry. However, dentists have not traditionally been taught psychosocial screening as part of their predoctoral education. The aim of this systematic review was to provide an overview of published studies on the implementation of screening for psychological comorbidity in dental and dental hygiene education. The term “psychological comorbidity” refers to the degree of coexisting anxiety, depression, or other mental health problems in a patient presenting with a physical condition. The review followed a protocol registered in PROSPERO (CRD42016054083) and was carried out in accordance with the PRISMA guidelines. The methodological quality of the included studies was assessed using a ten-item tool developed for medical education. The electronic search in PubMed, Scopus, and PsycINFO from the inception of each database until December 31, 2016, together with a hand search, identified 1,777 articles. After abstracts were screened, 52 articles were reviewed in full text applying inclusion and exclusion criteria; four articles remained for the qualitative synthesis. Generally, the reported data on specific methods or instruments used for psychological screening were limited. Only one of the included articles utilized a validated screening tool. The results of this systematic review show that published data on the implementation of psychological patient assessment in dental and dental hygiene education are limited. To address this gap, the authors recommend short screening tools such as the Graded Chronic Pain Scale and the Patient Health Questionnaire for Depression and Anxiety. Educating dental and dental hygiene students about easy-to-use, reliable, and validated screening tools for assessing psychological comorbidity warrants more research attention and greater implementation in educational curricula.

Birgitta Häggman-Henrikson, DDS, PhD, is Associate Professor, Department of Orofacial Pain and Jaw Function, Faculty of Odontology, Malmö University, Malmö, Sweden; EwaCarin Ekberg, DDS, Dr Odont, is Professor, Department of Orofacial Pain and Jaw Function, Faculty of Odontology, Malmö University, Malmö, Sweden; Dominik A. Ettlin, MD, DMD, is Head of Interdisciplinary Orofacial Pain Unit, Center of Dental Medicine, University of Zurich, Switzerland; Ambra Michelotti, DDS, Orthod, is Professor, Department of Neurosciences, Reproductive Sciences, and Oral Sciences, Division of Orthodontics, University of Naples, Naples, Italy; Justin Durham, BDS, PhD, is Professor of Orofacial Pain, School of Dental Sciences and Centre for Oral Health Research, Newcastle University, and Hon. Consultant Oral Surgeon, Newcastle-Upon-Tyne Hospitals’ NHS Foundation Trust, Newcastle-Upon-Tyne, UK; Jean-Paul Goulet, DDS, MSD, is Emeritus Professor, Faculty of Dental Medicine, Laval University, Quebec, Canada; Corine M. Visscher, PhD, is Professor, Department of Oral Kinesiology, Academic Centre for Dentistry Amsterdam, University of Amsterdam, and Vrije Universiteit Amsterdam, The Netherlands; and Karen G. Raphael, PhD, is Professor, Department of Oral and Maxillofacial Radiology, Pathology, and Medicine, New York University College of Dentistry, New York, USA. Direct correspondence to Dr. Birgitta Häggman-Henrikson, Department of Orofacial Pain and Jaw Function, Faculty of Odontology, Malmö University, 205 06 Malmö, Sweden; +46 40-6658503; Birgitta.haggman.henrikson@mah.se.

Keywords: dental education, dental hygiene education, behavioral sciences, psychosocial aspects, psychological, biopsychosocial, patient management, attitude of health personnel, patient-centered care

Submitted for publication 7/19/17; accepted 3/6/18
doi: 10.21815/JDE.018.104

It is widely acknowledged that oral health can impact a person’s physical, psychological, and social functioning.¹ It is perhaps unsurprising, therefore, that emerging evidence suggests disturbances in psychological and social functioning can negatively affect oral health and treatment outcomes in various dental disciplines.²⁻⁶ Modern medicine applies the biopsychosocial model, thereby taking into

account the multifactorial interaction of somatic, psychological, and social factors in any illness, disease, or disorder. However, in dentistry, there has only been limited uptake and use of the biopsychosocial model.

As modern dentistry becomes more demanding, dentists must adapt to achieve optimal outcomes,⁷ and a comprehensive approach to patient assessment is now needed in many aspects of everyday dentistry.

The biopsychosocial model forms part of this adaptation and encourages a more comprehensive heuristic approach including screening for psychological comorbidity as part of a comprehensive assessment. Currently, dental education focuses on thorough biomedical assessment and less often addresses patients' psychosocial profile even at a screening level.^{8,9}

The term "psychological comorbidity" refers to the degree of coexisting anxiety, depression, or other mental health problems in a patient presenting with a physical condition. Psychological comorbidity has been shown to influence patients' perceptions of their condition, pain ratings, treatment-seeking behavior, and treatment adherence, as well as recovery after surgical procedures.^{10,11} Understanding how these factors can affect the prognosis and the outcome of dental treatment is highly relevant and important for oral health care providers in the current-day practice of dentistry. For dentists in primary care settings to carry out screening for psychological comorbidity, they need to acquire the basic knowledge and develop the skills to properly use standardized screening tools. Such a goal can hardly be achieved unless this process is taught in predoctoral dental programs.

The relationship between an individual's psychological comorbidity and sociological status is bidirectional. When psychological and sociological factors coexist, they are called "psychosocial factors" and incorporate psychological attributes such as anxiety and depression as well as social variables that are more structural in nature, such as home and work environments. Psychosocial factors have been found to predict patients' adherence and response to dental treatment, thereby influencing the course of disease in addition to prognosis and outcome of treatment.¹² Patient adherence is a major prognostic factor in any dental treatment that requires a patient's cooperation and self-management. Most current dental procedures, especially in preventive dentistry, rely on the patient's cooperation, and that is inherently dependent on the psychosocial environment in which the patient functions. It is therefore reasonable to infer that screening for psychological comorbidity is highly relevant in all areas of dentistry.

It is important to note that psychological screening tools improve the recognition of a given disorder by serving as case-finding instruments, yet they have no diagnostic validity per se. Such diagnosis is the responsibility of a trained mental health professional on receipt of a referral, analogous to the

need for medical expertise when a somatic disorder such as diabetes is suspected. Considering its potential impact, screening for psychological comorbidity is relevant prior to initiation of dental treatment, as part of comprehensive patient assessment and management.

The use of standardized and reliable screening tools can help prevent more idiosyncratic and unstructured assessments of psychological comorbidity.¹³ It is thus imperative that this concept is taught to dental students and that the benefit of using structured screening tools is emphasized. The role of psychosocial factors is most evident in the development and/or maintenance of chronic pain conditions. Unsurprisingly, therefore, structured assessment of psychological comorbidity is widely accepted and used in this patient group. However, research has found that psychological profiling is important even in less chronic situations—for example, to predict pain severity after endodontic treatment.^{14,15} Other than intensity of pain, psychosocial factors can also help predict the adherence and treatment response in all areas of dentistry, so their evaluation may generally improve prognosis-based decision making.^{8,12,16,17}

Pain is defined by the International Association for the Study of Pain (IASP) as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage."¹⁸ Pain is a multidimensional experience, and patients with chronic orofacial pain may present with high psychosocial complexity. Screening for psychological comorbidity has become a definitive part of the diagnostic process in the management of chronic pain as the outcome helps to tailor patients' treatment plan to their psychosocial profile.^{18,19} Furthermore, such assessment provides valuable information regarding the prognosis for a successful treatment outcome.^{20,21} Utilization of psychological assessment for patients with chronic pain can serve as a model for other patient groups in dentistry^{6,22} and may help inform management strategies and contribute to improved treatment outcome and prognosis.^{8,16,17}

Two studies examined the impact of psychological comorbidity on patients suffering from acute orofacial pain.^{15,16} Although the possible benefit of psychosocial screening/assessment has not been clearly demonstrated for this patient group, a similar impact of pain on quality of life was found for patients with acute and chronic orofacial pain.²³ Based on

the findings of Garofolo et al. and Slade et al.,^{16,24} a reasonable hypothesis follows that, based on the etiology, therapeutic gains may be made in acute orofacial pain when management is tailored to the individual's psychosocial profile in order to help predict the patient's risk of chronicity. Being able to predict which patients with acute pain are at higher risk of developing chronic pain has been found to enable dentists to tailor treatment plans accordingly.¹⁷ One study reported that using treatment strategies based on individual risk profiles at an early stage improved treatment outcome.¹⁴ Law et al. found that early psychosocial assessment helped predict pain severity after endodontic treatment, suggesting it may be important even in less "chronic" toothache pain.¹⁵

Patient satisfaction depends on factors not only related to technical perfection. Individual psychological profiles may therefore help to capture patients' expectations and predict behavior when their cooperation with self-management schemes and adherence to self-care programs is important—for example, in periodontal management and caries prevention. This process may be especially important in cosmetic dentistry, which requires understanding of patients' aesthetic expectations, ensuring they are aligned with what is therapeutically feasible in order to achieve a treatment outcome viewed as successful, from both the patient and provider perspectives.

In June 2016, at the International Association for Dental Research (IADR) meeting in Seoul, Republic of Korea, the International RDC/TMD Consortium Network (renamed the International Network for Orofacial Pain and Related Disorders Methodology [INFORM] on May 27, 2017) hosted a one-day invitational workshop "Optimizing the Clinical and Research Utility of DC/TMD Axis II," attended by 18 participants and two chairpersons. The attendees were divided into three workgroups. The goal for one workgroup—and the topic of this article—was to review the use of psychological and psychosocial assessment in dental education. The goals of the other two workgroups were, broadly, 1) to review the utility of psychosocial assessment in clinical assessment and clinical decision making for general dentists,²⁵ and 2) to develop recommendations for future Axis II research in relation to health care settings and clinical decision making. The outcome of those discussions will be reported separately. At the workshop, the need for predoctoral dental curricula to include guidance on when and how to assess psycho-

social factors in order to educate dentists to deliver better comprehensive dental care was highlighted. That interest led the participants to question whether screening for psychological comorbidity and the use of structured tools was adequately addressed in the dental education literature. Therefore, the aim of this systematic review was to provide an overview of published studies on the implementation of screening for psychological comorbidity in dental and dental hygiene education.

Methods

This systematic review followed an a priori protocol, registered in PROSPERO (registration number CRD42016054083) and carried out in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.²⁶ There was no limitation on study design.

The electronic search encompassed all articles in PubMed, Scopus, and PsycINFO from the inception of each database until December 31, 2016. The search strategy was developed in collaboration with an information specialist at Malmö University. The main search strategy was developed for PubMed and then adapted for the other databases. The full strategy for the individual databases is shown in Table 1. In the electronic literature search, there was no restriction on language, study location, or study design. A hand-search of reference lists in original articles and review articles in the *Journal of Dental Education* and *European Journal of Dental Education* was carried out to identify additional studies. Grey literature, editorials, letters to editor, and commentaries were not included. Peer-reviewed original studies reporting methods or instruments for implementation of psychosocial patient screening in predoctoral dental and dental hygiene education were included in the review.

Two of the authors (BHH and ECE) independently read all titles and abstracts found in the searches to identify potentially eligible articles for inclusion. If one reviewer deemed an abstract as potentially relevant, it was retained for full text assessment. All potentially eligible studies were then retrieved, and full-text articles were reviewed (by BHH and ECE) to determine if they met the inclusion criteria. Any disagreement was resolved by discussion and consensus with a third reviewer (AM). Authors were not contacted for missing information.

Table 1. Search terms used in the study for electronic search of three databases

Database	Search Terms
PubMed	((curriculum[Title/Abstract] OR "Curriculum"[Mesh]) OR (("Schools, Dental"[Mesh] OR (dental school[Title/Abstract] OR dental schools[Title/Abstract])) OR "Students, Dental"[Mesh] OR "Education, Dental"[Mesh] OR (dental student[Title/Abstract] OR dental students[Title/Abstract]) OR dental education [Title/Abstract] OR dental hygienist students[Title/Abstract] OR dental hygienist education [Title/Abstract] OR (dental hygiene student[Title/Abstract] OR dental hygiene students[Title/Abstract]) OR dental hygiene education[Title/Abstract])) AND (((((psychosocial[Title/Abstract] OR psychosomatic [Title/Abstract]) OR Psychiatric[Title/Abstract] OR Psychological[Title/Abstract]) AND ((evaluation[Title/Abstract] OR screening[Title/Abstract]) OR assessment[Title/Abstract])) OR "Projective Techniques"[Mesh])
Scopus	TITLE-ABS-KEY ((curriculum OR "Dental school" OR "Dental schools" OR "Dental student" OR "dental students" OR "Dental education" OR "Dental hygienist student" OR "Dental hygienist students" OR "Dental hygienist education" OR "dental hygienist school" OR "dental hygienist schools" OR "Dental hygiene student" OR "Dental hygiene students" OR "dental hygiene education" OR "dental hygiene school" OR "dental hygiene schools") AND (evaluation OR screening OR assessment OR "projective technique" OR "projective techniques") AND (psychosocial OR psychosomatic OR psychiatric OR psychological))
PsycINFO	((ti,ab(dental education) OR ti,ab(dental school*) OR ti,ab(dental student*) OR ti,ab(dental hygienist student*) OR ti,ab(dental hygienist education) OR ti,ab(dental hygiene student*) OR ti,ab(dental hygiene education) OR ti,ab(curriculum)) OR (SU.EXACT("Dental Education") OR SU.EXACT("Dental Students") OR SU.EXACT("Curriculum"))) AND ((ti,ab(psychosocial) OR ti,ab(psychosomatic) OR ti,ab(Psychiatric) OR ti,ab(Psychological)) AND (ti,ab(evaluation) OR ti,ab(screening) OR ti,ab(assessment)))

Data extraction of included articles was carried out independently by two of the reviewers (BHH and ECE) and then compared and adjusted as necessary. The data extracted from the studies were first author, publication year/journal, setting/country, population, method, outcome, and results. A qualitative data synthesis of the results was carried out.

Assessment of risk of bias in included studies was carried out by two of the authors (BHH and ECE), who independently evaluated the methodological quality of the individual primary studies. Any disagreements were resolved by discussion. The quality of each individual publication was rated using a risk of bias tool developed for medical education, the Medical Education Research Study Quality Instrument (MERSQI). The tool has ten items that cover six domains of study quality: study design, sampling, type of data, validity of instrument, data analysis, and outcomes. Each domain has a maximum score of 3, allowing a maximum total score of 18. The minimum score for each domain is 1, except for the domain on validity of the instrument on which a score of zero is also possible. Thus, the summary score can range between 5 and 18. Although the instrument developers suggest no specific cut-off score to discriminate between low- and high-quality studies, they recommend review of individual items and domain-specific scores. The instrument has been found to be reliable for appraising methodological quality of publications in medical education.^{27,28}

Results

The electronic searches in PubMed, Scopus, and PsycINFO, together with the hand search, identified a total of 1,777 articles after duplicates were removed (Figure 1). After screening of abstracts, 52 articles were reviewed in full text. Of these, a total of 48 articles²⁸⁻⁷⁵ were excluded (Table 2), and four articles⁷⁶⁻⁷⁹ remained for the qualitative synthesis.

The included articles reported psychosocial assessment of patients treated by dental hygienists⁷⁷ and dental students^{76,78,79} in dental schools based in the U.S.,^{78,79} Canada,⁷⁷ and Chile.⁷⁶ The results of these studies were mainly based on qualitative synthesis of the psychosocial patient assessment (Table 3). The reported data on specific methods or instruments used for screening/assessment of psychological comorbidity were limited. The sole article utilizing validated screening tools found that the rumination subscale of the Pain Catastrophizing Scale (PCS) was a predictor for pain during a scaling procedure and that dental anxiety was correlated with pain ratings.⁷⁷ The other three studies were based on interviews using self-developed questions,⁷⁹ checklists,⁷⁸ and instruments.⁷⁶ The methodological quality assessed by MERSQI for these studies ranged from 8.0 to 12.5 with a median score of 11.75 (Table 4).

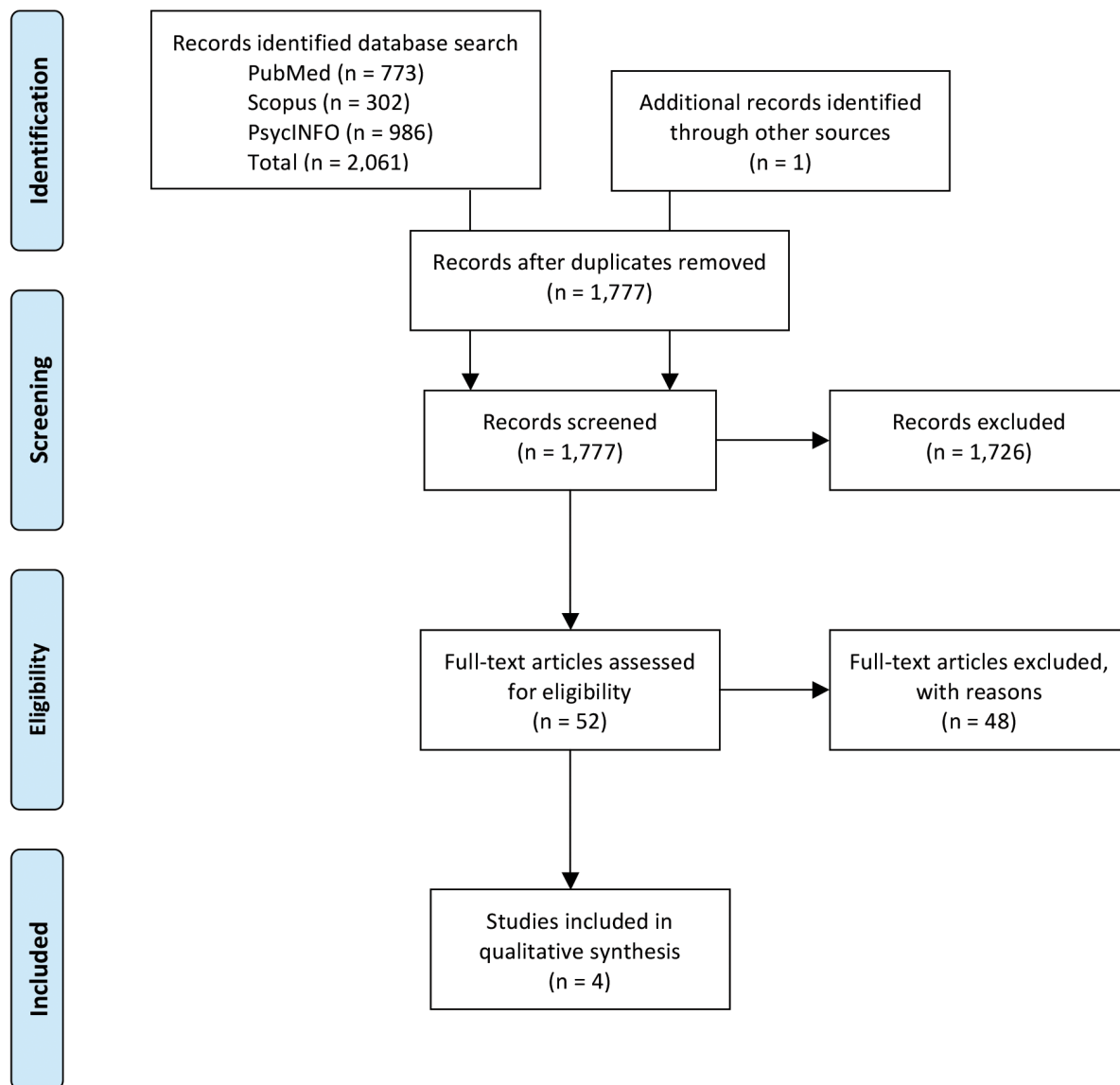


Figure 1. PRISMA flow chart showing numbers of included and excluded studies

Table 2. Articles excluded from the study at full-text assessment and main reasons for exclusion (n=48)

Main Reason for Exclusion	Number of Studies	Reference Numbers
Not dental or dental hygiene education	15	29-43
Not predoctoral dental education	1	96
No psychosocial screening or assessment performed by dental or dental hygiene students	31	28, 44-74
Letter to editor	1	75

Table 3. Results regarding psychosocial patient assessment in dental and dental hygiene education for included studies (n=4)

First author Year Journal	Setting Country	Population	Method	Outcome	Results	Comments
Sullivan 1998 Community Dent Oral Epidemiol	University dental clinic, Dalhousie University Canada	39 dental hygiene students 78 patients (32 men, 46 women)	Questionnaire after scaling procedure with dental hygiene students	Pain catastroph- izing scale (PCS); dental anxiety (DAS-R); pain experienced during scaling NRS-11 (0-10)	Age and ruminations subscale of PCS were predictors for pain. Dental anxiety was correlated with pain ratings.	Structured instru- ments but unclear if assessment was carried out by the dental hygienists.
Woods 2003 J Dent Educ	UCLA Dental Center USA	3 rd -year dental students 508 patients (253 men, 255 women)	Patient questionnaire and medical history	Three questions for psychoso- cial assessment; review of medical history for self- reported mental illness	Self-reported mental illness 27% and depression 15%. Study established need for training of dental students to recognize and manage psychologically com- promised patients.	No structured method or instru- ment used for psychosocial assessment. Unclear diagnos- tic criteria.
Wagner 2007 J Dent Educ	School of Dental Medicine, University of Connecticut USA	Rotation 1 and 2: 118 students Rotation 3: 79 students	History taking with patient instructors	Content checklist	Qualitative summary of items from check- list. Psychosocial items most frequently recognized by dental students: remarkable psychological state (anxiety).	No structured method or instru- ment used for psychosocial assessment.
Orsini 2014 J Dent Educ	University Andres Bello Chile	444 dental students	Communica- tion skills and basic psychological tools; own instrument developed	Own instrument piloted on large number of dental students	Instrument was found to be suitable, reason- able, and accessible. Incorporating aspects such as basic psycho- logical tools that have not previously been included but are essen- tial topics in general dentist competence.	No structured method or instru- ment used for psychosocial assessment.

Note: See reference list for full citations of articles.

Table 4. Appraisal of methodological quality of included articles (n=4) for the six Medical Education Research Study Quality Instrument domains and total

First Author, Year	Study Design	Sampling	Type of Data	Validity of Instrument	Data Analysis	Outcomes	Total Score
Sullivan, 1998	1.0	1.0	1.0	3.0	3.0	3.0	12.0
Woods, 2003	1.0	1.0	1.0	2.0	2.0	1.0	8.0
Wagner, 2007	1.5	2.0	3.0	1.0	3.0	2.0	12.5
Orsini, 2014	1.5	2.0	1.0	2.0	3.0	2.0	11.5

Note: On this instrument, the maximum score for each domain was 3, and total maximum score was 18. See reference list for full citations of articles.

Discussion

The main finding of this systematic review was that published data on specific methods or instruments used for patient screening/assessment of psychosocial comorbidity in dental and dental hygiene education were extremely limited. Our

literature search identified only four studies reporting methods or instruments for psychosocial patient screening in dental and dental hygiene education.⁷⁶⁻⁷⁹ This review revealed a paucity of publications in this field, although psychosocial assessment is part of the curricula in at least some dental schools. For example, in 2016, Fiehn and Christensen reported

that, in the Nordic countries, the assessment of psychological stress was part of the curriculum in periodontology in nine of 13 dental schools.⁵⁰ However, the methods or instruments used for the assessment were not specified.

The lack of specific methods or instruments to screen for psychosocial comorbidity was a theme in our systematic review, with three^{76,78,79} of the four studies not declaring a method or instrument. In the absence of tools for psychological assessment, the student (and later practitioner) is left to rely on his or her individual interpersonal skills. Although that may be perceived as sufficient, there is a likelihood that we, as dental practitioners, may overlook psychosocial issues that can affect the prognosis and outcome of dental treatment. The use of standardized instruments will not only support oral health providers in the decision making process, but also ensure that we do not miss key psychosocial issues. Moreover, standardized assessment is likely to increase the comfort level of students and practitioners in conducting such assessments. Our findings in this study indicate that dental education needs to introduce existing easy-to-use, validated screening tools developed for primary medical care to ensure a more reliable and standardized patient assessment of psychological comorbidity.

The only included article (Sullivan and Neish⁷⁷) that reported use of a validated screening tool used the Pain Catastrophizing Scale (PCS). The rumination subscale from the PCS together with age were predictors for pain experienced during scaling in the Sullivan and Neish study, although it was unclear whether the psychosocial assessment was carried out by the dental hygienists or by the researchers. The PCS is a 13-item instrument found to be related to pain intensity, increased risk of development of chronic pain, and poor treatment outcomes.⁸⁰ By contrast, Woods used three questions for psychosocial assessment and advocated for training dental students to recognize and manage psychologically compromised patients.⁷⁹ Wagner et al. evaluated history-taking skills with the aid of patient instructors and found improvement after training,⁷⁸ and Orsini and Jerez piloted a new instrument for evaluating psychosocial assessment skills in dental students.⁷⁶

Psychosocial distress often accompanies long-term illnesses, especially so in chronic pain conditions. For the most common chronic orofacial pain condition, temporomandibular disorders (TMD), a biopsychosocial model has been proposed, and, as a consequence, assessment of psychological comorbid-

ity is advocated when managing TMD patients. The first operationalized tools for psychosocial assessment of patients with TMD were published in 1992 as part of the Research Diagnostic Criteria/TMD (RDC/TMD).⁸¹ The RDC/TMD were universally adopted in research settings, but did not spread to the same extent in the clinical community. Therefore, the criteria and the associated instruments were revised with the aim of improving reliability, validity, and ease of use for clinicians and published in 2014 (DC/TMD).⁸² In the DC/TMD, Axis I diagnoses the physical disability, and Axis II assesses the psychosocial profile but is not meant for diagnosis. As part of the continuing process to facilitate implementation of psychosocial assessment in general dentistry, the need for shorter screening tools has emerged. Therefore, the comprehensive Axis II, previously recommended for researchers, specialists, and general dentists, now also has a shorter screening version more geared towards general dental clinicians. Two of the instruments in the shorter screening version of Axis II have emerged as especially useful for general dental practice settings: the short version of the Patient Health Questionnaire (PHQ-4)⁸³ and the Graded Chronic Pain Scale (GCPS).⁸⁴

The PHQ-4 is a short, four-item, validated questionnaire used for screening for anxiety and depression, which has been found to be reliable and valid for use in primary care settings.^{83,85} Though designed for psychological screening in general medical settings, it has been used in different patient groups and validated in the general population. The maximum total score is 12, with scores above 5 deemed “yellow flags” and scores above 8 as “red flags” for presence of depressive or anxiety disorders.⁸⁵ Although the role of the dentist is not to diagnose depression or anxiety, the use of screening tools can help assess suitability for dental procedures and, in the case of a red flag, for referring the patient to a suitable mental health professional. The PHQ-4 can be used with patients in all areas of dentistry, not only orofacial pain, and is an easy-to-use instrument to introduce in dental education. Psychosocial impairment may affect treatment outcome not only in the treatment of patients with dental or non-dental pain; it may also have relevance to preventive dentistry and in aesthetic and prosthetic treatment settings.⁸⁶⁻⁸⁸

Pain often has a psychological impact, rendering assessment of psychological distress valuable.⁸⁹ Although some orofacial pain clinics may have access to multidisciplinary clinical teams with behavioral clinicians, most clinics do not. Consequently, dentists

in primary dental care settings are dependent on knowing how to screen for psychological comorbidity as part of a comprehensive patient assessment and, if appropriate, be prepared to refer to a mental health clinician for further assessment. For the general dentist treating a patient with chronic pain (pain lasting longer than three months), the GCPS is recommended as a short but powerful, reliable, and clinically useful instrument in primary care settings. It can guide clinicians' decision making regarding choice of treatment modalities and whether to treat the patient themselves or refer to a specialist in orofacial pain.⁹⁰ The instrument provides a grading score from I to IV, on which I and II represent a pain disorder with low functional limitations, often manageable with simple rather than multimodal treatment. A GCPS score of III or IV indicates that a condition is more likely to become chronic. These scores represent high functional limitations, on which multimodal treatment is recommended and referral to a specialty clinic might be advisable. In addition to having good reliability and validity, the GCPS has been found to predict both treatment costs and need for health care.⁹¹

Dentists are accustomed to dealing with some aspects of psychosocial function as they may often deal with dental anxiety.⁸⁹ Nevertheless, there is often a lack of integration among biology, physiology, sociology, and psychology in dental education. Consequently, patient needs may not be fully met if patients visiting dental school clinics are not assessed properly. To better understand the patient's psychosocial situation, the PHQ-4 can be a useful tool to initiate communication. Psychological assessment can also be valuable as part of building the dentist-patient relationship and increasing patient understanding and acceptance. By building this topic into the dentist-patient relationship, patients may be more likely to return and recommend their dental practitioner. This likelihood may be especially important now, in the time of a changing patient-doctor relationship. Patients today are often preconditioned by information gained from electronic communications and by strong belief systems before meeting dental and medical care providers. Furthermore, aesthetics-driven dentistry, which may have a higher degree of subjectivity, has increased in the last decades. Thus, an increased focus is needed on patient beliefs and expectations. The importance of patient-centered outcomes and the impact of dental conditions on quality of life have been stressed in both research and clinical practice, leading to the development of short version tools such as Oral Health Impact Profile-5 (OHIP-5).⁹²

Taken together, in order to improve treatment outcomes, it is important for dentists to recognize all the factors that can interfere with treatment adherence and healing. The implications for dental education from these developments in dentistry are that implementation of psychosocial patient assessment has many benefits and can result in more individualized treatment, with improved outcomes, based on different psychosocial patient profiles. Assessment of psychosocial morbidity of patients in primary dental care can support treatment decisions by the general dental practitioner. From a clinical perspective, recommended short screening tools such as GCPS and PHQ-4 are freely available (www.rdc-tmdinternational.org). It may also be beneficial to consider the PROMIS (Patient-Reported Outcomes Measurement Information System) toolkit instruments for assessment of psychosocial constructs relevant to the dental setting (www.healthmeasures.net/explore-measurement-systems/promis). The set of instruments available in the PROMIS toolkit provide person-centered measures that evaluate relevant constructs such as anxiety and depression, enabling dental clinicians to select relevant measures for their patient populations.

We evaluated the methodological quality of the studies in our review with a tool developed for educational studies in medicine (MERSQI) with reported good reliability and content validity when compared with other educational instruments.^{27,93} Reed et al. evaluated 210 medical studies between 2002 and 2003 and reported an association between MERSQI scores and study fundings.²⁸ In a later study, a correlation between MERSQI scores and the acceptance of manuscripts was also identified.⁹³ A further study evaluated 21 reviews published in 2007-13 with the MERSQI and found their median score was 11.25,²⁷ which is similar to the median score of 11.75 for the studies in our review. We found the highest domain score for data analysis, with a median score of 3 out of 3, in contrast to a relatively low domain score for study design (median 1 out of 3). Both of these findings are in line with quality assessments of primary studies in a previous review.²⁷ However, our study found the lowest median score (median 1 out of 3) for the type of data collected. This result was mainly caused by the use of subjective assessment rather than objective measurements in those studies. Taken together, the methodological quality of the studies in our review was acceptable.

The aim of a systematic review is to summarize the available published evidence on a given topic. It

is in the nature of systematic reviews to underscore the absence of publications in that area. The paucity of publications on our topic does not inherently demonstrate that psychosocial assessment discussions rarely occur in dental education settings. Even though this possible disconnect may be viewed as a potential limitation of our review, the extremely small number of published studies on the topic strongly suggests that screening for psychological comorbidity utilizing standardized tools in dental education is not commonplace. Today, there is enough compelling evidence of the benefits of using standardized screening tools for psychological comorbidity that teaching future general dentists to use them in primary care settings should be envisioned and integrated into dental curricula. Such implementation would be consistent with medicine and nursing education, where assessment of psychological comorbidity has been used for some time now.

For dental schools to provide their students with a well-rounded education, we recommend that screening for psychological comorbidity should become part of the educational program. By including an assessment of psychological comorbidity, dental care providers can build a therapeutic alliance with the patient, which can improve outcomes.²¹ Patients' trust and comfort in the patient-dentist relationship may increase,⁹⁴ which can reduce anxiety. Patients will also benefit from more personalized health care, thereby increasing treatment satisfaction, adherence, and the likelihood of desired treatment outcomes. Improved patient investment in the therapeutic process and increased personal satisfaction with the dentist are also likely to lead to better patient retention.^{95,96} Psychological screening/assessment benefit both students/practitioners and the patients receiving care. For students to learn to treat the patient rather than solely the disease, the use of structured tools that are valid and reliable should be encouraged.

Conclusion

Our systematic review found that published data on the implementation of screening/assessment of psychological comorbidity in dental and dental hygiene education is extremely limited. The results from the studies we assessed were mainly based on qualitative assessment, and the reported data on specific methods or instruments used for psychosocial patient assessment were scarce. The extremely small number of published studies on psychosocial

patient screening indicates a possible comparable lack in dental and dental hygiene education. These findings suggest there is a need for implementation of easy-to-use, reliable, and validated screening tools for assessing psychological comorbidity in patients in dental education as well as in general dental practice to improve patient care.

Acknowledgments

We are grateful for the contributions from the other workshop participants: Lene Baad-Hansen (Aarhus, Denmark), Matthew Breckons (Newcastle, UK), Ben Brönnimann (Aarau, Switzerland), Jin-Woo Chung (Seoul, Republic of Korea), Thomas List (Malmö, Sweden), Frank Lobbezoo (Amsterdam, The Netherlands), Donald R. Nixdorf (Minneapolis, MN, USA), Richard Ohrbach (Buffalo, NY, USA), Christopher Peck (Surry Hills, NSW, Australia), Carolina Roldán-Barraza (Frankfurt am Main, Germany), Sonia Sharma (Buffalo, NY, USA), and Yoshihiro Tsukiyama (Fukuoka, Japan).

REFERENCES

1. Baiju RM, Peter E, Varghese NO, Sivaram R. Oral health and quality of life: current concepts. *J Clin Diagn Res* 2017;11(6):ZE21-6.
2. Phillips C, Kiyak HA, Bloomquist D, Turvey TA. Perceptions of recovery and satisfaction in the short term after orthognathic surgery. *J Oral Maxillofac Surg* 2004;62(5):535-44.
3. Rustemeyer J, Eke Z, Bremerich A. Perception of improvement after orthognathic surgery: the important variables affecting patient satisfaction. *Oral Maxillofac Surg* 2010;14(3):155-62.
4. Heydecke G, Tedesco LA, Kowalski C, Inglehart MR. Complete dentures and oral health-related quality of life: do coping styles matter? *Community Dent Oral Epidemiol* 2004;32(4):297-306.
5. Ozhayat EB. Influence of negative affectivity and self-esteem on the oral health-related quality of life in patients receiving oral rehabilitation. *Health Qual Life Outcomes* 2013;11:178.
6. Manfredini D, Landi N, Di Poggio AB, et al. A critical review of the importance of psychological factors in temporomandibular disorders. *Minerva Stomatol* 2003;52(6):321-6.
7. Lee JY, Watt RG, Williams DM, Giannobile WV. A new definition for oral health: implications for clinical practice, policy, and research. *J Dent Res* 2017;96(2):125-7.
8. Gatchel RJ, Peng YB, Peters ML, et al. The biopsychosocial approach to chronic pain: scientific advances and future directions. *Psychol Bull* 2007;133(4):581-624.
9. Suvinen TI, Reade PC, Kempainen P, et al. Review of aetiological concepts of temporomandibular pain disorders: towards a biopsychosocial model for integration of physical disorder factors with psychological and psychosocial illness impact factors. *Eur J Pain* 2005;9(6):613-33.

10. Bair MJ, Robinson RL, Katon W, Kroenke K. Depression and pain comorbidity: a literature review. *Arch Intern Med* 2003;163(20):2433-45.
11. du Fort GG, Newman SC, Bland RC. Psychiatric comorbidity and treatment seeking: sources of selection bias in the study of clinical populations. *J Nerv Ment Dis* 1993;181(8):467-74.
12. Bhalla A, Rajasekaran UB, Singh M, et al. A cross-sectional study to assess the perception of psychosocial elements among pediatric patients visiting dental clinics. *J Contemp Dent Pract* 2017;18(11):1021-4.
13. Keefer L, Sayuk G, Bratten J, et al. Multicenter study of gastroenterologists' ability to identify anxiety and depression in a new patient encounter and its impact on diagnosis. *J Clin Gastroenterol* 2008;42(6):667-71.
14. Currie CC, Stone SJ, Durham J. Pain and problems: a prospective cross-sectional study of the impact of dental emergencies. *J Oral Rehabil* 2015;42(12):883-9.
15. Law AS, Nixdorf DR, Aguirre AM, et al. Predicting severe pain after root canal therapy in the national dental PBRN. *J Dent Res* 2015;94(3 Suppl):37S-43S.
16. Garofalo JP, Gatchel RJ, Wesley AL, Ellis E 3rd. Predicting chronicity in acute temporomandibular joint disorders using the research diagnostic criteria. *J Am Dent Assoc* 1998;129(4):438-47.
17. Wright AR, Gatchel RJ, Wildenstein L, et al. Biopsychosocial differences between high-risk and low-risk patients with acute TMD-related pain. *J Am Dent Assoc* 2004;135(4):474-83.
18. Durham J, Raphael KG, Benoliel R, et al. Perspectives on next steps in classification of orofacial pain, part 2: role of psychosocial factors. *J Oral Rehabil* 2015;42(12):942-55.
19. 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(2):202-8.
20. Litt MD, Porto FB. Determinants of pain treatment response and nonresponse: identification of TMD patient subgroups. *J Pain* 2013;14(11):1502-13.
21. Litt MD, Shafer DM, Kreutzer DL. Brief cognitive-behavioral treatment for TMD pain: long-term outcomes and moderators of treatment. *Pain* 2010;151(1):110-6.
22. Fillingim RB, Ohrbach R, Greenspan JD, et al. Potential psychosocial risk factors for chronic TMD: descriptive data and empirically identified domains from the OPPERA case-control study. *J Pain* 2011;12(11 Suppl):T46-60.
23. Shueb SS, Nixdorf DR, John MT, et al. What is the impact of acute and chronic orofacial pain on quality of life? *J Dent* 2015;43(10):1203-10.
24. Slade GD, Diatchenko L, Bhalang K, et al. Influence of psychological factors on risk of temporomandibular disorders. *J Dent Res* 2007;86(11):1120-5.
25. Visscher CM, Baad-Hansen L, Durham J, et al. Benefits of implementing psychological and pain-related disability assessment in dental practice. *J Am Dent Assoc*, forthcoming.
26. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 2009;339:b2535.
27. Cook DA, Reed DA. Appraising the quality of medical education research methods: the medical education research study quality instrument and the Newcastle-Ottawa scale-education. *Acad Med* 2015;90(8):1067-76.
28. Reed DA, Cook DA, Beckman TJ, et al. Association between funding and quality of published medical education research. *JAMA* 2007;298(9):1002-9.
29. Asimakopoulou K, Newton JT, Daly B, et al. The effects of providing periodontal disease risk information on psychological outcomes: a randomized controlled trial. *J Clin Periodontol* 2015;42(4):350-5.
30. Board of Trustees of the Society for Personality A. Standards for education and training in psychological assessment position of the Society for Personality Assessment. *J Pers Assess* 2006;87(3):355-7.
31. Cavalcanti RF, Studart LM, Kosminsky M, de Goes PSA. Validation of the multimedia version of the RDC/TMD axis ii questionnaire in Portuguese. *J Appl Oral Sci* 2010;18(3):231-6.
32. Diehl RL, Foerster U, Sposetti VJ, Dolan TA. Factors associated with successful denture therapy. *J Prosthodont* 1996;5(2):84-90.
33. Diercke K, Ollinger I, Bermejo JL, et al. Dental fear in children and adolescents: a comparison of forms of anxiety management practiced by general and paediatric dentists. *Int J Paediatr Dent* 2012;22(1):60-7.
34. Durham J, Ohrbach R. Oral rehabilitation, disability, and dentistry. *J Oral Rehabil* 2010;37(6):490-4.
35. Hadjistavropoulos HD, Juckes K, Dirkse D, et al. Student evaluations of an interprofessional education experience in pain management. *J Interprof Care* 2015;29(1):73-5.
36. Kim SJ, Kim MR, Shin SW, et al. Evaluation of the psychosocial status of orthognathic surgery patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2009;108(6):828-32.
37. Kolawole KA, Agbaje HO, Otuyemi OD. Impact of malocclusion on oral health related quality of life of final year dental students. *Odontostomatol Trop* 2014;37(145):64-74.
38. MacDonald-Wicks L, Levett-Jones T. Effective teaching of communication to health professional undergraduate and postgraduate students: a systematic review. *JBI Libr Syst Rev* 2012;10(28 Suppl):1-12.
39. McCrorie P, Cushing A. Case study 3: assessment of attitudes. *Med Educ* 2000;34(Suppl 1):69-72.
40. Morris AJ, Roche SA, Bentham P, Wright J. A dental risk management protocol for electroconvulsive therapy. *J ECT* 2002;18(2):84-9.
41. Ogle OE, Hertz MB. Anxiety control in the dental patient. *Dent Clin North Am* 2012;56(1):1-16.
42. Schönwetter DJ, Law D, Mazurat R, et al. Assessing graduating dental students' competencies: the impact of classroom, clinic, and externships learning experiences. *Eur J Dent Educ* 2011;15(3):142-52.
43. Stedman JM, Hatch JP, Schoenfeld LS. The current status of psychological assessment training in graduate and professional schools. *J Pers Assess* 2001;77(3):398-407.
44. Allareddy V, Havens AM, Howell TH, Karimbux NY. Evaluation of a new assessment tool in problem-based learning tutorials in dental education. *J Dent Educ* 2011;75(5):665-71.
45. Anehosur GV, Nadiger RK. Evaluation of understanding levels of Indian dental students' knowledge and perceptions regarding older adults. *Gerodontol* 2012;29(2):e1215-21.

46. Benbelaïd R, Dot D, Levy G, Eid N. Difficulties encountered at the beginning of professional life: results of a 2003 pilot survey among undergraduate students in Paris Rene Descartes University (France). *Eur J Dent Educ* 2006;10(4):204-9.
47. Boissoneault J, Mundt JM, Bartley EJ, et al. Assessment of the influence of demographic and professional characteristics on health care providers' pain management decisions using virtual humans. *J Dent Educ* 2016;80(5):578-87.
48. Cardoso CL, Loureiro SR, Nelson-Filho P. Pediatric dental treatment: manifestations of stress in patients, mothers, and dental school students. *Braz Oral Res* 2004;18(2):150-5.
49. Davenport ES, Davis JEC, Cushing AM, Holsgrove GJ. An innovation in the assessment of future dentists. *Br Dent J* 1998;184(4):192-5.
50. Fiehn NE, Christensen LB. Examination of lifestyle factors and diseases in teaching periodontology in dental education in the Nordic countries. *Eur J Dent Educ* 2016;20(1):26-31.
51. Góonzalez G, Quezada VE. A brief cognitive-behavioral intervention for stress, anxiety, and depressive symptoms in dental students. *Res Psychother Psychopath Proc Outcome* 2016;19(1):68-78.
52. Gorter RC, Eijkman MAJ. Communication skills training courses in dental education. *Eur J Dent Educ* 1997;1(3):143-7.
53. Hamesch U, Croypley M, Lang J. Emotional versus cognitive rumination: are they differentially affecting long-term psychological health? The impact of stressors and personality in dental students. *Stress Health* 2014;30(3):222-31.
54. Hannah A, Lim BT, Ayers KMS. Emotional intelligence and clinical interview performance of dental students. *J Dent Educ* 2009;73(9):1107-17.
55. Hannah A, Millichamp CJ, Ayers KM. A communication skills course for undergraduate dental students. *J Dent Educ* 2004;68(9):970-7.
56. Hill KB, Hainsworth JM, Burke FJ, Fairbrother KJ. Evaluation of dentists' perceived needs regarding treatment of the anxious patient. *Br Dent J* 2008;204(8):E13; discussion 442-3.
57. Krahwinkel T, Nastali S, Azrak B, Willershausen B. The effect of examination stress conditions on the cortisol content of saliva: a study of students from clinical semesters. *Eur J Med Res* 2004;9(5):256-60.
58. Lanning SK, Ranson SL, Willett RM. Communication skills instruction utilizing interdisciplinary peer teachers: program development and student perceptions. *J Dent Educ* 2008;72(2):172-82.
59. Lantz MS, Chaves JF. What should biomedical sciences education in dental schools achieve? *J Dent Educ* 1997;61(5):426-33.
60. Manipal S, Mohan CS, Kumar DL, et al. The importance of dental aesthetics among dental students' assessment of knowledge. *J Int Soc Prev Community Dent* 2014;4(1):48-51.
61. McGoldrick PM, Pine CM, Mossey PA. Teaching dental undergraduates behavior change skills. *Eur J Dent Educ* 1998;2(3):124-32.
62. Mossey PA, Newton JP. The structured clinical operative test (SCOT) in dental competency assessment. *Br Dent J* 2001;190(7):387-90.
63. Newton JT, Sturmey P. Development of a short form of the treatment evaluation inventory for acceptability of psychological interventions. *Psychol Rep* 2004;94(2):475-81.
64. Pine CM, McGoldrick PM. Application of behavioural sciences teaching by UK dental undergraduates. *Eur J Dent Educ* 2000;4(2):49-56.
65. Pyle MA, Jasinevicius TR, Sheehan R. Dental student perceptions of the elderly: measuring negative perceptions with projective tests. *Spec Care Dent* 1999;19(1):40-6.
66. Rosen EB, Donoff RB, Riedy CA. U.S. dental school deans' views on the value of patient-reported outcome measures in dentistry. *J Dent Educ* 2016;80(6):721-5.
67. Ruff JC, Mendez JC. An integrated geriatric dentistry program. *Geront Geriatr Educ* 1988;8(3-4):59-68.
68. Sangappa SB, Tekian A. Communication skills course in an Indian undergraduate dental curriculum: a randomized controlled trial. *J Dent Educ* 2013;77(8):1092-8.
69. Simm W, Guimaraes AS. The teaching of temporomandibular disorders and orofacial pain at undergraduate level in Brazilian dental schools. *J Appl Oral Sci* 2013;21(6):518-24.
70. Strong J, Meredith P, Darnell R, et al. Does participation in a pain course based on the International Association for the Study of Pain's curricular guidelines change student knowledge about pain? *Pain Res Manag* 2003;8(3):137-42.
71. Tamaro S, Berggren U, Bergenholtz G. Representation of verbal pain descriptors on a visual analogue scale by dental patients and dental students. *Eur J Oral Sci* 1997;105(3):207-12.
72. Thornton LJ, Stuart-Buttle C, Wyszynski TC, Wilson ER. Physical and psychosocial stress exposures in U.S. dental schools: the need for expanded ergonomics training. *Appl Ergon* 2004;35(2):153-7.
73. Tsai TH, Kramer GA, Yang CL, et al. NBDE Part II practice analyses: an overview. *J Dent Educ* 2013;77(12):1566-80.
74. Woelber JP, Spann-Aloge N, Hanna G, et al. Training of dental professionals in motivational interviewing can heighten interdental cleaning self-efficacy in periodontal patients. *Front Psychol* 2016;7:254.
75. Benoliel R, Sharav Y, Markitziu A. The medically compromised patient (MCP): how should undergraduates be trained? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1997;83(5):525-6.
76. Orsini CA, Jerez OM. Establishing a good dentist-patient relationship: skills defined from the dental faculty perspective. *J Dent Educ* 2014;78(10):1405-15.
77. Sullivan MJL, Neish NR. Catastrophizing, anxiety, and pain during dental hygiene treatment. *Community Dent Oral Epidemiol* 1998;26(5):344-9.
78. Wagner J, Arteaga S, D'Ambrosio J, et al. A patient-instructor program to promote dental students' communication skills with diverse patients. *J Dent Educ* 2007;71(12):1554-60.
79. Woods CD. Self-reported mental illness in a dental school clinic population. *J Dent Educ* 2003;67(5):500-4.
80. Sullivan M, Bishop S, Pivik J. The pain catastrophizing scale: development and validation. *Psychol Assess* 1995;7:524-32.

81. Dworkin S, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations, specifications, critique. *J Craniomand Disord* 1992; 6:301-55.
82. Schiffman E, Ohrbach R, Truelove E, et al. Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the international RDC/TMD consortium network and orofacial pain special interest group. *J Oral Facial Pain Headache* 2014;28(1):6-27.
83. Kroenke K, Spitzer RL, Williams JB, Lowe B. An ultra-brief screening scale for anxiety and depression: the PHQ-4. *Psychosomatics* 2009;50(6):613-21.
84. Von Korff M, Ormel J, Keefe FJ, Dworkin SF. Grading the severity of chronic pain. *Pain* 1992;50(2):133-49.
85. Lowe B, Wahl I, Rose M, et al. A 4-item measure of depression and anxiety: validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *J Affect Disord* 2010;122(1-2):86-95.
86. da Costa AC, Rodrigues FS, da Fonte PP, et al. Influence of sense of coherence on adolescents' self-perceived dental aesthetics; a cross-sectional study. *BMC Oral Health* 2017;17(1):117.
87. Garg K, Tripathi T, Rai P, et al. Prospective evaluation of psychosocial impact after one year of orthodontic treatment using PIDAQ adapted for Indian population. *J Clin Diagn Res* 2017;11(8):ZC44-8.
88. Reissmann DR, Dard M, Lamprecht R, et al. Oral health-related quality of life in subjects with implant-supported prostheses: a systematic review. *J Dent* 2017;65:22-40.
89. Hally J, Freeman R, Yuan S, Humphris G. The importance of acknowledgement of emotions in routine patient psychological assessment: the example of the dental setting. *Patient Educ Couns* 2017;100(11):2102-5.
90. Kotiranta U, Suvinen T, Kauko T, et al. Subtyping patients with temporomandibular disorders in a primary health care setting on the basis of the research diagnostic criteria for temporomandibular disorders axis II pain-related disability: a step toward tailored treatment planning? *J Oral Facial Pain Headache* 2015;29(2):126-34.
91. Durham J, Shen J, Breckons M, et al. Health care cost and impact of persistent orofacial pain: the DEEP study cohort. *J Dent Res* 2016;95(10):1147-54.
92. Naik A, John MT, Kohli N, et al. Validation of the English-language version of 5-item oral health impact profile. *J Prosthodont Res* 2016;60(2):85-91.
93. Reed DA, Beckman TJ, Wright SM, et al. Predictive validity evidence for medical education research study quality instrument scores: quality of submissions to JGIM's medical education special issue. *J Gen Intern Med* 2008; 23(7):903-7.
94. Khatami S, Macentee MI. Evolution of clinical reasoning in dental education. *J Dent Educ* 2011;75(3):321-8.
95. De Boever JA, Van Wormhoudt K, De Boever EH. Reasons that patients do not return for appointments in the initial phase of treatment of temporomandibular disorders. *J Orofac Pain* 1996;10(1):66-72.
96. Gil IA, Barbosa CMR, Pedro VM, et al. Multidisciplinary approach to chronic pain from myofascial pain dysfunction syndrome: a four-year experience at a Brazilian center. *Cranio* 1998;16(1):17-25.