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ORIGINAL ARTICLE

Development of a Dental Anxiety Provoking Scale: A pilot study in Hong Kong

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Abstract *Background/purpose:* Dental anxiety is closely related to one's past experience in dental clinics. However, little is known about what clinical, environmental, and psychological aspects provoke anxiety in dental patients. Extending on previous work in The Netherlands which explored anxiety provoking stimuli, the objective of the study was to develop a Dental Anxiety Provoking Scale (DAPS) that measures the degree to which anxiety was provoked by dental stimuli and to identify the underlying factor structure of the DAPS.
Materials and methods: Four hundred and sixty study participants were recruited from two universities in Hong Kong. Each participant completed a self-administrated questionnaire that included a 73-item measure of dental anxiety provoking stimuli, and a four-item dental anxiety scale.
Results: Results of exploratory and confirmatory factor analyses showed that the DAPS has seven factors, namely, dental check-up, injection, scale and drill, surgery, empathy, perceived lack of control, and clinic environment, and has 27 items. Results of structural equation modeling showed that three factors of the DAPS; dental check-up, surgery, and clinic environment, had a significant effect on dental anxiety score. The Cronbach α values ranged from 0.76 to 0.92 while the composite reliability values ranged from 0.78 to 0.93. The average variance extracted (AVE) values ranged from 0.55 to 0.81. The minimum AVE value was greater than the square of correlation value for each pair of factors.
Conclusion: The study developed and validated the DAPS covering a wide range of dental anxiety provoking stimuli, findings were concise enough to be used in clinical based studies.

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Introduction

Dental anxiety has been a research focus over the past several decades.[1–9] Despite the advances in dental equipment and procedures, dental anxiety is still recognized as a major issue in the provision of dental care.[2,3,5–10] Patients with high dental anxiety recall more pain than they actually experienced in tooth extraction.[11] Empirical evidence demonstrated that a high level of dental anxiety was significantly associated with irregular dental attendance,[12,13] delays in dental treatment,[10] and dental avoidance.[14,15] Armfield et al[10] reported that high dental anxiety was related to less frequent dental visits, more severe dental problems, and only visiting dental clinics for painful dental problems. Hence, high dental anxiety is significantly associated with poor oral health.[5,10] In addition, it was found that parents' dental anxiety and avoidance behaviors were related to dental caries in children.[15] Hence the vicious cycle of dental anxiety not only affects a person's oral health but may also affect the person's next of kin.

The existing literature has put a lot of emphasis on the consequences of dental anxiety. However, the current study examines what causes dental anxiety. Although dental anxiety is shown to be closely related to one's past experience in dental clinics,[16–18] the provoking effect of clinical and environmental aspects on the anxiety of dental patients has yet to be comprehensively studied. Oosterink et al[16] conducted an extensive literature review and found that most literature focused on certain aspects of anxiety provoking stimuli and practices in the dental setting. The most common aspects include pain sensations,[19,20] having dental surgery,[21] having an injection,[22,23] sight, sound, and feeling of the drill,[12,19,24] negative dentist behavior,[25] various aspects of clinical environment such as the sight and sound of dental chair and equipment,[12] the smell of the clinic,[18,24,26] and perceived lack of control.[18,26] Oosterink et al[16] compiled a questionnaire that covered 67 potentially anxiety provoking stimuli in the dental setting and tested the questionnaire using a convenience sample in The Netherlands. They aimed to establish a hierarchy of anxiety provoking stimuli. Using the Scree plot of eigenvalues from the exploratory factor analysis they found that stimuli could be categorized by two sets of factors: (1) invasive-treatment-related stimuli factors; and (2) noninvasive-treatment-related stimuli factors. Oosterink et al[16] showed that the number of extreme anxiety-provoking stimuli had the greatest influence on the dental anxiety score (DAS) using stepwise regression analysis. However, Oosterink et al[16] did not continue to investigate the factor structure of those stimuli in detail and did not establish the relationships between anxiety provoking stimuli factors and DAS. The current study addresses these gaps in dental research by establishing a Dental Anxiety Provoking Scale (DAPS) and examining the relationship between DAPS and dental anxiety. The developed DAPS is more concise and better suited for clinical use. This study followed established procedures for scale development in social science starting with identification of an item pool, checking the face and content validity of the items, collecting data, performing exploratory and confirmatory factor analyses, and ending with assessing external validity of the scale.

Materials and methods

Participants

A convenience sample of university students in Hong Kong was recruited from The University of Hong Kong (250 students) and The Hong Kong Polytechnic University (400 students). Out of the sample of 650 students, 460 students (230 students from each university) completed and returned questionnaires, representing a response rate of 71%. All of the participants had dental experience as free dental check-ups and treatment are provided in the universities, and 95% of school children join the School Dental Care Service provided by the Department of Health, Government of Hong Kong Special Administrative Region. University students were selected because they have the language ability to respond to an English questionnaire and they can articulate their experiences in the dental setting. The problems inherent in translation were avoided. Out of the 460 respondents, 230 (50%) were female. The largest group of respondents were aged 20–21 years ($n = 160$), followed by 22–23 years ($n = 140$), 18–19 years ($n = 120$), < 18 years ($n = 20$), and ≥ 24 years ($n = 20$). It should be noted that the use of students as study participants may threaten the generalizability of the study findings due to the unique characteristics of the student population.

Data collection

Ethics approval was obtained from the Institutional Review Board of The University of Hong Kong/Hospital Authority Hong Kong West Cluster (UW 14–010). Teaching assistants invited students who attended lectures and tutorials in various faculties to participate. Participation was voluntary and self-administered anonymous questionnaires were used to collect data. Informed consent was obtained from all participants. Teaching assistants distributed the questionnaires in the classroom and participants were asked to return the questionnaires in 15 minutes, before lectures/tutorials began.

Instrument: Dental anxiety provoking stimuli

This list contains 73 items covering a wide range of situations and stimuli that provoke a person's anxiety toward dentistry. The stimuli include the 67 potential anxiety provoking stimuli adopted from Oosterink et al[16] and the following six items proposed by the authors: (1) sight of the scaler; (2) the smell when scaling teeth; (3) the taste when scaling teeth; (4) the sound of scaling teeth; (5) sensation of the active scaler; and (6) the taste when drilling teeth. The items were reviewed by two faculty members and 10 students in the Faculty of Dentistry to ensure face and content validity.[27,28] All items were rated on a 4-point Likert scale ranging from 1, representing not anxiety provoking at all, to 4, representing extremely anxiety provoking.

Instrument: Dental Anxiety Scale (DAS)

DAS is a four-item measure designed to assess a person's anxiety toward dentistry. The scale was developed by