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Dentophobia-latent Component Factor Analysis of Dental Concerns Assessment Scale

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Abstract

BACKGROUND: Dentophobia (DF) is unreasonable, irrational, excessive, and socially limiting fear of specific situations related to dental care. The condition is part of the ultimate and pathological cluster of dental anxiety.

AIM: Objectives of the present study are: (1) Identification of latent factors in the psychological manifestation of dental fear, anxiety, and phobia and (2) comparison of these factors with the degree of manifestation of the psychological construct and gender differences.

METHODS: A cross-sectional online-based survey was conducted. The primary sociological information is collected through a direct individual survey including 32 items divided into four sections. Statistical data processing includes descriptive statistics, non-parametric hypothesis tests, exploratory and confirmatory factor analysis for detection and verification of latent factors, internal validity analysis.

DISCUSSION: The presence of a latent factor conditionally describing "pain related fear" is a possible reason for the overlap of DF with other panic disorders related to medical care described in the literature. A study performed for a wider and diverse population sample would produce more credible findings from which to draw more accurate conclusions.

CONCLUSION: This study provides a better understanding of how to identify patients who are prone to, or already suffer from dental anxiety and allows dentists and health-care professionals to provide better health. The analysis of this study discovered a significant difference between latent factors from the construct encompassing the pain related fear and social fear.

Introduction

Dentophobia (DF) is unreasonable, irrational, excessive, and socially limiting fear of specific situations related to dental care. The condition is part of the ultimate and pathological cluster of dental anxiety. DF is included as a separate disease, in the group of specific anxiety disorders, both in the diagnostic manual of the American Psychiatric Organization [1] and in the International Classification of Diseases (10) [2]. Recent epidemiological studies have estimated high dental anxiety and DF prevalence of up to 30% in children [3], [4], [5] and between 10 and 20% in adults [6], [7]. Parents "inherited" dental fear [8] and the expected dental procedure [9] is identified as main drivers for this specific anxiety disorder.

DF is an independent cause of deteriorated oral status, deteriorated quality of life associated with oral health [10], and lowered subjective pain threshold [11]. Dental anxiety is characterized as a specific patient response to a vague trigger associated with dental procedure. Usually, the trigger cannot be determined by patients and is not present at the time of the response. "Dental anxiety" and "dental phobia" often are used as synonyms; however, there are some noticeable differences [12]. Some authors claim that dental anxiety and DF should be studied as separated disorders. Although, many consider them in one spectrum of specific fear conditions. The main argument for that is the observed overlap of dental anxiety and phobia within patients suffering from other panic or personality disorders [13], [14]. As a results of this dispute, many diagnostic questionnaires have been developed to improve the epidemiological assessment of these dental-related fear conditions. Choosing a diagnostic tool usually is considered as a scientifical challenge. The reason is that multiple instruments are available, each with proven validity and reliability. The final decision should be based on questionnaire's advantages and disadvantages [15].

The increasing numbers of published assessment questionnaires require their systemic classification in terms of the practical field in which they are used [16]. Despite the solid evidence in favor of questionnaires validity and reliability, often specific psychological components of dental fear remain unclear.

Aims

Objectives of the present study are: (1) Identification of latent factors in the psychological manifestation of dental fear, anxiety, and phobia and (2) comparison of these factors with the degree of manifestation of the psychological construct and gender differences.

Methods

A cross-sectional online-based survey was conducted. The primary sociological information is collected through a direct individual survey including 32 items divided into four sections: (1) Individual data about the respondent; (2) four 5-point Likert scale questions for assessment of dental anxiety according to the validated instrument-Dental Anxiety Scale Revised (DAS-R) [17], (3) 26 Likert scale questions on a modified validated scale for assessment of dental anxiety - Dental concerns assessment scale (DCAS) [18], and (4) three questions about special proximity to the dental profession.

Statistical data processing includes descriptive statistics, non-parametric hypothesis tests, exploratory and confirmatory factor analysis for detection, and verification of latent factors and internal validity analysis. The analysis of the data is realized with the statistical package SPSS IBM Statistic v.26; JASP v0.14.1; AMOS v.26.

Results

In total 149 respondents took part in the survey (Table 1). The predominant participants were women (n = 135, 90.60%). Lower dental anxiety prevailed in men (M = 7.51; SD = 2.09). A statistically significant association between categories of dental anxiety and gender was found (χ^2 = 14.50; p = 0.002; df = 3). A similar relationship had been reported in other studies [18].

Table 1: Characteristics of the respondents

Characteristics of the respondents	Gender	
	Male	Female
Number, n (%)	14 (9.4)	135 (90.6)
Age, mean (SD)	25.14 (13.3)	21.17 (3.96)
Age, median (IQR)	21 (4.75)	20 (4.5)
Score of DAS-R, mean (SD)	7.51 (2.09)	11.16 (4.09)
Score of DAS-R, median (IQR)	7 (1.75)	11 (6.5)
Low dental anxiety, n (%)	11 (78.57)	41 (30.37)
Moderate dental anxiety, n (%)	1 (7.14)	42 (31.11)
High dental anxiety, n (%)	2 (14.29)	18 (13.33)
Dentophobia, n (%)	-	34 (25.8)

The factor analysis of the DCAS instrument (DCAS) is performed after sampling adequacy test for each variable in the model (KMO = 0.89; Bartlett's test of sphericity χ^2 (153) = 2016.15, p < 0.001). Principal components analysis with varimax rotation and confirmatory factor analysis based on Eigenvalue graph result in tree detention dental fear latent structure. The questions forming the latent factors are presented in Table 2. The latent factors are indicated as: (1) "Social fear" related mainly to the questions describing the lack of sufficient information and the concern about situations undermining their reputation; (2) "Pain related fear" is mainly related to the anxiety detectors in question to procedures with a real risk of pain; and (3) fear related to objective situation in the dental office – related to materials and equipment as well as specific dental procedures.

Further analysis of the difference between latent factors among the categories of dental anxiety proves statistical significance only for latent factors for "social fear" (F = 11.35; df = 3.13; p < 0.001) and "pain related fear" (F = 13.75; df = 3.13; p < 0.001). The latent factor construct encompassing the dental fear associated with the situation fails to distinguish the categories to a significant degree (F = 1.25; df = 3.13; p = 0.29). *Post hoc* analysis using Tukey method finds statistically significant differences between the two already established latent factors. It distinguishes between low and moderate dental anxiety and high dental anxiety and DF. However, none of these latent factors significantly distinguish between the groups of respondents with high dental anxiety and those with DF.

Only the latent factor associated with pain related fear shows significantly higher values in the group of women (M = 0.09; SD = 0.98). Impressive is the trend of decreasing severity of pain related fear with age increase, despite the lack of a significant relationship established by the present study (r = −0. 113; p = 0.17). The latent factor associated with "pain-related fear" was found to be significantly higher (t = −3.17; df = 140) in respondents who had their own experience (treatment) with a dental specialist (M = 0.26; SD = 0.928) compared to those without a similar history (M = −2.47; SD = 0.26) [19].

The three mentioned latent factors derived from the DCAS methodology correlate significantly with the results of the DAS-R methodology, which indirectly serves for their external validation.

Discussion

The present study identifies three psychological constructs in the understanding of DF. The presence of a latent factor conditionally describing "pain related fear" is a possible reason for the overlap of DF with other panic disorders related to medical care described in the literature [13], [20]. The established gender variations are confirmed and it is proved that they are mainly valid for the latent factor related to pain. Further

Table 2: Factor loadings and communalities based on a principal components analysis with varimax rotation for 26 items from the Dental concerns assessment scale (DCAS) (n = 149)

Items from DCAS	Social fear and lack of information-based fear	Pain related fear	Dental procedures and environment fear
Cronbach's alpha	0.90	0.859	0.810
1. Sound or vibration of the drill		0.618	
2. Not being numb enough		0.726	
3. Dislike the numb feeling			0.551
4. Injections (needles)		0.593	
5. Probing to assess gum disease		0.649	
6. The sound or feel of scraping during teeth cleaning		0.623	
7. Gagging, for example during impressions of the mouth			0.645
8. X-rays			0.676
9. Rubber dam (latex/nitrile sheet used in dentistry to isolate the operative site from the rest of the mouth.)			0.756
10. Jaw getting tired			0.735
11. Cold air hurts teeth			0.636
12. Not enough information about procedures	0.462		
13. Root canal treatment		0.738	
14. Extraction		0.687	
15. Fear of being injured*	0.433	0.63	
16. Panic attacks	0.602		
17. Not being able to stop the dentist*	0.658	0.448	
18. Not feeling free to ask questions	0.723		
19. Not being listened to or taken seriously	0.796		
20. Being criticized, put down, or lectured to	0.825		
21. Smells in the dental office			
22. I am worried that I may need a lot of dental treatment	0.755		
23. I am worried about the cost of the dental treatment I may need	0.594		
24. I am worried about the number of appointments and the time that will be required for necessary appointments and treatment; time away from work, or the need for childcare or transportation	0.664		
25. I am embarrassed about the condition of my mouth	0.647		
26. I don't like feeling confined or not in control	0.594		

*Questions related to two of the latent factors are assigned to the latent factor to which they have stronger connection.

studies could also investigate this association across a wide variety of age groups. Difference between DF and dental anxiety may be unique to the studied participants who were of a similar age. Such limitations may further be cleared through detecting in which population the contrast is or is not present. Social fear and pain related fear can successfully distinguish low from high levels of dental anxiety but cannot be used to differentiate DF. Personal experience of dental treatment compared to "friend's experience" determines higher levels of "pain-related fear" and dental anxiety. Some authors register whether past experience is affecting the perception of dental anxiety [20], [21]. Our study has focused on current latent factors during specific situations, lack of information during the treatment, or dental environment fear.

Dental procedures and environment

Dental practice atmosphere is a proved latent factor causing dental fear, anxiety, and phobia. Multidisciplinary team approach could establish calming and relaxing environment where patients feel comfortable. Attitude of the receptionist, dental assistant, or nurse should be immensely positive and attentive with a friendly smile. The approach toward every patient entering the practice should be proactive individually directed, providing enough information regarding the stay in the dental office. The interior is forming the first impression and overall experience of the patient. Leading requirements are cleanliness and cosiness [22].

Data support that natural essential oil of orange has sedative properties used in dental office [23], [24]. Especially, women who were exposed to orange odor reached a lower level of state anxiety, a more positive mood, and a higher level of calmness.

Recent research suggests that aromatherapy is associated with reduction in dental anxiety and it is extremely effective (pooled mean difference: −3.36 [95% CI, −3.77–−2.95, p = 0.00001) [25]. It could be diffused in the waiting room for patients waiting for a scheduled appointment achieving relaxant effect. Nevertheless, the previous studies showed that there is no significant effect between the use of orange or apple odor [26].

Leading latent factors from the dental environment as specific pain related causes are sound of the drill, injections and procedures as extractions and root canal treatment. More detailed information could be obtained after dividing the dental procedures by specialties [27]. Dentist's behavior before starting medical procedures could modify the dentophobic experiences. According to some authors, around 73.47% of the patients have fear of vomiting or choking of gagging. Most of the respondents rank the fear of vomiting reflex as moderate [27], [28]. It is also important that parent/carer presence have an influence on the patient's response. Sometimes patients report that they have tried to postpone their dental treatment because of dental anxiety [29]. Team approach is essential as coping strategy during the dental procedure. During the treatment holding the nurse's hand (for children) could be included and verbal support, ambient music, temperature, and light [30].

Pain related fear

Pain related fear is a main motivator for avoidance or delay of dental visit in patients with DF [30].

Pain reduction can positively affect the frequency of visits to a dentist leading to improvement of the oral health [28]. Pain is cited as a very common reason for rejecting a dental procedure, as well as a cause of DF. Some authors have investigated the role of pain in DF through electroencephalogram experiment and its temporal resolution [30]. Electroencephalograms can be interpreted as indicators of emotional significance and attention allocation. It is proved that direct instructions and patient-orientated attention could lead to possible changes and emotion regulation strategies. It is registered during the entire period of different types of dental procedures, with predominance of extractions of molars, periodontal scaling, anesthetic injections, and others [11]. Pain and anxiety are also associated with endodontic treatment. Patients with symptomatic irreversible pulpitis who needed emergent endodontic treatment also show high dental anxiety [31].

A successful behavior modification method in patients undergoing short invasive dental procedures is virtual reality method [32], [33]. Assessment of expected pain relief may be integrated into pre-treatment assessment for painful dental patients. However, further evaluation of the association should be done [31]. In contrast, pain is usually what brings the patient to the dental practice and with anesthetic measures a dentist is able to control the patient's cause of pain or dull the effect of the procedure [34]. Reducing negative affect and physiological distress in patients in the dental office is leading to more cooperative behaviors and decreased appointment time for the patients. Some authors find the diaphragmatic breathing as a promising method for reduction of dental anxiety with benefits as low cost, easy for implementation, and suitable for the daily dental practice [12], [35], [36].

Social fear and lack of information-based fear

The cost of dental treatment is accepted as one of the most anxiety-eliciting dental situations (64.5%), followed by fear of needles/injections (46.0%) and painful or uncomfortable procedures (42.9%) [37].

Another latent factor causing dental anxiety is about the information received regarding the number of visits for dental treatment. Multinomial logistic regression found that each increment in the number of visits increased the odds of worsening dental anxiety (odds ratio [OR], 2.2; $p < 0.05$) [38], [39] Researchers in Poland assessed dental anxiety in association with the frequency of dental appointments and individual dental hygiene practices. Properly planned dental treatment turn out to be a valuable instrument to decrease the patient's unreasonable fear, to encourage him to have more regular dental visits, and to improve their oral-hygiene habits. It is believed that every undertaken effort is effectively reducing anxiety levels in dental patients [40]. Providing information regarding the condition of the mouth or criticizing the patient during the dental visit is leading to high anxiety levels. Dental patients being criticized or lectured usually report high level of anxiety [15].

A study performed for a wider and diverse population sample would produce more credible findings from which to draw more accurate conclusions. The future studies may also explore whether gender influences the correlation between personality types and dental anxiety, as well as look deeper at the personality characteristics that could lead to an association within the personality group.

Conclusion

This study provides a better understanding of how to identify patients who are prone to, or already suffer from dental anxiety and enable dentists and health-care professionals to accommodate to the patients care in a more targeted method, allowing them to provide better healthcare. The analysis of this study discovered a significant difference between latent factors from the construct encompassing the pain related fear and social fear. However, none of the factors could distinguish between the groups with high dental anxiety and DF.

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