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Common use of a Fear Survey Schedule for assessment of dental fear among children and adults

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Background. Little is known about children with dental fear (DF) in a long-term perspective. Measures of DF suitable for use among children, adolescents, and adults would be of value for longitudinal and family studies.

Aim. Our aim was to explore the DF subscale of the Children's Fear Survey Schedule (CFSS-DS) in highly fearful adult dental patients.

Design. The subjects were 230 adult patients applying for treatment for severe DF at a specialized DF clinic. Questionnaires investigated background data, general fear and DF, and general anxiety and depression. Reference data were obtained from 36 nonfearful patients on a subset of questionnaires.

Results. The fearful group reported high levels of DF on all measures and at a level similar to children with severe DF. The DF measures clearly differed between the fearful and reference groups. A factor analysis revealed a three-factor structure (fear of dental treatment, medical treatment, and of strangers and choking), which explained 68% of the variance.

Conclusion. The CFSS-DS appears suitable for use in studies of adult populations. The results indicated that some areas of DF (physiology, avoidant behaviour, anticipatory anxiety), areas of importance among adult patients, are not assessed by the CFSS-DS. Studies of adults should therefore also include established adult measures of DF.

Introduction

It is well documented that dental fear (DF) may cause frequent and serious problems for both dentist and patient, and gives rise to a number of deleterious effects[1–3]. Well over a third of the grown-up population admits to being fearful and 5% can be regarded as extremely fearful or phobic[2,4]. In Sweden, about every 10th child is referred to specialist pedodontic clinics some time during childhood or adolescence; the majority because of behavioural management problems (BMP) and DF in combination with severe dental decay[5]. These 10% of children account for a major part of dental decay and consume considerable resources at the specialist as well as at the general dentist.

In attempts to explore the aetiology and natural history of DF among adults, it has been possible to identify several background factors[1,3]. However, one must realize the limited reliability and validity in studies of adults due to the extensive timespan between the onset of fear (often childhood) and these studies. Both direct and indirect pathways to fear can be present, although the patient only attributes one or the other as the reason for fear[6]. Thus, results reported on the cause of DF must be interpreted in the light of the long retroperspective almost always present in studies of adult dental fearful individuals. For most patients, avoidance and negative emotions towards dentistry have been present most of their grown-up lives. Thus, the background of DF may be more reliably investigated and understood in studies of children.

However, in research on dental treatment problems among children, different constructs have been used and definitions are unclear. Difficulties due to psychological/behavioural factors, often combined with an aggravating caries situation, are commonly labelled DF because patients' behaviour may look like fear reactions (i.e. avoidance, late cancellations, refusals, crying, anger). In an epidemiological

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study among 4000 children in the city of Göteborg, we concluded that behavioural management problems and DF are not synonymous. Klingberg[7] reported that 10.5% showed BMP and 6.7% showed DF. These groups only partly overlapped each other; in the BMP group, 27% were also fearful, while among fearful children, 61% showed BMP. In Klingberg's studies we found that the children's temperament, DF among mothers, and previous experiences of painful dental treatment strongly predicted negative reactions in the future. One may conclude that similar to what we had found among adults, a multifaceted picture was present among children. However, nothing is known about these children in a long-term perspective whether they are treated for their DF and BMP or not. Also we do not know if or how they are represented among those who report treatment fear or phobia as adults.

Thus, the understanding of the aetiology of BMP and DF is presently founded on cross-sectional data and indirect information. Much of the information relates to studies of adults and suffers from distortion by retrospection. However, there are a number of questions that can only be answered in a natural history perspective, using a prospective design. Longitudinal studies are scarce[8,9] and to our knowledge there are few studies aimed to predict and follow the development during childhood into adulthood. There are a number of reports from the same longitudinal study revealing different prevalence rates and patterns of stability and instability in individuals developing from adolescence into young adulthood[9,10]. In a series of investigations we aim to increase the understanding of DF reactions and behaviour problems in dentistry by studying the natural history of these reactions in both children and adults.

In the present study our purpose was to investigate some measurements of DF for common use among children and adults. Measures of DF suitable to use among children, adolescents, and adults would be of value for research purposes such as longitudinal studies and family studies where relations between children and parents ratings are investigated. It has been tried to adapt questionnaires of DF for adults among children; however, the results has not been completely promising[11] and has significant limitations according to age. To our knowledge, no such attempts have been made with adapting children's questionnaires for use among adults.

CFSS-DS, the dental subscale of Children's Fear Survey Schedule[12], is a self-report or parental-report 15-item questionnaire intended to measure DF in children. Satisfactory reliability and validity of the scale has been reported in the review by Aartman *et al.*[11]. Normative data and ranges indicative of high DF in children based on CFSS-DS scores are available[7,13]. CFSS-DS is commonly used in studies examining prevalence and possible predictors and concomitants of DF in children, and also of correlations between DF and DBMP[7]. Factor analyses on CFSS-DS in studies of DF in children are reported in the literature. In samples not selected for high DF, three factors of DF have been indicated: (i) fear of highly invasive dental procedures; (ii) fear of less invasive aspects of treatment; and (iii) fear of medical aspects and strangers[14–16]. Ten Berge *et al.*[14] concluded that DF as measured with CFSS-DS could be conceptualized as one-dimensional, as most items loaded on more than one factor. In a study of highly DF children, ten Berge *et al.*[17] found a stronger four-factor pattern explaining 60% of the variance: (i) fear of general, less invasive aspects of dental treatment; (ii) fear of medical aspects; (iii) fear of drilling; and (iv) fear of strangers (including choking). The value of including measurement of other aspects of DF than those included in CFSS-DS (i.e. fear of pain) has been proposed[18].

Thus, our aim was to explore the CFSS-DS[12] questionnaire in a group of severely dental fearful adult patients and to evaluate the instrument in comparison with established measures of DF and general emotional reactions in adults. We also aimed to evaluate the prediction of high DF and to explore the factor structure and explained variance of CFSS-DS.

Materials and methods

Patients and procedures

The present study was conducted at a specialized DF clinic (DFRTC) at the Faculty of Odontology,

Göteborg University, Sweden, during 1 year (October 2003–September 2004). During the 12-month period, 307 new patients applied for treatment at the DF clinic and were invited to take part in the present study. After exclusion of 77 individuals, a sample of 230 remained. A study of measurement of behavioural problems in this sample has recently been reported[19]. The main reason for exclusion was patients' unwillingness to take part in the research data collection. Marginal numbers of individuals were excluded due to problems filling out the questionnaires or because of lack of time at the clinic. Among the excluded group of patients, data on 60 individuals, who answered the Dental Anxiety Scale (DAS), the Dental Fear Survey (DFS), and using the Hospital Anxiety and Depression scale (HAD) as part of their clinical evaluation for treatment, did not differ from the analysed group with regard to age and sex distribution or psychometric variables.

The subjects were 230 adult patients applying for treatment for severe dental anxiety, who were investigated in conjunction to their first visit to the clinic. A screening process only allowed inclusion of patients who refused conventional dental treatment and who were willing to enter the research project. After written consent, each patient answered the psychometric questionnaires (see below) before seeing the dentist for a clinical interview.

A subset of questionnaires – the CFSS-DS, the short form of the Children's Fear Survey Schedule (CFSS-SF), and the DAS – were distributed to a group of nonfearful dental patients, to check for discrimination between a fearful and a nonfearful group in adults, similar to what has been found among children and adolescents. The questionnaires were distributed to 36 subjects applying for treatment at the general dentistry clinic at the dental school. These patients were consecutively selected among new patients to the clinic. Only those patients reporting a history of regular dental visits were included. These subjects constitute a reference group for the CFSS-DS in nonfearful dental patients. The study was approved by the Regional Ethical Review Board in Göteborg University.

Instruments

The questionnaires investigated background data including age, sex, previous dental contacts (regularity and time since last visit with a dentist for completed regular dentistry), dental and general fearfulness, and general anxiety and depression.

Dental fear and anxiety were assessed by a Swedish version of the CFSS-DS[7,12]. A version for adults was modified only by letting the respondent assess her- or himself instead of a child. No other change in wording was done. CFSS-DS consists of 15 items related to various aspects of dental treatment. Each item can be scored on a five-grade scale, from 1 (not afraid) to 5 (very afraid). Responses range from sums of 15–75. Scores of 38 and over are used to be indicative of DF in children[7], and scores of 32 and above indicate a risk range[13]. For evaluation purpose, DF was also assessed with the well-established DAS[20,21] and the DFS[22,23]. DAS reported as sum score (ranging from 4 to 20), DFS reported as item mean (ranging from 1 to 5), high scores indicate more severe DF.

General fears were assessed using the CFSS-SF[7,24]; in a Swedish version modified as the dental subscale. CFSS-SF contains 18 items to be rated from 1 (not afraid) to 5 (very afraid), giving total scores ranging from 18 to 90. Items refer mainly to fear-relevant situations or objects according to the three main categories of phobia in *DSM-IV*[25]. The CFSS-SF sum-score was used as an indication of general fear.

General anxiety and depression were assessed using the HAD[26]. The HAD is widely used and a reliable measure of presence and severity of clinical anxiety (HAD-A) and depression (HAD-D)[27]. Swedish population data and tests of reliability and validity reveal that cut-offs 7/8 can be used for detecting probable cases and 10/11 for detecting clear cases of clinical anxiety/depression[27].

Statistical methods

The data were analysed regarding the questionnaire variables among fearful patients with regard to differences according to sex and tested with the chi-square test and Student's *t*-test. Pearson's correlation coefficients were calculated among variables separately for the

sexes and in the total group. Data were also analysed for differences between fearful and reference subjects with Student's *t*-test procedure. Predetermined significance levels were set at 0.05. Cronbach's alpha was used to analyse internal consistency reliability. For establishing the predictive value of included variables a linear regression was performed with CFSS-DS as depending variable. The exploratory factor analysis was carried out and rotated (Varimax rotation with Kaiser's normalization) to establish the statistical separation of the CFSS-DS into factors. Decision on the final number of factors was based on Kaiser's criterion (eigenvalue > 1), inspection of the screen plot, and explicitness of the item loadings.

Results

Sample characteristics

The sample included 230 dentally fearful patients: 144 (63%) women and 86 (37%) men. The 36 patients in the reference group had a similar gender distribution: 23 (64%) women and 13 (36%) men. The fearful patients were somewhat younger (mean age 36.6 years, SD = 10.5) than the reference group (mean age 43.4 years, SD = 18.6; $P < 0.05$). Despite refusing immediate start of conventional dental treatment, 18% of the fearful patients reported regular dental treatments, 10% went regularly but seldom, 45% only when in pain, and 28% reported never visiting the dentist. The estimated time since last having completed dental treatment with a dentist was assessed by 227 individuals according to 5-year periods. Thus, 63 patients (28%) reported having visited a dentist and completed treatment during the last 5 years, while 55 patients (24%) had not completed regular dental treatment in at least 15 years. Nine individuals claimed never to have completed treatment with a dentist. The distribution of time since last dental treatment was not significantly different among men and women.

Dental fear, general fear, anxiety, and depression

The fearful group reported high levels of DF on all measures. The reported DF on CFSS-DS (M = 44.7, SD = 10.0) was on a level corresponding to children with severe DF. The rating on the DAS (M = 17.0, SD = 2.8) and DFS (M = 3.9, SD = 0.7) was on a level expected for adult patients with severe DF. The reference group reported significantly lower ratings of DF compared with the fearful group on DAS (fearful group M = 17.0, SD = 2.8, vs. reference group M = 8.4, SD = 4.0, $P < 0.001$) and CFSS-DS (fearful group M = 44.7, SD = 10.0, vs. reference group M = 25.7, SD = 10.8, $P < 0.001$). Women reported higher DF on CFSS-DS than men in both the fearful group (fearful women M = 45.8 vs. fearful men M = 42.8, $P < 0.05$) and the reference group (reference women M = 30.1 vs. reference men M = 20.8, $P < 0.01$), and on DAS in the reference group (reference women M = 9.4 vs. reference men M = 6.5, $P < 0.05$). On the DFS (available only in the fearful group), women reported more fear than men on the physiology and situational dimensions (M = 3.8 and 4.2 for women, respectively, vs. 3.5 and 4.0 for men, $P = 0.013$ and $P = 0.019$), while there was no gender difference in anticipation anxiety. On general fear measured with CFSS-SF, there was no difference between fearful group and reference group (fearful group M = 38.8, SD = 11.7, vs. reference group M = 37.4, SD = 13.7), while women reported more general fearfulness than men in both groups (fearful women M = 40.3, vs. fearful men M = 34.2, $P < 0.001$; reference women M = 42.1 vs. reference men M = 30.8, $P < 0.05$). A correlation analysis among fearful and reference patients verified the relationships among variables. Thus, the strongest correlations were found between CFSS-DS and DAS, and between the two CFSS dimensions (Table 1).

The internal consistency (Cronbach's alpha coefficient) for CFSS-DS and CFSS-SF were satisfactory, 0.85 and 0.86, respectively, for the fearful group.

The fearful patients reported elevated levels of general anxiety according to reference data (HAD-A score M = 11.6, SD = 5.1), while they reported depressed mood in the upper end of the normal range (HAD-D score M = 6.4, SD = 4.2). There were no gender differences in HAD scores. HAD-A correlated with both CFSS-DS ($r = 0.49$, $P < 0.01$) and CFSS-SF ($r = 0.39$, $P < 0.01$).

Table 1. Correlations between group (0 = reference, 1 = fearful patients), sex (0 = male, 1 = female), age, and measures of dental fear (CFSS-DS and DAS) and general fear (CFSS-SF) in a group including 266 patients, both fearful patients (*n* = 230) and the reference group of nonfearful patients (*n* = 36).

	CFSS-DS	CFSS-SF	DAS
Group	0.56***	–0.02	0.71***
Sex	0.15*	0.27**	0.09
Age	0.05	0.04	0.00
CFSS-DS	–	0.46***	0.77***
CFSS-SF	0.46***	–	0.13*
DAS	0.77***	0.13*	–

*$P < 0.05$, **$P \leq 0.01$, ***$P < 0.001$.

In order to investigate the predictive value of age, gender, general anxiety and depressed mood (HAD-A, HAD-D), and general fear (CFSS-SF) on severe DF, a linear regression analyse was performed in the fearful group, with CFSS-DS as dependent variable. General anxiety (HAD-A) was the only predicting variable for DF, and was found to have a low predictive value, similar for both DF measures (data not shown).

To investigate the factor structure of the CFSS-DS, exploratory factor analyses were performed (Table 2). A three-factor solution was decided, after analysing the Kaisers's criterion (eigenvalue > 1), the screen plot, and explicitness of item loadings. This solution explained 68% of the variance. Factor I, accounting for 43.7% of the variance, is characterized by fear of dental treatment, both highly invasive and less invasive procedures. Factor II, accounting for 15.6% of the variance, is characterized by fear of medical treatment. Factor III, accounting for 8.7% of the variance, is characterized by fear of strangers and fear of choking.

Discussion

The present study was designed to investigate whether a scale for assessing DF in children (CFSS-DS) is suitable for use also in an adult population. The scale was tested on adult subjects applying for treatment for severe DF, and on subjects with regular dental care and no severe DF. The subjects with severe DF had as expected high ratings of DF on the well-established adult measures, similar to previous studies of adults with severe DF[28], and they reported high DF on the CFSS-DS similar to studies of children with high DF, while the subjects in the reference group reported low DF on both the CFSS-DS and the established adult DF measure. The CFSS-DS had comparably high correlations with well-established measures of DF in adults, showed both in subjects with severe DF and in the reference group. The CFSS-DS also showed expected agreement with subjects' ratings of

Table 2. Factor analysis of CFSS-DS in the fearful patients (*n* = 230). Component loadings of CFSS-DS according to three factors. Strong factor loadings (> 0.5) in bold.

Factors and items		Rotated factor component loadings		
		I	II	III
Factor I	'Dentistry'			
DS 11	Having somebody put instruments in your mouth	**0.877**	0.122	0.187
DS 4	Having somebody examine your mouth	**0.868**	0.179	0.071
DS 8	The dentist drilling	**0.862**	0.169	–0.038
DS 5	Having to open your mouth	**0.850**	0.138	0.141
DS 10	The noise of the dentist drilling	**0.847**	0.101	0.106
DS 1	Dentists	**0.838**	0.278	–0.019
DS 9	The sight of the dentist drilling	**0.749**	–0.004	0.229
DS 15	Having the nurse clean your teeth	**0.665**	0.032	0.296
Factor II	'Medical care'			
DS 2	Doctors	0.067	**0.873**	0.052
DS 13	Having to go to the hospital	–0.024	**0.838**	0.215
DS 3	Injections (shots)	0.240	**0.703**	–0.007
DS 14	People in white uniforms	0.217	**0.635**	0.264
Factor III	'Fear of strangers, fear of choking'			
DS 7	Having somebody look at you	0.053	0.112	**0.836**
DS 6	Having a stranger touch you	0.197	0.183	**0.794**
DS 12	Choking	0.248	0.371	0.417

general fear, anxiety, and depression, according to previous studies on DF in adults[29,30].

Following that the included scales on DF were designed to measure the same concept, the correlation between the CFSS-DS and the established scales of adult DF might have been expected to be even stronger than found in this study. One possible explanation is that there are differences in the conceptualization of DF between the scales. The scales for adults used in the present study include items on physiological reactions, examples of avoidant behaviour, and anticipation anxiety, areas rarely covered in scales for children. The scale for children used in the present study focus on fear of specific moments in dental treatment (an area that also forms a substantial part of the adult scales); however, the scale also include items on the relation with caregivers, such as having someone very close to you, to be handled by strangers. These social or relational aspects of DF are not covered in the scales for adults. The scale for assessing DF in children also includes items on fear for hospital and doctors. Thus, the 'not even higher' agreement between the CFSS-DS and the adult scales may be due to differences in conceptualization of DF. In the literature of DF in adults, it has been argued that more than one measure of DF should be used, as different measures cover partly different aspects of DF (cognitive–psychological, behavioural, and physiological reactions), and preferably also measures of other psychological reactions[31,32].

In a study of highly DF children, ten Berge *et al*.[17] found a four-factor pattern: (i) fear of general, less invasive aspects of dental treatment; (ii) fear of medical aspects; (iii) fear of drilling; and (iv) fear of strangers (including choking). In the present study of highly DF adult patients, an even stronger factor pattern is found, where all exclusively dental care items form the largest factor, followed by fear of medical treatment items and fear of strangers (including choking, the one item not entirely included in the three-factor model). Compared to the factor analysis reported on children with high DF by ten Berge[17], our model for adult patients with high DF had all items on dental care combined into the largest factor, instead of split into two factors as in ten Berge's study (less invasive and drilling), but otherwise the factor solution and distribution of items are the same. The CFSS-DS scores are almost identical in the two groups, indicating that both studies include subjects with severe DF (ten Berge used parent report for the sample, 4–12 years old).

The results from the present study thus indicate that CFSS-DS as a measure captures aspects of DF not covered in the commonly used adult DF measures, aspects that seem to be relevant in understanding the complexity of DF in adults. The importance of fear for strangers is one such aspect. Moore *et al*. recently investigated the role of embarrassment and social anxiety in a qualitative study of a clinical sample of adults with severe DF[33]. Most subjects reported embarrassment as part of their DF, often interpreted as a side-effect to DF, but 30% reported social anxiety similar to psychiatric criteria for social anxiety disorder.

To conclude, the scale for DF in children investigated in the present study appears suitable to use in studies assessing DF in adult populations. The scale could be useful when designing longitudinal and familial studies of development of DF and dental behaviour management problems. However, this study also indicates that some areas of DF in adults are not covered in the scale for children (physiology, avoidant behaviour, anticipatory anxiety), areas of importance for description of the patient group for clinical and research purposes. Studies of adults using scales for child DF should therefore also include established adult measures of DF.

What this paper adds

- The CFSS-DS has similar distribution and factor structure among both fearful adults and children.
- The CFSS-DS can discriminate between fearful and nonfearful adults.
- Some areas of DF in adults are not covered in the CFSS-DS (physiology, avoidant behaviour, and anticipatory anxiety), whereas CFSS-DS captures aspects of DF not covered in the commonly used adult DF measures (fear for strangers), aspects that seem to be relevant in understanding the complexity of DF in adults.

Why this paper is important to paediatric dentists

- This paper shows that the CFSS-DS may be used in longitudinal studies that predict and follow the development of DF from childhood into adulthood.
- The CFSS-DS may be used to investigate relations between child and parent ratings in family studies.

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