# Dental anxiety and behaviour management problems: The role of parents

Krikken, J.B.

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# Chapter 2

## Is the Inventory of Stressful Situations Predictive for Child Dental Anxiety

JB Krikken

AJ van Wijk

JM ten Cate

JSJ Veerkamp

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## Abstract

*Background*

Adequate assessment of a child's dental anxiety before treatment will enable the dentist to adapt this treatment to the child's needs. Questionnaires to assess dental anxiety typically include questions about dental procedures, which cannot be filled out by parents of young children that lack dental experience. The Inventory of Stressful Situations (ISS) is a questionnaire that can be used to asses anxiety of children in response to daily situations.

*Aim*

To test the psychometric properties of the ISS and to test its predictive value for assessing dental anxiety.

*Methods*

Parents of 344 children filled out the ISS and 343 parents filled out the CFSS-DS on behalf of their child. Responses were subjected to factor analyses and psychometric properties were assessed. Multiple stepwise regression analysis was performed to assess predictive validity for the CFSS-DS.

*Results*

A three-factor structure was found, with a total explained variance of 53.8% of the ISS. The factors could be labelled as "daily nurturance", "invasive experiences" and "new things". Regression analysis showed that approximately 30% of the variance in CFSS-DS score can be explained by the factors "new things" and "invasive experiences".

*Conclusion*

The ISS might be a valuable instrument in the assessment of dental anxiety in young children without dental experience.

## Introduction

Dental anxiety is a common phenomenon in children and can lead to dental behaviour management problems (DBMPs), which is the most common reason for failure of treatment of young children [Pine et al., 2004; McQuistan et al., 2006; Jensma & Veerkamp, 2008]. The aetiology of dental anxiety is multifactorial [Rachman, 1977; King & Ollendick, 1989; Milgrom et al., 1995; Townend et al., 2000]. In the dental situation, DBMPs could be mistaken for dental anxiety. Dental anxiety and DBMP are closely related and are frequently seen together in the same child. This can be confusing and an adequate assessment of the child's dental anxiety before treatment is started will enable the dentist to adapt this treatment to the child's needs.

Anxiety can be assessed using behaviour observations or by using questionnaires. When using observational techniques, it is very difficult to recognize dental anxiety and distinguish it from, for example, pain or movement of the child. Also, observational techniques are very time consuming. Therefore, in a research situation it is easier to use questionnaires for the assessment of dental anxiety. In the research on child dental anxiety, the Child Fear Survey Schedule Dental Subscale (CFSS-DS) is widely used [Cuthbert & Melamed, 1982; ten Berge et al., 1998; Chhabra et al., 2012; Rantavuori et al., 2012; Salem et al., 2012]. This 15-item questionnaire contains questions on general medical situations (for example "how anxious is your child for doctors", "how anxious is your child about having to go to the hospital") and items that are dentist specific (for example "how anxious is your child for dentist", "how anxious is your child for having to open his mouth").

Young children do not have the cognitive capacity to fill out a questionnaire on their own. Therefore, for the assessment of dental anxiety in these children, the report of their parents is used. The majority of parents are adequate reporters of their child's dental anxiety [Klingberg, 1994; Krikken et al., 2012]. The CFSS-DS consists of various dentist specific items. Most of the three to six year old children lack any dental experience. Therefore, the dentist items of the CFSS-DS are difficult to fill out for their parents, thereby weakening the outcome of the proxy report. The use of a structured questionnaire based on day-to-day stressful situations may give the dentist an idea of how the child might react to the new event of dental treatment. This assessment also might help the dentist to identify the children that are at risk of becoming dentally anxious. For this reason the Inventory of Stressful Situations was constructed based on structured interviews about daily stressful situations with mothers of children who were referred for dental treatment [van Hooft et al., 1998; Klaassen et al., 2002]. The aim of the current study is to test the psychometric properties of the Inventory of Stressful Situations and to test its predictive value for assessing dental anxiety.

## Materials and methods

*Subjects and procedure*

This study was conducted among 658 newly referred child patients and their parents of three secondary paediatric dental care clinics in Amsterdam and Haarlem, the Netherlands. All children were referred to these clinics by their family dentist because of their young age, dental developmental disturbances, behaviour management problems, dental anxiety, or a combination of these reasons. The Dental Subscale of the Child Fear Survey Schedule (CFSS-DS) and the Inventory of Stressful Situations (ISS) were filled out by parents at home as a routine before the first intake session at the clinics. The parents were informed about the study and were asked permission to use their questionnaires for the present study.

*Measures*

Dental anxiety was measured using the Dutch version of the Dental Subscale of the Child Fear Survey Schedule (CFSS-DS), a questionnaire with sufficient validity and reliability [Aartman, 1998; ten Berge et al., 1998]. It consists of 15 items to be answered on a 5-point scale ranging from 1 (not afraid at all) to 5 (very afraid), which are summed for a total score (range 15-75). The test includes an additional item where parents are asked to rate their own level of dental fear on the same 5-point scale. Research has resulted in the following classification of scores for Dutch children: a non-clinical range (not anxious, scores below 32), a borderline range (potentially anxious, scores between 32 and 39) and a clinical range (very anxious, scores of 39 and higher) [ten Berge et al., 1998].

Anxiety of children for daily stressful situations was assessed using the Inventory of Stressful Situations (ISS). This questionnaire was constructed after approximately 100 structured interviews with parents whose children were referred to a centre for special dental care [van Hooft et al., 1998]. The parents were asked to answer the question: “Which daily situations are frightening or stressful for your toddler?”. The answers were collected in a long list and reduced to a short list based on frequency. This was the basis for the ISS (Figure 1). Each question was scored using the same 5-points scale as was used in the CFSS-DS, with 1 (not afraid at all) to 5 (very afraid), resulting in a total score that ranges from 16 to 90.

*Data analysis*

Exploratory factor analysis was performed in order to analyze response patterns, and varimax rotation was performed to investigate whether more specific response patterns were present. Standard psychometric characteristics of the ISS were assessed. The independent-samples t-test was used to compare mean scores and the Wilcoxon signed rank test was used to compare dependent measurements of ordinal variables. The Pearson correlation coefficient was used as a measure of linear association, and multiple stepwise regression analysis was performed to assess predictive validity.

| | How anxious is your child about.. | not anxious at all | | | | very anxious |
|---|---|---|---|---|---|---|
| 1 | First time going to school | ○ | ○ | ○ | ○ | ○ |
| 2 | Doctors | ○ | ○ | ○ | ○ | ○ |
| 3 | Injections | ○ | ○ | ○ | ○ | ○ |
| 4 | Cutting hair | ○ | ○ | ○ | ○ | ○ |
| 5 | Washing hair | ○ | ○ | ○ | ○ | ○ |
| 6 | Cutting nails | ○ | ○ | ○ | ○ | ○ |
| 7 | Water | ○ | ○ | ○ | ○ | ○ |
| 8 | New things | ○ | ○ | ○ | ○ | ○ |
| 9 | Insects | ○ | ○ | ○ | ○ | ○ |
| 10 | Swallowing pills | ○ | ○ | ○ | ○ | ○ |
| 11 | Getting nose drops | ○ | ○ | ○ | ○ | ○ |
| 12 | Tapping blood | ○ | ○ | ○ | ○ | ○ |
| 13 | Sleeping over | ○ | ○ | ○ | ○ | ○ |
| 14 | Showering | ○ | ○ | ○ | ○ | ○ |
| 15 | Getting a suppository | ○ | ○ | ○ | ○ | ○ |
| 16 | Sudden noise | ○ | ○ | ○ | ○ | ○ |

**Figure 1.** An overview of the ISS items and the answer scale

## Results

*Descriptive statistics*

Children aged 3-8 years old were included in the study. These were 83.3% of the newly referred children (N=584). Children younger than 3 years old were excluded, because most of their parents were not able to fill out the questionnaires completely. Children older than 8 years old are mostly referred because of specific psychological problems. For that reason, these children were also excluded. The CFSS-DS was returned by parents of 568 children and the ISS by parents of 508 children. Only questionnaires that were filled out completely were used in the analysis. This included 343 CFSS-DS questionnaires, 307 ISS questionnaires, and 229 ISS/CFSS-DS pairs. Mean ages and mean scores on CFSS-DS and ISS are presented in Table 1. No differences in these variables were found between boys and girls. The internal consistency of the CFSS and ISS proved to be adequate. Cronbach's alpha was 0.93 for the CFSS-DS and 0.86 for the ISS.

*Initial analysis*

A significant correlation was found between the CFSS-DS and ISS (Pearson $r=0.65$, $p<0.01$). Two items of the ISS questionnaire were the same as in the CFSS-DS questionnaire. Although the questions "how anxious is your child about doctors" of the CFSS-DS and the ISS were identical, the correlation between them was not perfect. Only strong correlation was

found between them (Spearman r=0.78, p<0.01). This was also found for the item "how anxious is your child about injections" (Spearman r=0.84, p<0.01). On average, scores for "doctors" was significantly higher when filled out in the CFSS (Z=-2.47, p=0.01, 1.99 vs 1.92) compared to the ISS. Also, on average, the item score for "injections" was significantly higher when filled in the CFSS (Z=-3.03, p<0.01, 3.14 vs 3.02). After excluding these two items ("how afraid is your child about doctors", and "how afraid is your child about injections"), the correlation between the CFSS-DS and ISS was lower, but still significant (Pearson r=0.58, p<0.01). After removing these two items, Cronbach's alpha for the ISS was 0.83.

**Table 1.** Mean scores and standard deviations for age in months, CFSS-DS-scores and ISS-scores.

| | Boys | | | Girls | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | mean | *SD* | N | mean | *SD* | N | mean | *SD* |
| Age | 323 | 62.33 | 16.39 | 261 | 62.50 | 16.02 | 584 | 62.41 | 16.21 |
| CFSS-DS | 189 | 34.88 | 11.95 | 154 | 34.89 | 12.31 | 343 | 34.89 | 12.09 |
| ISS | 167 | 29.81 | 8.64 | 140 | 28.74 | 8.63 | 307 | 29.32 | 8.64 |
| ISS subscores: | | | | | | | | | |
| Daily nurturance | 269 | 7.09 | 2.95 | 217 | 6.35 | 2.16 | 486 | 6.76 | 2.65 |
| Invasive experiences | 216 | 10.27 | 3.72 | 186 | 10.03 | 3.78 | 402 | 10.16 | 3.74 |
| New things. | 221 | 4.93 | 1.97 | 202 | 4.67 | 1.82 | 423 | 4.81 | 1.90 |

Age, age of the children presented in months; CFSS-DS, Child Fear Survey Schedule; ISS, Inventory of stressful situations.

The ISS was filled out by parents of 508 children. Only 60% of the questionnaires (N=307) were filled out completely. An overview of the number of missing answers on each question is given in Table 2. Considering that more than 20% of the parents did not fill out question 12 ("How afraid is your child of tapping blood"), this item was also excluded from further analysis, resulting in a total of 344 completely filled out ISS questionnaires. Cronbach's alpha after item reduction was 0.83. The correlation between the ISS and the CFSS-DS after item reduction was still significant (Pearson r=0.51, p<0.01).

**Table 2.** Overview of the number of missing values on the ISS items.

| ISS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Missing | 25 | 10 | 25 | 13 | 2 | 1 | 5 | 22 | 18 | 53 | 38 | 112 | 48 | 3 | 25 | 8 |

ISS, Inventory of stressful situations.

*Factor analysis of the ISS*

To assess the psychometric properties of the ISS, an exploratory factor analysis was performed on the 13 item version of the ISS. This yielded three factors with eigenvalues above 1: 4.42, 1.41 and 1.16 respectively. On the first factor, explaining 34% of the variance, all items

loaded substantially. Only two items had loadings <0.5. The factor analysis pattern after varimax rotation is shown in Table 3.

**Table 3.** Rotated ISS factor matrix.

| | | ISS | | |
|---|---|---|---|---|
| | | Factor I | Factor II | Factor III |
| | Eigenvalue | 2.69 | 2.43 | 1.87 |
| | % total scale variance | 20.7 | 18.7 | 14.4 |
| 1 | First time going to school | 0.198 | -0.011 | **0.818** |
| 4 | Cutting hair | **0.583** | 0.123 | 0.284 |
| 5 | Washing hair | **0.779** | 0.209 | 0.130 |
| 6 | Cutting mails | **0.682** | 0.167 | 0.127 |
| 7 | Water | **0.728** | 0.052 | 0.136 |
| 8 | New things | 0.082 | 0.248 | **0.756** |
| 9 | Insects | -0.002 | **0.724** | -0.055 |
| 10 | Swallowing pills | 0.226 | **0.661** | 0.210 |
| 11 | Getting nose drops | 0.323 | **0.672** | 0.172 |
| 13 | Sleeping over | 0.157 | 0.335 | **0.531** |
| 14 | Showering | **0.676** | 0.206 | -0.022 |
| 15 | Getting a suppository | 0.221 | **0.635** | 0.163 |
| 16 | Sudden noise | 0.121 | **0.556** | 0.330 |

ISS, Inventory of Stressful Situations
Strong factor loadings are printed in **bold** type.

Again three factors with eigenvalues above 1.0 were found. These three factors accounted for 53.8% of the total scale variance. Factor I, accounting for 21% of variance, consists of 5 items. This factor will be labelled “daily nurturance”, because it contains items that describe events that take place at home, such as “washing hair” and “cutting nails”. Factor II will be labelled “invasive experiences” and accounts for 19% of the variance, consisting of 5 items relating to invasive procedures, such as “insects” and “getting nose drops”. Factor III, accounting for 14% of the variance, consists of only 3 items related to new experiences, such as “new things” and “sleeping” over and will be labelled “new things”. The scores on the items that load primarily on one factor (see Table 3) were summed for subscale scores. The internal consistency of these subscales were, given the limited number of items in each scale, in an acceptable range. Cronbach’s alpha was 0.75 for “daily nurturance”, 0.74 for “invasive experiences” and 0.64 for “new things”. Boys scored significantly higher on the subscale daily nurturance, $t(484)=3.12$, $p=0.002$. No differences between boys and girls were found on the other two subscales.

*Regression analysis*

A regression analysis was conducted to predict the CFSS-DS score, using sex, age and

the three subscale scores of the ISS as predictors. Results showed that the model was statistically significant and explained 30.3% of the variance, $F(2,247)=53.8$, $p<0.01$. The second subscale "invasive experiences" and third subscale "new things" of the ISS contributed significantly to the regression equation (Table 4). The variables sex, age and the ISS subscale "daily nurturance" did not significantly contribute to this regression equation.

**Table 4.** Multiple stepwise regression analysis with CFSS-DS score as criterion.

| Step | R | $R^2$ | β | SE | p | t | Predictor |
|---|---|---|---|---|---|---|---|
| 1 | 0.54 | 0.29 | 0.54 | 10.24 | 0.00 | 9.98 | Invasive experiences |
| 2 | 0.55 | 0.30 | 0.45<br>0.16 | 10.24<br>10.14 | 0.00<br>0.01 | 7.14<br>2.47 | Invasive experiences<br>New things |

R, multiple correlation; $R^2$, percentage explained variance on criterion; β, standard b coefficient; SE, standard error estimate; p, significance of coefficient.



## Discussion

The aim of this study was to test the psychometric properties of the Inventory of Stressful Situations and to test whether it can be used to predict dental anxiety. The items "doctors" and "injections" were present in both the CFSS-DS and the ISS. Leaving these items in the ISS would increase the correlation (and explained variance) between ISS and CFSS-DS, not as a result of a strong conceptual association, but simply because both questionnaires contain the same items. Therefore, these items were removed for subsequent analysis. The number of missing responses for another item (tapping blood) was quite large. This item was also excluded because the vast majority of parents were not able to answer that item, rendering it useless. Apparently, the majority of these young healthy children never experienced this the procedure of tapping blood. Factor analysis of the answers to the remaining 13 items of the ISS resulted in three clear factors. The first factor is related to several aspects of daily home care and may be described as "daily nurturance", such as "washing hair" and "cutting nails". The second factor is related to things that can threaten the child's integrity and may be defined as "invasive experiences", such as "swallowing pills" and "insects". The third factor consists of items that can be described as "new things", such as "first time going to school" and "sleeping over". Multiple regression analysis showed that the subscales "invasive experiences" and "new things" together account for 30.3% of the variance in CFSS-DS score. The subscale "daily nurturance" did not add to the equation.

The subscales of the ISS found in this study consist only of 3 or 5 items, which is insufficient for adequate (i.e. reliable and valid) measurement. However, the Cronbach's alphas of the three subscales were, given the limited number of items, in an acceptable range. Generalising more items, related to the content of these subscales will certainly improve internal consistency, and possibly also the value of the ISS in predicting dental anxiety. The first factor, which was labelled "daily nurturance" explained most of the variance of ISS scores, but did not significantly contribute to the regression equation. Based on the character of the items in this factor, one

might expect that this subscale would be a predictor for dental anxiety. That is, all these items concern compulsory activities at home and involve some kind of control issue. It may be obvious that having to undergo dental treatment is a comparable situation.

Children younger than 3 years old and children older than 8 years old were excluded from this study. Children younger than 3 years old were excluded because most parents of these children were unable to fill out most of the CFSS-DS and ISS items, because most children have not experienced things like “first time going to school” (ISS) and “having the nurse clean your teeth” (CFSS-DS) yet. Also, for the treatment of these young children, most times sedative techniques are used, rather than behaviour guidance strategies. As such, the prediction of the dental anxiety of these children will not be of much importance. The majority of the children above 8 years old were referred because of specific psychological problems, such as needle phobia or severe dental phobia. These children were excluded from the study, because children of this age are able to fill out a questionnaire themselves.

Many questionnaires were not completely filled out and could not be used in the analysis. The questionnaires were filled out by parents at home prior to the first visit at the clinic. As such, the questionnaires were not checked, so parents could easily skip a question when they did not know an answer, or did not understand the question. Moreover, in the present sample, a majority of the children were from non-western cultural background and a large number of their parents lacked sufficient knowledge of the Dutch language to fill out the questionnaires. Adding to this, many parents in this sample were illiterate or not able to read or write in Dutch.

The questions “how afraid is your child about doctors” and “how afraid is your child about injections” scored significantly higher when it was answered in the CFSS-DS than in the ISS. Possibly, these two items scored higher in the CFSS-DS, because parents feel that it is more important in that context. Also the tendency for higher scores on the other items of the CFSS-DS might have increased the scores.

With the present version of the ISS, about 30 percent of variance on CFSS-DS scores could be explained, which is promising as knowledge of a child’s dental anxiety prior to treatment is valuable. To improve the internal consistency, reliability and predictive value of the ISS subscales, items should be generated that correspond to the content of the subscales found in the present study. This will increase the range of the subscales, create more dispersion in the data, and can possibly improve the predictive power of the ISS. Given the non-response and non-representativeness of the present sample for the population of Dutch children, the best approach would be to generate additional items and to add these to the 16 items described in the present study. This new version of the ISS could then be tested in a different sample. By doing so, it can be assessed whether the present findings can be reproduced, whether the new items add to the robustness of the subscales found and if this results in improved predictive power for the ISS subscales with respect to dental anxiety and behaviour management problems.

## References

Aartman IH. Reliability and validity of the short version of the Dental Anxiety Inventory. Community Dent Oral Epidemiol 1998; 26(5): 350-354.

Chhabra N, Chhabra A, and Walia G. Prevalence of dental anxiety and fear among five to ten year old children: a behaviour based cross sectional study. Minerva Stomatol 2012; 61(3): 83-89.

Cuthbert MI and Melamed BG. A screening device: children at risk for dental fears and management problems. ASDC J Dent Child 1982; 49(6): 432-436.

Jensma MA and Veerkamp JS. [Treatability of children according to Dutch dentists]. Ned Tijdschr Tandheelkd 2008; 115(8): 420-422.

King N.J. and Ollendick T.H. Children's anxiety and phobic disorders in school settings: classification, assessment, and intervention issues. Rev Educ Res 1989; 59: 431-470.

Klaassen MA, Veerkamp JS, Aartman IH, and Hoogstraten J. Stressful situations for toddlers: indications for dental anxiety? ASDC J Dent Child 2002; 69(3): 306-9, 235.

Klingberg G. Reliability and validity of the Swedish version of the Dental Subscale of the Children's Fear Survey Schedule, CFSS-DS. Acta Odontol Scand 1994; 52(4): 255-256.

Krikken JB, van Wijk AJ, ten Cate JM, and Veerkamp JS. Measuring dental fear using the CFSS-DS. Do children and parents agree? Int J Paediatr Dent 2013; 23(2): 94-100.

McQuistan MR, Kuthy RA, Daminano PC, and Ward MM. General dentists' referrals of 3- to 5-year-old children to pediatric dentists. J Am Dent Assoc 2006; 137(5): 653-660.

Milgrom P, Mancl L, King B, and Weinstein P. Origins of childhood dental fear. Behav Res Ther 1995; 33(3): 313-319.

Pine CM, Adair PM, Burnside G, Nicoll AD, Gillett A, Borges-Yanez SA, Broukal Z, Brown J, Declerck D, Ping FX, Gugushe T, Hunsrisakhun J, Lo EC, Naidoo S, Nyandindi U, Poulsen VJ, Razanamihaja N, Splieth C, Sutton BK, Soo TC, and Whelton H. Barriers to the treatment of childhood caries perceived by dentists working in different countries. Community Dent Health 2004; 21(1): 112-120.

Rachman S. The conditioning theory of fear-acquisition: a critical examination. Behav Res Ther 1977; 15(5): 375-387.

Rantavuori K, Tolvanen M, and Lahti S. Confirming the factor structure of modified CFSS-DS in Finnish children at different ages. Acta Odontol Scand 2012; 70(5): 421-425.

Salem K, Kousha M, Anissian A, and Shahabi A. Dental Fear and Concomitant Factors in 3-6 Year-old Children. J Dent Res Dent Clin Dent Prospects 2012; 6(2): 70-74.

Ten Berge M, Hoogstraten J, Veerkamp JS, and Prins PJ. The Dental Subscale of the Children's Fear Survey Schedule: a factor analytic study in The Netherlands. Community Dent Oral Epidemiol 1998; 26(5): 340-343.

Townend E, Dimigen G, and Fung D. A clinical study of child dental anxiety. Behav Res Ther 2000; 38(1): 31-46.

Van Hooft MJM, Veerkamp JS, and ten Berge M. Stressful situations for a young child; Predictors for dental anxiety? Eur J Paediatr Dent 1998; April (Abstract of oral and poster presentation)(80): 64.