CHAPTER 3.1

THE DENTAL SUBSCALE OF THE

CHILDREN'S FEAR SURVEY SCHEDULE:

A FACTOR ANALYTIC STUDY IN THE NETHERLANDS

Abstract

The Dental Subscale of the Children's Fear Survey Schedule (CFSS-DS) is a well-known instrument for assessing dental fear in children. Previous studies have shown that the scale has acceptable reliability and validity. Factor analysis using scores of a group of Finnish schoolchildren resulted in three factors. No other data on the factor structure have been published. In order to report on the factor structure of the Dutch parental version of the CFSS-DS, the present study was undertaken. Factor analysis using scores of a group of Dutch children (n=150) demonstrated a factor pattern fairly similar to the results found in the Finnish study. Three factors were found: 1) fear of highly invasive dental procedures, 2) fear of less invasive aspects of treatment and 3) fear of medical aspects. Considering that almost all items load substantially (≥ .20) on more than one factor, it seems that one primary underlying dimension concerns exists: fear of invasive treatment aspects. The CFSS-DS is proposed as a reliable, one-dimensional measure of dental fear.

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Introduction

The Dental Subscale of the Children’s Fear Survey Schedule (CFSS-DS) is a well-known instrument for assessing dental fear in children, developed in 1982 (Cuthbert & Melamed, 1982). It is used to register differences in dental fear between experimental groups and control groups (Klingman, Melamed & Cuthbert, 1984; Melamed, Hawes, Heiby & Glick, 1975; Melamed, Weinstein, Hawes & Katin-Borland, 1975), to select fearful and non-fearful children from a larger reference population (Klingberg, Berggren & Noren, 1994; Klingberg, Vannas Löfqvist & Hwang, 1995) and to estimate the prevalence of dental fear in children (Chellappah, Vignesha, Milgrom & Lo, 1994; Milgrom, Mancl, King & Weinstein, 1995). The scale consists of 15 items related to various aspects of dental treatment.

The psychometric characteristics of the scale have been studied in several countries. Normative data have been reported for US, Singaporean, Swedish, Finnish and Chinese populations (Alvesalo, Murtomaa, Milgrom, Honkanen, Karjalainen & Tay, 1993; Chellappah et al., 1990; Cuthbert & Melamed, 1982; Klingberg, 1994; Klingberg et al., 1994; Milgrom et al., 1995; Milgrom, Jie, Yang & Tay, 1994). Both the internal reliability and the test-retest reliability of the scale have proved satisfactory (Alvesalo et al., 1993; Klingberg, 1994; Klingman et al., 1984). The scale has also demonstrated acceptable validity measured by such constructs as behavioural and other self-report measures of dental fear (Cuthbert & Melamed, 1982; Klingberg, 1994; Klingberg et al., 1995; Klorman, Ratener, Arata, King & Sveen, 1978; Melamed, Yurcheson, Fleece, Hutcherson & Hawes, 1978; Milgrom et al., 1994, 1995). However, little research has been done on factors accounting for variance of dental fear. In a Finnish study, factor analysis resulted in three factors accounting for 54% of the scale variance (Alvesalo et al., 1993). These factors were defined as 1) fear of highly invasive procedures, 2) fear of potential ‘victimisation’ and 3) fear of less invasive procedures. The authors claim that, in a comparable unpublished study in the United States, four factors were found, with the initial second factor split into two separate factors (fear of choking and injections and fear of strangers). Since the results indicate that the subscale is a useful instrument in the research of dental fear in children, further factor analysis will be needed to determine which aspect accounts for the strongest part of dental fear in Dutch children. Therefore, the aim of the present study was to report on the reliability and the factor structure of the Dutch version of the CFSS-DS. In addition, the results will be compared with the results found in an earlier study (Alvesalo et al., 1993).
Material and methods

This study was conducted among 150 children, treated in a private dental practice in Amsterdam. Most of the children were regular dental patients of the practice. Over a 4-month period, the parents of all children between 4 and 12 years of age were asked to participate by completing the CFSS-Ds on behalf of their children, since the younger children were not able to complete the questionnaire by themselves. Only parents who were able to understand and complete the questionnaire on their own were selected to participate in this study. It should be added that research has shown that parents are quite able to assess their child’s dental fear (Milgrom et al., 1994). The mean age of the children was 7.5 years (SD 2.1, range 4-11) and the group consisted of 85 boys and 65 girls. The children were treated by two different dentists, each with at least 10 years’ experience in treating fearful children. To obtain a valid instrument for measuring dental fear in the Netherlands, a Dutch two-way translation of the scale was made. The questionnaire was completed in the waiting room of the dental practice, during or before treatment. The CFSS-DS is a 5-point Likert-scale and consists of 15 items, each item scoring from 1 (not afraid) to 5 (very afraid). Total scores thus range from 15 to 75. The scale was designed to be completed by one of the parents; in almost all cases this was the mother.

Data analysis

To test the internal consistency of the Dutch translation of the scale, reliability analysis (alpha) was performed (Cronbach, 1990). To assess the factor structure, factor analysis (principal components, varimax rotation) was employed (Alvesalo et al., 1993; Cronbach, 1990). Factor analysis uses the correlations between items on a scale as the basis to determine whether subsets of items exist that might relate to each other strongly, even though all scale-items are related to the general concept of interest. Factor scores above 0.5 indicate a strong loading on a particular subset of items. The strength of these subsets of items is usually represented in eigenvalues indicating which factors, or subsets of items, account for the strongest part of the total scale variance. Eigenvalues above 1.0 are considered strong enough to be taken into account.

Results

The mean total CFSS-DS score is 27.0 (SD 9.7, range 15-61). No significant differences in total fear scores between boys and girls were found nor was a relationship between total fear score and age found. In the Finnish study, the mean total score was 22.1. No relationship was found between age and total score, whereas gender and total score were found to be related; girls had higher fear scores than boys.
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Reliability of the CFSS-DS

The internal consistency of the Dutch parental version of the CFSS-DS proved to be good: Cronbach’s alpha was 0.90. In the Finnish study, Cronbach’s alpha was 0.85.

Factor analysis

The first solution of a principal components analysis yielded three factors with eigenvalues above 1.0: 7.19, 1.43 and 1.13 respectively. On the first factor, explaining 48% of the variance, all items loaded substantially. Only two items had loadings < 0.62. The factor analysis pattern after varimax rotation of the Dutch version of the CFSS-DS is shown in Table 1.

Table 1. Rotated CFSS-DS factor matrix for Dutch children (parent’s version) and Finnish children.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Dutch CFSS-DS</th>
<th>Finnish CFSS-DS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Factor I</td>
<td>Factor II</td>
</tr>
<tr>
<td></td>
<td>7.19</td>
<td>1.43</td>
</tr>
<tr>
<td>% total scale variance</td>
<td>48.0%</td>
<td>9.5%</td>
</tr>
<tr>
<td>1. Dentists</td>
<td>.721*</td>
<td>.468</td>
</tr>
<tr>
<td>2. Doctors</td>
<td>.384</td>
<td>.638</td>
</tr>
<tr>
<td>3. Injections (shots)</td>
<td>.465</td>
<td>.446</td>
</tr>
<tr>
<td>4. Having somebody examine your mouth</td>
<td>.538</td>
<td>.608</td>
</tr>
<tr>
<td>5. Having to open your mouth</td>
<td>.477</td>
<td>.572</td>
</tr>
<tr>
<td>6. Having a stranger touch you</td>
<td>.109</td>
<td>.618</td>
</tr>
<tr>
<td>8. The dentist drilling</td>
<td>.840</td>
<td>.182</td>
</tr>
<tr>
<td>9. The sight of the dentist drilling</td>
<td>.824</td>
<td>.146</td>
</tr>
<tr>
<td>10. The noise of the dentist drilling</td>
<td>.786</td>
<td>.110</td>
</tr>
<tr>
<td>11. Having somebody put instruments in your mouth</td>
<td>.779</td>
<td>.288</td>
</tr>
<tr>
<td>12. Choking</td>
<td>.105</td>
<td>.055</td>
</tr>
<tr>
<td>13. Having to go to the hospital</td>
<td>.211</td>
<td>.582</td>
</tr>
<tr>
<td>14. People in white uniforms</td>
<td>.211</td>
<td>.764</td>
</tr>
<tr>
<td>15. Having the nurse clean your teeth</td>
<td>.695</td>
<td>.453</td>
</tr>
</tbody>
</table>

*Strong factor loadings are printed in bold type.

Again three factors with eigenvalues above 1.0 were found. These three factors accounted for 65% of the total scale variance. Factor I, accounting for 48% of the variance, consists of items relating to highly invasive dental procedures, such as ‘drilling’ and ‘injections’. Factor II, accounting for 9.5% of the variance, consists of items relating to less invasive procedures and items relating to strangers, such as ‘having somebody examine your
The CFSS-DS: factor analysis in the Netherlands

mouth', 'having to open your mouth' and 'having a stranger touch you'. Factor III, accounting for 7.5% of the variance, consists of items related to general medical aspects of treatment, such as 'choking' and 'having to go to the hospital'. Factor analysis using the scores of boys and girls separately resulted in similar factor patterns. For girls four factors were found, with the initial second factor divided in two, i.e., one factor is related to less invasive dental procedures and the other factor is related to strangers. For boys factor analysis resulted in the same three factors as for the total group.

Discussion

Factor analysis of the Dutch parental version of the CFSS-DS resulted in three factors. The first is related to several specific dental procedures and may be defined as 'fear of highly invasive dental procedures'. The second factor is related to more general aspects of dental treatment, including items related to less invasive dental procedures as well as to items related to strangers and may be defined as fear of 'less invasive aspects of dental treatment'. The third factor consists of the items 'having to go to the hospital' and 'choking' and may be defined as 'fear of medical aspects'. These results suggest that in the present study the highly invasive dental procedures account for the strongest part of dental fear. Two other constructs, i.e., 'fear of less invasive aspects of dental treatment' and 'fear of medical aspects', were found to be part of the concept dental fear, but account for a less prominent part of the variance.

Further inspection of the factor analytical results before and after varimax rotation, however, not only shows that almost all items load substantially on the first or second factor but that in fact many items load (>0.20) on more than one factor. This indicates a somewhat weak factor structure and it is suggested that the CFSS-DS essentially measures a primary, one-dimensional concept of dental fear which may be defined as 'fear of invasive treatment aspects'.

Close inspection of the factor pattern found in the Finnish study again shows that almost all items (except item 5) load on more than one factor (Alvesalo et al., 1993). The factor structure of the Dutch version of the CFSS-DS, therefore, proved to be fairly comparable to that found in the Finnish study, in spite of differences in populations and methods used in the studies. In the first place, there was a difference in the mean age of the children: in the present study the children were significantly younger than in the Finnish study (mean 7.5 vs 13 ± 1 years). Second, in the Finnish study children in grades 6 and 7 of a public school were asked to complete the questionnaire in the classroom, while in the present study, the questionnaire was completed by one of the child's parents before or during dental treatment, in the waiting room of the dental practice. Despite these
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differences in populations and methods similar results were found in both studies, indicating that the CFSS-DS has a stable factor pattern.

In conclusion, it seems that the internal structure of the Dutch parental version of the CFSS-DS is reliable and stable and that the scale generally operates in the same way in the Netherlands as it does in other countries, irrespective of the children's age, situational or cultural factors. In addition, the children's self-reports from the Finnish study (Alvesalo et al., 1990) have generated similar results to the parent's reports in the present study. This indicates that parents may be well able to assess their child's fear, using the parent's version of the CFSS-DS, as also suggested in a previous study (Milgrom et al., 1994). The conclusion that the CFSS-DS essentially measures one underlying concept of dental fear seems to be justified, but the question arises whether it operates in the same way in a population consisting specifically of highly fearful children. Further research and confirmatory factor analysis will be needed to establish the factor structure of dental fear as assessed by the CFSS-DS in highly fearful children or in other more specific populations. In addition, research in a larger population of children will be needed to further explore the indications of possible gender differences found in this study.
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References


