A short-term follow-up of treatment outcome in groups of uncooperative child dental patients

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ABSTRACT. Aim To evaluate the short-term follow-up outcome in four subgroups of uncooperative child dental patients referred to a specialist paediatric dental clinic in Sweden. Methods Seventy children, classified into four groups (based on fear, temperament, behaviour and verbal intelligence), were followed-up at their public dental clinics after termination of specialist dental treatment. Questionnaire assessments of children’s dental and general fear, parental dental fear, emotional stress, locus of control and parenting efficacy were made by parents pre and post treatment and at follow-up and were analysed within and between groups. At follow-up, parents rated their children’s coping and procedure stress, while treatment acceptance was rated by the dentists. Results Decreases in child dental fear were maintained at follow-up, although a third of children still had moderate or high dental fear. For those children who had been classified into the externalising, impulsive group, an increased risk of non-acceptance (RR=3.7) was indicated. The risk of dental fear at follow-up was increased for the group of fearful, inhibited children (RR=3.8). For the study group as a whole a poorer follow-up outcome could be predicted by avoidance behaviour (OR 12.9-16.6) and moderate or high post treatment dental fear (OR 6.5-21.3). Conclusions Fearful, inhibited child dental patients may need, due to dental fear, extra attention even after successful dental treatment at a specialist clinic. Externalising, impulsive children constitute a special challenge for dentistry. The continued need for adjusted management after termination of specialist treatment can be predicted from avoidance behaviour and post treatment dental fear scores.

KEYWORDS: Dental fear, Behaviour management problems, Personality characteristics.

Introduction

Dental behaviour management problems (DBMP) are among the most frequent reasons for referral to specialised paediatric dentists. DBMP refer to a clinically significant lack of cooperation, or disruptive patient behaviour, in the dental treatment situation. These patients are, at referral, often in need of substantial dental treatment and thus they are highly time-consuming. Although clearly related to dental fear, a distinction between DBMP and dental fear among children has been pointed out in a Swedish population study where the phenomena were only partially associated [Klingberg, 1995]. Of children showing DBMP in the dental situation, 27% had dental fear as assessed by their parents.

Children’s DBMP and/or dental fear are best construed within a multifactorial context of personal, environmental or situational factors [Milgrom et al., 1995; Klingberg and Raadal, 2001]. Focusing on personal factors, DBMP or dental fear have been variously related to child development (i.e. age) [Holst and Cressner, 1987; Klingberg et al., 1995], intelligence [Toledano et al., 1995] and general fearfulness [Klingberg et al., 1995; Milgrom et al., 1995; Klingberg et al., 1999]. Relationships with shyness [Klingberg and Broberg, 1998], a temperament of negative mood or emotionality [Liddell 1990; Klingberg and Broberg, 1998] and general emotional or behavioural problems [Raadal et al., 1995; ten Berge et al., 1999] have also been pointed out.

Following a person-based approach (cluster analyses), we identified in a previous study [Arnrup et al., 2002] four subgroups with different profiles of fear and other personal characteristics (temperament, behaviour and verbal intelligence) among 4-12 year old children referred for specialised paediatric dentistry.
because of DBMP. A small group of children had an externalising and impulsive behaviour profile, attention problems, indications of a lower verbal intelligence level, but only moderate dental fear. Two groups were highly fearful, but different in temperament and behaviour. One group (non-deviant in temperament and behaviour) was fearful, extrovert, outgoing, while children in the other group were shy and had an internalising behaviour, thus forming a fearful, inhibited profile. The remaining children, who formed a cluster with the lowest values on dental and general fear, non-deviant temperament and behaviour, were labelled non-fearful, extrovert, outgoing. A validation procedure revealed group differences in concomitant factors indicating a possible relationship with earlier negative dental experiences possibly complicated by general problems in this non-fearful, extrovert, outgoing group [Arnrup et al., 2003].

In the fearful, extrovert, outgoing group, the highest levels of parental dental fear and parental emotional stress were found, while no additional contributory factors were identified in the fearful, inhibited group. The small group of externalising, impulsive children was characterised by a number of concomitants, giving a picture of a multi-problem situation.

Within paediatric dentistry, treatment aimed to cure dental fear or to deal with DBMP is usually based on behavioural management techniques including “tell-show-do”, gradual exposure and positive reinforcement [Berggren et al., 2003]. These behavioural approaches can be used alone or in combination with pharmacological sedation, often by inhalation of nitrous oxide/oxygen. The use of sedation offers an easier way to relaxation and may thus facilitate acceptance. Two 5-year follow-ups of specialist treatment of Swedish children, referred because of DBMP, have reported overall success rates of about 80% for behaviour management techniques, if needed combined with nitrous oxide/oxygen sedation [Holst and Crossner, 1984; Varpio and Wellfelt, 1991]. In one of these studies there was a clear age effect, with higher success rates for younger children [Varpio and Wellfelt, 1991].

It may be presumed, due to the heterogeneity within the actual patient group, that children with different problem profiles would differ in success, and also need different modes of treatment. Studies of fearful child dental patients in Amsterdam indicate that children with internalisation problems need extra attention in the dental treatment situation, and they presented with relatively high dental fear scores even after treatment at a specialist clinic [ten Berge, 2001].

In our previous exploratory study among the referred DBMP children, the immediate post-treatment outcome for an ad hoc individualised treatment based on behaviour management techniques, alone or in combination with nitrous oxide/oxygen sedation, showed an overall success rate of 90% [Arnrup et al., 2003]. A lower success rate was found in the group of externalising, impulsive children. The parents of these children, however, seemed to benefit from the treatment, which was indicated by lower ratings of emotional stress and higher ratings of their own sense of control. There was also better parenting efficacy post treatment compared with pre treatment, giving the possibility of a positive development in child behaviour at follow-up.

The principal goal of the treatment was to make it possible for children to manage future dental treatment at their ordinary public dental clinics. Therefore, evaluation of the outcome of our ad hoc individualised treatment, measured as the children’s maintenance of their treatment capacity, must include at least one follow-up session at the public dental clinic. The primary aim of the present study was thus to evaluate the short-term follow-up treatment outcome in four groups of children, referred because of DBMP and treated at a specialist paediatric dental clinic. A second aim was to determine to what extent child age, avoidance behaviour and post-treatment dental fear scores were related to the follow-up outcome. Due to the relatively small sample size this analysis could only be performed for the study group as a whole, i.e. with no consideration of the effect of the four heterogeneous subgroups.

**Material and methods**

**Subjects and procedures.** The subjects of the present investigation were 81, 4-12 year old children, referred because of DBMP and treated at the specialist paediatric dental clinic in Örebro, Sweden as reported previously [Arnrup et al., 2003]. The children had been retrospectively classified into 4 subgroups, which were based on fear, temperament, general behaviour and verbal intelligence [Arnrup et al., 2002]. The age and gender distributions in the different subgroups are shown in Table 1. Avoidance behaviour in terms of missed appointments (20 children) and/or permanent discontinuation (5 children) of the treatment period had been recorded for 22 children (27%) [Arnrup et al., 2003]. Post-treatment, 25 children had been assessed by their parents as still having moderate or high dental fear.

Two children from the externalising, impulsive group had been treated under general anaesthesia. Four additional children (one from each group) were still cared for at the specialist paediatric dental clinic. Four
children were repeatedly scheduled at the public dental clinic but never showed up, and for another child no report from the clinic was received, leaving 70 children (30, 18, 15 and 7 respectively) for follow-up at public dental clinics. There was a higher proportion of boys among those (n=11) not included in the follow-up and parents reported higher own dental fear. The median length of the total observation period was 597 days (range 357-1385), with a median interval from treatment to follow-up of 383 days (range 160-849), without differences between groups.

Parental questionnaires were answered at baseline, at treatment completion (post-treatment) and after the follow-up visit(s). Follow-up protocols and information were sent to the ordinary dentists at public dental clinics in due time before the planned visit(s). Approval by the Research Ethics Committee of Örebro County Council was obtained before the study. All child/parent pairs gave their informed consent to inclusion.

Repeated psychometric measures. Children’s dental fear was assessed using a Swedish parental version of the 15-item Dental Subscale of the Children’s Fear Survey Schedule (range 15-75) [Klingberg, 1994]. Scores of 38 and above have been used as indicative of dental fear [Klingberg, 1994; Klingberg et al., 1994a]. It has recently also been suggested that scores of 32-39 may represent a borderline area for dental fear [ten Berge et al., 2002]. When dichotomised, we have in the present report used the level of ≥32 for moderate or high dental fear. For assessments of general fear, a Swedish version of the Short Form (18 items; range 18-90) of the Children’s Fear Survey Schedule was used [Klingberg et al., 1994a].

Parental dental fear was assessed by Corah’s Dental Anxiety Scale (range 4-20). The parents also rated their own feelings of emotional stress (5 items; range 0-15) in sequential situations related to dental appointment and treatment for the child [Arnrup et al., 2003]. To measure parents’ sense of control relevant to their children’s dental behaviour management problems, we used a modified version (8 items; range 8-40) [Hagekull et al., 2001; Arnrup et al., 2003] of the parental locus of control scale developed by Campis et al. [1986]. High scores correspond to an internal locus of control. Parents’ perceived ability to influence their children’s behaviour was measured by a modified version (7 items; range 7-35) of Freedman-Doan’s parenting efficacy questionnaire [Freedman-Doan et al., 1995; Arnrup et al., 2003].

Treatment protocols. Treatment mode at the specialist paediatric dental clinic was recorded as the use of behaviour management techniques alone or in combination with the integrated use of nitrous oxide/oxygen sedation. Avoidance behaviour (yes/no) was indicated by the occurrence of missed appointments at the specialist paediatric dental clinic and/or permanent discontinuation of the treatment period.

At follow-up, the actual need of treatment was recorded by the general dentists as: examination only, preventive treatment, fillings, extractions, or other treatment, and was in the analyses dichotomised as need of operative treatment (use of injection and/or drilling) or not.

Ratings of acceptance were made according to a modified version [Holst and Crossner, 1987] of Frankl’s behaviour rating scale for assessments of the children’s behaviour during treatment. Acceptance was recorded by the general dentists at each follow-up visit for a set of 8 treatment steps [Arnrup et al., 2003] on 4-point scales from 0 = no acceptance to 3 = positive acceptance as defined by Holst and Crossner [1987]. Acceptance for each treatment step, if introduced, was dichotomised as non-acceptance (score 0-1) or acceptance (score 2-3), and the occurrence of any non-acceptance during follow-up was recorded.

<table>
<thead>
<tr>
<th>Child age and gender</th>
<th>Boys</th>
<th>Girls</th>
<th>Boys</th>
<th>Girls</th>
<th>Boys</th>
<th>Girls</th>
<th>Boys</th>
<th>Girls</th>
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<tr>
<td>N</td>
<td>17</td>
<td>17</td>
<td>9</td>
<td>11</td>
<td>5</td>
<td>12</td>
<td>6</td>
<td>4</td>
<td>37</td>
<td>44</td>
</tr>
<tr>
<td>Mean age in years</td>
<td>8.0</td>
<td>8.0</td>
<td>8.8</td>
<td>8.5</td>
<td>8.9</td>
<td>9.4</td>
<td>8.8</td>
<td>6.8</td>
<td>8.4</td>
<td>8.4</td>
</tr>
<tr>
<td>SD</td>
<td>2.4</td>
<td>1.7</td>
<td>1.6</td>
<td>2.4</td>
<td>2.7</td>
<td>2.5</td>
<td>1.7</td>
<td>1.5</td>
<td>2.1</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Table 1 - Sample characteristics by subgroup.
Outcome key measures. Considering that the reason for referral of the children in the study group was DBMP, the most relevant long-term outcome variable ought to be the occurrence of non-acceptance. Also, the follow-up levels (moderate or high) of child dental fear should be considered relevant to the fear aspect of DBMP.

In addition, parental ratings of procedure stress and children’s coping at follow-up were chosen as important outcome variables. Procedure stress (yes/no) was assessed by the accompanying parent on one item asking if there was anything in the treatment that was difficult for the child. Children’s coping was scored from very poor (1) to very good (5), with score 3 as neither good nor poor on one item: “How did your child manage the latest visit to the general dentist?”. In the analyses, children’s coping has been dichotomised as good (score 4-5) or insufficient (score 1-3).

Statistical analyses. Analyses of differences between the four groups were tested with Fisher’s exact test as it concerns nominally scaled variables. To introduce a multivariate perspective and to obtain clinically meaningful outcome parameters, we used binomial regression analyses with the estimation of Relative Risk (RR), supplemented with 95% Confidence Intervals.

Scaled outcome variables and their progress over time were illustrated by graphs (Fig. 1) and analysed using an ANOVA model with repeated measurements. This analysis allowed estimation of a group factor (4 levels), a time factor (3 time-points) and an interaction factor between group and time. The latter factor is the primary effect parameter since significant interaction shows that the four groups have different progress over time. With a non-significant interaction, the focus is on the time and group factors.

Bivariate relationships (data not shown) were estimated by Cramer’s C coefficient (categorical variables) or Spearman’s rank-order correlation coefficient (ordinarily scaled variables). Logistic regression analysis was used in multivariate analyses with the outcome key measures as the dependent variables. To adjust for treating dentist and treatment mode at the specialist clinic, these variables were forced to enter the models. Other variables were entered in a stepwise manner following a forward conditional selection procedure, until a combined set of prognostic measures was defined, and then entered in the final models.

The level of statistical significance was set at 5%, i.e. P<0.05. However, in view of the exploratory character of the study and the limited sample size, resulting in low power and a high risk of type II errors, the focus is placed on estimates and tendencies. Therefore, statistically non-significant results of potential clinical impact are also reported and discussed.

Fisher’s exact tests and calculation of Cramer’s C coefficient were performed using the StatXact statistical package version 5.0.3, both computations with algorithms specially adapted for small samples. Binomial regression analyses were carried out using the STATA package, version 7. ANOVA with repeated measurements was done as a MIXED model in the SAS program, version 8.1. All other statistical analyses were done by SPSS version 11.0.

Results

Follow-up outcome by group. After treatment at the specialist paediatric dental clinic, 70 children were seen for follow-up at their public dental clinics. The mean number of visits at follow-up was 1.8 (median 1; range 1-5), similar between groups. Twenty-seven children (39%; no differences between groups) were in need of operative treatment. Among children in need of operative treatment at follow-up, four had received only partial dental treatment at the specialist clinic, and two had discontinued their treatment.

Non-acceptance was recorded for 12 children (valid n=62), seven of whom were among those in need of restorative treatment. Thus, non-acceptance was recorded for 14% of the children without operative treatment need, and for 28% of the children with operative treatment need (P=0.20). For children in need of operative treatment, the non-acceptance occurred mainly in operative treatment steps, such as injection or drilling and filling, while the acceptance of examination procedures did not differ from that of other children. The group frequencies of non-accepting children varied from 12% to 43% (highest for externalising, impulsive children; Table 2), but group differences were not significant.

A third of the parents reported their child to be stressed by the follow-up examination and/or treatment procedures. Ratings of procedure stress were most frequent in the fearful, extrovert, outgoing and fearful, inhibited groups (38%; Table 2). Most parents (76%) rated their children’s coping with the dental treatment at follow-up as good, while 24% assessed their children’s coping as insufficient. The highest proportion of insufficient coping (38%; Table 2) was found in the fearful, extrovert, outgoing group.

For 21 children (34%; valid n=61), the follow-up level of dental fear was within the moderate or high range, with the highest frequency (60%; Table 2) in the fearful, inhibited group. The relative risks by group (adjusted for treating dentist at the specialist clinic) for non-acceptance, procedure stress, insufficient coping and
moderate or high dental fear at follow-up are shown in Table 3.

In summary, children with a fearful profile (in particular fearful, inhibited) at baseline were more often reported to have moderate or high dental fear at follow-up. Externalising, impulsive children showed a (non-significantly) higher frequency of non-acceptance than other groups.

Changes in psychometric measures by time and group. The previously reported [Arnrup et al., 2003] decrease in child dental fear remained stable during the follow-up period, as shown in Figure 1. For the group of 68 children available for repeated measurements analyses, the dental fear mean score at baseline was 36.4, followed by 28.1 post treatment and 28.6 at follow-up. It is obvious since the interaction time-group is highly significant that the four subgroups show a different development over time. The relatively high spread at baseline has diminished, indicating a more rapid progress for the fearful, extrovert and outgoing group.

Only minor and statistically non-significant changes in child general fear were recorded for the entire study group (means 39.3, 37.8 and 38.8 for the three time-points). However, a slight increase from baseline to post-treatment in child general fear among children in the non-fearful, extrovert, outgoing group persisted during the follow-up period, while the two fearful groups reported decrease (time-group interaction P=0.03).

Parental dental fear levels were unchanged (means 8.8, 8.4 and 8.4), with the parents in the fearful, extrovert, outgoing group on a (non-significantly) higher level.

The means for parental emotional stress were 3.4, 1.9 and 2.5, showing a relapse from post-treatment to
follow-up after the decrease during treatment. The parental emotional stress relapse was particularly clear in the two groups of fearful children, while parents of externalising, impulsive children in fact reported a continued decrease, although the interaction effect was not statistically significant (Fig. 1).

With regard to parental locus of control (means 34.6, 34.8 and 35.1) and parenting efficacy (means 29.0, 28.9 and 29.4), the assessments were relatively stable over the treatment and follow-up periods, but with significant time-group interactions. For the externalising, impulsive group, parental locus of control was increased during the treatment period, and the higher level was maintained at follow-up. These parents also reported an increased parenting efficacy level post-treatment, while a relapse was seen at follow-up (Fig. 1).

Follow-up outcome related to age and gender. No relationships between non-acceptance or procedure stress and age were found, while insufficient coping was associated with higher age (11.5 versus 9.4 years; P<0.01). It was also shown that children with moderate or high dental fear at follow-up were significantly older than children with lower dental fear levels (10.9 versus 9.4 years; P<0.01). In addition, age was associated with higher parental emotional stress (r_s=0.38; P<0.01) and with lower parenting efficacy (r_s=-0.27; P=0.04). No gender differences in categorical or scaled outcome measures were revealed.

Prediction of follow-up outcome. Multiple logistic regression analyses with the four categorical outcome key measures (non-acceptance, procedure stress, insufficient coping and moderate or high dental fear) as dependents and selected independents (based on bivariate relationships and initial stepwise conditional logistic regression analyses; data not shown) are summarised in Table 4. Avoidance behaviour during the specialist treatment predicted a poorer outcome in all measures with Odds Ratios from 12.9 to 16.6. Moderate

![Fig. 1 - Changes in child dental fear, parental emotional stress, parental locus of control and parenting efficacy from baseline measures pre-treatment over post-treatment to follow-up in a group of uncooperative Swedish children.](image_url)
Discussion

This follow-up study of child dental patients, treated at a specialist paediatric dental clinic after referral because of lack of cooperation, showed that the decrease in children’s dental fear levels, as assessed by their parents, remained relatively stable after at least one follow-up visit to the public dental clinic. A third of the children, however, still had a moderate or high dental fear level. According to the general dentists’ ratings, 81% of the children went through an examination and, if needed, through treatment procedures with full acceptance. Following our primary aim, it was shown that children with a fearful profile at baseline were more often reported to have moderate or high dental fear at follow-up. Externalising, impulsive children showed the highest frequency of non-acceptance. Following our second aim, avoidance behaviour and moderate or high dental fear post treatment were found to predict a poorer follow-up outcome. Age influenced outcome, as older children showed a poorer performance.

At follow-up, 70 children were seen at the public dental clinics. Of the remaining children, two had been treated under general anaesthesia and another four were still cared for at the specialist clinic, and probably would have shown fear or lack of cooperation if followed-up at public dental clinics. For example, the externalising, impulsive group consisted of seven children who returned to their public dental clinics (included in the follow-up report) and three long-term specialist patients and/or patients treated under general anaesthesia (not included in the follow-up report), which ought to be considered. In addition, four of the five non-attending children at follow-up already showed avoidance behaviour during treatment at the specialist clinic and possibly would have influenced our results towards a poorer outcome if they had participated in the follow-up.

Due to the small sample sizes, between-group differences in follow-up outcome measures are difficult to evaluate. On the one hand, the low power or high post treatment dental fear was found to predict a poorer outcome in three of the four measures. Higher age was associated with poorer coping and with moderate or high dental fear. Need of operative treatment indicated a higher risk for non-acceptance (Odds Ratio 5.4; Table 4).

Table 4 presents results from final models of logistic regression analyses with different outcome variables in a group of uncooperative Swedish children.

<table>
<thead>
<tr>
<th></th>
<th>Non-acceptance (no=45; yes=11)</th>
<th>Procedure stress (no=42; yes=17)</th>
<th>Insufficient coping (no=46; yes=14)</th>
<th>Moderate or high dental fear (no=39; yes=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td>Dentist at specialist clinic (cat)</td>
<td>0.9 0.4-2.1</td>
<td>0.7 0.3-1.4</td>
<td>0.6 0.2-1.4</td>
<td>1.2 0.5-2.7</td>
</tr>
<tr>
<td>Treatment with use of sedation (cat)</td>
<td>2.0 0.3-11.2</td>
<td>6.7 1.1-39.9*</td>
<td>8.8 0.9-90.6</td>
<td>1.9 0.3-10.6</td>
</tr>
<tr>
<td>Age</td>
<td>1.0 0.7-1.4</td>
<td>1.1 0.8-1.5</td>
<td>1.6 1.1-2.5**</td>
<td>1.9 1.2-2.9**</td>
</tr>
<tr>
<td>Avoidance (cat)</td>
<td>14.5 1.1-186.4*</td>
<td>12.9 1.6-101.2*</td>
<td>14.9 1.5-144.8*</td>
<td>16.6 1.6-175.0*</td>
</tr>
<tr>
<td>Moderate/high dental fear post treatment (cat)</td>
<td>16.4 1.4-195.4*</td>
<td>6.9 1.1-43.9*</td>
<td>6.5 0.7-56.0</td>
<td>21.3 2.5-183.9*</td>
</tr>
<tr>
<td>General fear at follow-up</td>
<td>1.1 1.0-1.2</td>
<td>1.0 0.9-1.1</td>
<td>1.0 0.9-1.1</td>
<td>1.2 1.0-1.3**</td>
</tr>
<tr>
<td>Need of operative treatment at follow-up (cat)</td>
<td>5.4 0.9-33.7</td>
<td>2.9 0.7-13.0</td>
<td>2.9 0.5-16.5</td>
<td>0.8 0.1-4.9</td>
</tr>
<tr>
<td>Model summary (Nagelkerke R²)</td>
<td>0.44</td>
<td>0.41</td>
<td>0.51</td>
<td>0.61</td>
</tr>
</tbody>
</table>

cat = categorical variable, OR = Odds Ratio, CI = Confidence Interval
*P<0.05
**P=0.01
Follow-up as dependents (column headings) and independents (left column) selected based on bivariate relationships and initial stepwise logistic regression analyses. Only cases with follow-up visit(s) at PDC are included; children treated under general anaesthesia are excluded.
of the study entails a risk of ‘false negative’ findings (Type II error). We therefore decided also to report potentially important but statistically non-significant findings. On the other hand, the results suggest that the ad hoc individualised specialist treatment (without knowledge of the subgroup classification) for children attending their follow-up was rather well adjusted and successful in equalising opportunities for future dental treatment. In order to optimise treatment further, there is an urgent need for treatment outcome and follow-up studies of larger samples of children, divided into subgroups and randomly assigned to different treatment modes.

It should be kept in mind that the levels of child dental fear, which occurred as an important discriminator, by definition, differed between subgroups. The high frequency of fearful, inhibited children with moderate or high dental fear at follow-up is in agreement with the findings reported by ten Berge [2001]. Thus, fearful children with internalising problems also had higher fear scores post-treatment. Considering that dental fear decreases over time, attention should be paid to the phenomenon of regression to the mean. The larger decreases in the groups, which presented the highest baseline dental fear levels, may in addition to a treatment effect be partly explained by this statistical phenomenon.

The somewhat deviant picture given by the different outcome measures can be interpreted as if these measures reflect different facets of the outcome. It may also be that, for example, parental ratings of children’s procedure stress or insufficient coping were biased by influence from the parents’ own dental fear or emotional stress. Parents in the fearful, extrovert, outgoing group were those who reported the highest own dental fear and relapse of emotional stress. They also reported high rates of insufficient coping and procedure stress, although dentists’ ratings of non-acceptance were moderate. The externalising, impulsive group showed the reverse picture, with the highest frequency of non-acceptance according to the dentists, but parents reporting good coping and lower procedure stress.

Concordant with the findings in a Swedish 5-year follow-up [Varpio and Wellfelt, 1991], the outcome was better for younger than for older children. One explanation, as suggested by Varpio and Wellfelt, may be that younger children’s lack of cooperation may partly be due to a discrepancy between their actual mental development level and the expectations of the dental personnel [Varpio and Wellfelt, 1991]. Such a condition will, if not too poorly managed, diminish with time. In addition to a sometimes more complex aetiology, it is reasonable to assume longer problem duration for the older children. Thus, dental personnel should be aware of the early signs of dental fear or behaviour management problems and endeavour to make a differential diagnosis and initiate immediate management.

Our finding of avoidance as a discriminator for a poorer outcome parallels the association between dental fear and avoidance reported among adult patients [Berggren and Meynert, 1984]. In child populations, associations between dental fear [Bedi et al., 1992; Klingberg et al., 1995] or behaviour management problems [Klingberg et al., 1994b] and missed appointments have been reported. A Norwegian retrospective study of dental treatment and attendance from age 12 to 18 revealed that painful or unpleasant treatment experiences markedly increased the risk of avoidance [Skaret et al., 1999]. Also, a relationship between dental fear during adolescence and non-utilisation of dental care during early adulthood has been revealed among young Norwegians [Skaret et al., 2003a; Skaret et al., 2003b]. The Swedish dental recall system for children offers check-ups and dental treatment on a regular basis and free of charge. However, limited resources have led to a restrictive attitude. A common policy in public dentistry is to offer a second, but not a third chance for children who miss their appointments. Based on our results, and in view of the predictive potential of avoidance, a more permissive attitude may be justified.

In summary, different outcomes were found for children with different fear and personality profiles, the fearful, inhibited children showing the highest frequency of dental fear at follow-up. The group of externalising, impulsive children separated into long-term specialist patients and those who returned to the public dental clinic, where they showed the highest frequency of non-acceptance. The picture of the group classified as non-fearful, extrovert, outgoing is still inconsistent but indications of a higher drop-out and avoidance may suggest poorer motivation or unreported dental fear.

The present results indicate a need for continued adjusted management and treatment for a considerable proportion of children referred because of dental behaviour management problems and treated at a specialist paediatric dental clinic by behaviour management techniques, sometimes with the integrated use of nitrous oxide/oxygen sedation. Whether the long-term outcome can be further improved by more differentiated management and treatment, adjusted to the different groups of children, should be investigated.
Conclusions
Because of their fear, inhibited child dental patients need extra attention even after successful dental treatment by specialist paediatric dentists. Externalising, impulsive children constitute a special challenge for dentistry. The continued need for adjusted management and treatment can be predicted from post-treatment dental fear scores and the occurrence of avoidance behaviour at the specialist clinic.

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References