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Anticipatory anxiety in children visiting the dentist: lack of effect of preparatory information

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Aim. This study sought to explore whether viewing a leaflet explaining the benefits of dental treatment would have a significant impact on children's anticipatory anxiety.

Method. Fifty children aged 8–12, attending the paediatric dental clinic of King's College Hospital, London, took part in this triple-masked, randomized control study. The participants were randomly allocated to one of two groups and either shown an intervention leaflet containing child-friendly dental information (the experimental group) or a leaflet with child-friendly information on the benefits of healthy eating (the control group). Using the Facial Image Scale, anxiety was measured when the children arrived for their dental appointment, once before reading the leaflet and again after reading the leaflet.

Results. There was no statistically significant effect of the experimental leaflet on self-reported anxiety levels in this study, although anxiety levels did drop slightly in both groups after reading a leaflet.

Conclusions. Providing paediatric patients with preparatory information about what to expect from a visit to the dentist had no effect on anticipatory anxiety in comparison to reading a leaflet about healthy eating. We speculate that reading, or cognitive processing, may have some beneficial effect. Future work should investigate this possibility.

Introduction

Dental anxiety and fear in children are well documented, although studies vary greatly in estimates of their prevalence. The terms 'anticipatory anxiety' and 'anxiety' are often used to denote concern occurring without the presence of the feared stimulus, whereas 'fear' is taken as the response to the anxiety-provoking stimulus. The use of different definitions and measurement tools will clearly influence estimates of the prevalence of these constructs. One European study found that 35% of 5-year-olds and 21% of 12-year-old children were anxious about visiting the dentist[1]. At about the same time, in Norway, Skaret *et al.*[2] reported 15–19% of their sample showed high dental anxiety. Although in America, it was found that 23% of 895 5–11 years old showed dental fear[3]. More recently, however, in Denmark, only 5.7% of the children studied exhibited dental fear[4], and this figure tallied with that of Buchanan and Niven[5] who found that 7% of their sample reported fear. A recent review, Klingberg and Broberg[6], suggested that the prevalence of dental fear is in the region of 9% of the population.

Anticipatory anxiety may lead to avoidance of dental treatment[7], whereas the fear response may make treatment stressful for the dentist[8]. The origins of dental fear are likely to be multifactorial[9]. The experience of pain and trauma during dental treatment has been suggested to play an important role in the onset of dental fear[10]. However, other factors such as the temperament of the child are important[6].

Traditionally, there are many varied approaches to managing dental anxiety and fear. For example, children are given a sense of control over proceedings, may hold a toy, or the dentist can spend a little 'social' time with the fearful child before treatment (e.g. Wright *et al.*[11]). As an alternative to these 'traditional' approaches, the American Academy of Pediatric Dentistry has outlined a series of behavioural management techniques to deal

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with the problem, ranging from, for example, voice control, to distraction, to physical restraint[12]. When all else fails, sedation with drugs such as nitrous oxide has been advocated. Indeed, as recently as 2004, there was a call to widely re-introduce nitrous oxide for this purpose[13].

One modern approach to the management of children's dental anxiety is based on social learning theory[14]. Here, the idea is to expose possibly fearful children to positive information or images of dental treatment such that they learn that dentistry is good, or even fun, and certainly nothing to be afraid of. In this way, Fox and Newton[15] reported that exposure to positive images of dentistry reduced low-level anticipatory dental fear in British children. They took two groups of children waiting to see the dentist and showed one group positive images of dentistry (e.g. a teddy bear in the dentist's chair) and the other group 'dentally neutral' images of gardening. They then measured anxiety using the Venham picture scale[16]. The group that saw the positive dental images reported no dental anxiety at all, whereas the group shown neutral images said they felt an average anxiety level of 3.3 on the Venham scale, which varies from 0 (no anxiety) to 8 (very high anxiety). This study, however, took only one measurement of anxiety, after exposure to the images. It might have been better to have demonstrated a reduction in anxiety by taking two measurements, one before the images and one afterwards.

At about the same time, a similar study looked at the effect of previous exposure to dental information on dental anxiety in Nigerian children (Folayan and Idehen)[17]. In contrast to Fox and Newton, they found no effect of previous exposure to dental information to reduce dental anxiety. Of course, an immediate difference between the two papers is the possibility that cultural and ethnic differences between Nigerian children and British children could be important and should not be overlooked.

Therefore, we decided to revisit the idea and test British children with exposure to positive dental information for an effect to reduce anticipatory dental anxiety. We also decided to take pre- and post-intervention measurements. An alternative to the Venham measure of anxiety in children is the Facial Image Scale (FIS)[5]. It correlates well, at 0.7, with the Venham scale, but is possibly more child-friendly, and quicker and easier to use.

Thus, the aims of this study were to confirm whether Fox and Newton's[15] finding that exposure to information that shows dentistry in a positive way can reduce dental anxiety in children, or whether the truth lies more with the findings of Folayan and Idehen[17], who found no effect of dental information to reduce anxiety in children. Moreover, this study sought to improve on Fox and Newton's[15] study by measuring anxiety levels at two time points – once before exposure to the dental information leaflet and again after the children have read the leaflet. The null hypothesis was that there was no difference in the levels of anxiety reported by children who read a leaflet giving positive information about the dental visit versus those who read a leaflet about healthy diet.

Materials and methods

The study was carried out in the paediatric dental clinic of King's College Hospital, Denmark Hill, London, a secondary care facility that services a diverse and multi-ethnic population. Ethical approval for the study was obtained from the King's College Hospital research ethics committee (Ref: 07/Q0703/20). Data collection took place between January and April 2007.

Participants

The participants were drawn from a consecutive series of current and new patients attending the paediatric dental clinic of King's College Hospital, London by one member of the research team (F.O.), and were selected according to the following criteria: (i) any child who attended the clinic, aged between 8 years and 12 years; and (ii) patients whose parent or caregiver gave consent.

Children were excluded from the study if any of the following applied: (i) children who refused to participate in the study; (ii) children whose understanding of and spoken level of the English language was judged by the researcher to be

insufficient for them to participate; (iii) children whose parent or guardian was not available to give consent or who refused consent; and (iv) children who were visually disabled.

The participants were approached in the waiting area of the clinic. They were recruited, gave consent, and had their initial level of anticipatory dental anxiety assessed using the FIS. The FIS was administered by a single researcher (F.O.) who had been trained in the administration of the scale in the waiting area. Parents were free to assist their child in completing the FIS, but no child required such assistance from the researcher or their parent. The participants were then randomly allocated to the experimental and control groups following a predetermined sequence drawn up by an independent statistician using computer-generated random numbers. The allocation sequence was concealed by using a series of opaque envelopes, each of which contained the group allocation for a single participant. The intervention (giving leaflets) was administered by an independent dental nurse. Fifteen minutes after the participant indicated that they had read the leaflet, the participants were again asked to rate their level of anticipatory dental anxiety using the FIS.

Design and analysis

The study was a triple-masked randomized controlled trial. Neither the participant nor the individual conducting the measurements, nor the statistician undertaking the data analysis, knew which group the participant was in at the time of the trial or at the stage of data analysis. In a between-subjects design, 50 participants were recruited following a power calculation which determined that to have 80% power to detect a mean reduction of 1.0 in the Facial Image score (anxiety scale measurement), assuming a standard deviation of 1.3; 25 patients were required per group. The anxiety scores were compared across the groups with Mann–Whitney '*U*'.

Materials

The intervention leaflet (containing preparatory information) was developed by the research team in collaboration with staff from the Oral Health Promotion department of a large teaching hospital. The health promotion staff provided guidance on age-appropriate language and images to be used in the leaflet. Additionally, five children within the targeted age group and a psychologist were involved in developing the leaflet. Validation was sought from the Oral Health Promotion department and paedodontists from the Department of Paediatric Dentistry, King's College Hospital. Entitled 'Check out a visit to the dentist', it was A4 sized and posed six frequently asked questions along with their answers. For example, Q What might you wear? A. A bib; this will keep your clothes clean. Special glasses. These protect your eyes and make the bright light comfortable.

The control group was given a leaflet with information about healthy eating. The leaflet obtained from the Oral Health Promotion department, King's College Hospital NHS Foundation Trust, had been used successfully in previous health promotion campaigns on eating healthy foods, 'five-a-day campaign' for children in this age group (8–12 years). The presentation style of the control leaflet was similar to the experimental leaflet. The control leaflet was twice the size of the intervention leaflet, but contained a similar amount of information.

The FIS (Buchanan and Niven)[5] was used as the primary outcome measure of the level of anxiety in the subjects. It is a semantic differential scale consisting of five images ranging from very happy to very unhappy. There are corresponding scores of 1 for very happy and 5 for very unhappy. The card was shown to the patient, and he or she then indicated on the scale, which 'face' best mirrored their feelings at that particular time. The results were then stored and later recorded using Microsoft Excel analysed using SPSS software.

Results

Table 1 shows the mean anxiety levels of the two groups before and after they read the leaflets. It can immediately be seen that at 2.12 and 2.04, there was no difference in anxiety levels between the groups before the participants read the leaflet ($U = 299.5$, NS).

Table 1. Mean anxiety scores before and after intervention.

	Experimental group – preparatory leaflet ($n = 25$)	Control group – diet leaflet ($n = 25$)
Mean (SD) anxiety score before	2.12 (1.01)	2.04 (0.69)
Mean (SD) anxiety score after	1.56 (0.71)	1.80 (0.76)
Mean (SD) anxiety score difference (before – after)	0.56 (0.82)	0.24 (0.61)

After reading the leaflets, the mean anxiety levels had dropped slightly to 1.56 and 1.80 in the experimental and control groups, respectively, but these drops were not statistically significant ($U = 257.5$, NS). No further analyses were undertaken.

The sample comprised 12 boys and 13 girls in each group (total 24 boys and 26 girls), and very clearly this was not statistically different. With respect to age, once again there was no difference between the groups. The experimental group had a mean age of 10.06 years (SD 1.34) and the control group was on average 10.08 years old (SD 1.53). Fourteen of the experimental group were accompanied by their mother, and 16 mothers accompanied the control group children. Each group was represented by six fathers accompanying their children and 'others' accompanied five experimental group children and three of the control group. There were no drop-outs at any stage of the trial. No adverse effects of the intervention were noted.

Discussion

The results revealed no effect of dental information to reduce anticipatory dental anxiety in our sample. These results support Folayan and Idehen[17] who also found no effect of dental information to reduce anxiety in Nigerian children visiting the dentist. The findings of this study are based on a group of children attending a large dental hospital in South London; this may raise some questions concerning the generalizability of the findings to primary dental care settings.

On closer examination, however, the comparison between Fox and Newton[15], Folayan and Idehen[17], and the current findings is not clear cut. Each study used a different method to measure anxiety. Fox and Newton[15] found a reduction in anxiety, but used positive images of dentistry, rather than just information about dentistry. Folayan and Idehen[17] investigated children who had been exposed to dental information in the past, whereas we exposed children to dental information as an integral part of the study. In short, each of the three pieces of research was sufficiently different that we can only infer whether our findings support or refute either previous study.

The findings from this study must be considered in the light of its limitations. A number of potential confounding variables were not assessed in the study design, although the process of random allocation would hopefully have avoided potential bias in the comparison of groups. These confounding variables would include the previous experience of medical and dental treatment, the anticipated treatment to be undertaken and whether the participants knew what treatment they could expect, the coping style of the participant – the use of specific coping styles has been found to interact with presentation of information to reduce anticipatory anxiety in adults[18]. The power calculation for this study was based on the ability to detect a unit difference in the FIS; it remains to be determined whether this would be significant in the clinical situation.

None of the studies has looked at particularly anxious children. Our study found mean anxiety levels of 2.12 and, for example, Fox and Newton[15] reported a mean anxiety score of 3.3. Clearly, if Cohen *et al.*[7] are right, then anxious children (whom these studies should be targeting) do not routinely attend the dentist. Future studies of children's dental anxiety should aim to recruit participants somewhere other than the dentist's surgery. At the very least, future studies should attempt to select participants who exhibit higher levels of dental anxiety. Otherwise, such studies may encounter floor effect problems.

It may also be the case that the method of measuring dental anxiety in each of the three studies is inappropriate. Each measure used is self-report and highly subject to demand characteristics confounds. Fox and Newton[15] actually reported a median anxiety level of 0 in their experimental group. One has to

speculate that this group realized that the study was about positive images of dentistry and gave the 'demanded' response. Future work needs to consider factors such as these more carefully. This study certainly lends weight to Klingberg and Broberg's[6] recent conclusion that the whole area is fraught with methodological and conceptual problems.

In conclusion, we are unable to recommend that dentists provide dental information to anxious children in the hope of managing that anxiety. We did note, however, a slight effect of reading something (either dental information or healthy eating information) to reduce self-reported anticipatory anxiety. We speculate, however, that some beneficial effects may occur because of cognitive processing. Thus, even if Fox and Newton's[15] findings were the result of demand factors, these demand factors required the appropriate cognitive processing. Currently, cognitive behavioural therapy (CBT[19]) is the subject of much interest in adult dental fear or anxiety. Inherent in CBT is a high level of cognitive processing. We speculate that future studies might fruitfully investigate the possibility that a task presenting dentistry in a positive way, but requiring a high level of cognitive processing might effectively manage dental anxiety in children.

What this paper adds

- Demonstrates that providing dental-specific information does not necessarily reduce anticipatory dental anxiety.
- Demonstrates that there may be a general effect of a cognitive task (reading) in reducing anticipatory dental anxiety.

Why this paper is important to paediatric dentists

- This paper has implications for the provision of interventions to reduce anticipatory dental anxiety among paediatric dental patients waiting for treatment.
- Providing information does not increase anxiety as might be anticipated or a cause for concern.
- The effect of providing information is not specific to dental information; any task requiring the child to engage in a cognitive activity appears to reduce dental anxiety prior to dental treatment.

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