Title:

An exploratory study investigating children's perceptions of dental behavioural management techniques

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Abstract

Background: Behaviour management techniques [BMTs] are utilized by dentists to aid children's dental anxiety. Children's perceptions of these have been under-explored, and their feedback could help inform paediatric dentistry.

Aim: To explore children's acceptability and perceptions of dental communication and BMTs, and to compare these by age, gender, and dental anxiety.

Design: Sixty-two 9-to-11 year-old school-children participated in the study. Children's acceptability of BMTs was quantified using a newly-developed Likert scale, alongside exploration of children's experiences and perceptions through interviews. ANOVA and t-tests explored BMT acceptability ratings by age, gender and dental anxiety. Thematic analysis was used to analyse interviews.

Findings: Statistical analyses showed no effect of age, gender, or dental anxiety upon BMT acceptability. Children generally perceived the BMTs as acceptable or neutral; stop signals were the most acceptable, and voice control the least acceptable BMT. Beneficial experiences of distraction and positive reinforcement were common. Children described the positive nature of their dentist's communication and BMT utilisation.

Conclusion : Dental anxiety did not affect children's perceptions of BMTs. Children were generally positive about dentist's communication and established BMTs. Children's coping styles may impact perceptions and effectiveness of BMTs and should be explored in future investigations.

Introduction

Although dental treatments have significantly improved over time, dental anxiety remains prevalent in society[1]. Dental anxiety refers to negative apprehension regarding treatment; it is a psychological problem that interferes with dentistry provision[2] and is a cause of stress for dental staff[1]. Compared to those with low dental anxiety, children with higher dental anxiety are more likely to have had several tooth extractions and episodes of tooth decay[3].Childhood experiences are fundamental in the formation and maintenance of dental anxiety; over half of dentally-anxious adults reported their dental anxiety developed during childhood[4]. Child- and patient-centred approaches to paediatric dentistry, alongside utilising methods of behaviour management and appropriate communication, can lower dental anxiety and promote positive attitudes towards oral health and dental treatment[2].To prevent or help lessen paediatric patients' dental anxiety, dental practitioners utilise a number of behavioural management techniques [BMTs]. BMTs shape patients' coping behaviour in order to effectively provide dental treatment[2]. Through their use, positive dentist-patient relationships can be maintained to provide quality dental care and encourage attendance across the lifespan[6]. Communication is vital in paediatric dentistry and aids utilisation of BMTs [6, 7].

Psychological BMTs target maladaptive anxiety patterns to promote long-term decreases in dental anxiety[8]; these are easily implemented and cost-effective[9]. Dentists may provide sensation information throughout treatment; this involves a verbal 'running commentary' of the procedure and associated stimuli, such as tool-related noise[10]. Voice control is used as verbal reinforcement to control uncooperative behaviours[6]. However, use of a firm

and loud voice has been associated with increased anxiety in child-patients[11]. Tell-show-do desensitizes the patient to dental equipment through demonstrating or explaining the procedure verbally and/or through using visual stimuli[12]. Tell-show-do informs the child of the procedure in order to reduce anticipatory anxiety and avoid subsequent behavioural problems[2], and is effective in managing children's behaviour[13]. Positive reinforcement involves praising desired behaviour to encourage reoccurrence of positive dental behaviours and decrease dental anxiety[14]. Positive reinforcement is applied twofold; social positive reinforcement involves verbal praise and appropriate physical contact, while non-social methods involve post-treatment rewards such as stickers. Both types are regularly utilized by dentists[2]. The type of reinforcement needs to be salient to the child patient in order to strengthen behaviour[6].

Patients' perceived control can be increased through use of stop signals, such as raising a hand during treatment[14]. Through their use, a patient's anxiety can be decreased before and throughout the procedure[2]. Averting concentration through distraction techniques, such as music and pictures, are frequently used by dentists to assist patients' coping through displacement of their anxiety[2]. Pharmacological sedative techniques are also used to accompany behaviour management of child patients[14]. Sedation physiologically reduces arousal, yet providing sedation requires behavioural cooperation; this could increase anxiety as the patient may be anxious about its administration[14]. Conscious inhalation sedation is the favoured pharmacological method among UK dental practitioners; 73% reported feeling comfortable using inhalation sedation as behavioural management and preferred it over other pharmacological methods[15].

Although BMTs are regularly employed, there is limited consideration in gaining paediatric patients' opinions about behaviour management[11]; indeed there has been minimal consideration given to listening to children's views of dentistry[18]. Acceptability of behavioural management is considered in terms of its clinical effectiveness and perceptions of its use[17], and evaluation of BMTs has focused on clinician and parental feedback[18]. Crossley and Joshi[15] reported British dentists were comfortable in applying BMTs to paediatric patients; Tell-show-do was the most common technique used, with the majority of dentists surveyed stating they were comfortable in applying this technique to their child patients. In assessing parental acceptability of BMTs, Murphy et al[12] found non-invasive BMTs, such as Tell-show-do and voice control, were most acceptable, with child-restraint and strong pharmaceuticals least acceptable. Kantaputra et al[13] attempted to gauge Thai children's perceptions and attitudes through using video-recorded demonstrations of management techniques. Higher likeability scores were reported for Tell-show-do and positive reinforcement though surprisingly participants showed more approval of restraint and pharmacological methods than voice control. Although this study attempts to explore children's views, there are some limitations that may have affected the results. For example, participants' previous dental experiences were not explored and a minority reported no experiences of attending the dentist, which may have affected the approval ratings. Similarly dental anxiety was not measured; it is possible anxiety could influence attitudes towards BMTs.

Children are the recipients of treatment and BMTs, and so their perspectives are important in gaining patient feedback in the evaluation of paediatric dentistry[19, 20]. Collaborating with children as active members in research

could aid the practice of paediatric dentistry to enhance dental experiences and maintain attendance[19]. Gaining both quantitative and qualitative feedback from children with a range of dental anxiety levels could help evaluate BMTs commonly used by dentists. The aim of this study, therefore, was to conduct a preliminary exploration into children's experiences and perceptions of BMTs, and compare perspectives by age, gender, and level of dental anxiety.

Methods

Sample

A convenience sample of 62 children at a school in South-West England volunteered and consented to participate. Parental consent was gained prior to taking part. Children were 9-to-11 years old (M=10.3yrs ± 0.55), with just over half the sample girls (N=35, 56.5%)

Study design

A mixed-methods design was used, as this approach is useful in gaining dual perspectives of dentistry and provides valuable insights that contribute to service evaluation[16, 20]. Participants completed measures to assess their dental anxiety and acceptability of BMTs, alongside a semi-structured interview exploring their experiences and perceptions of dentistry and BMTs.

Measures

Dental Anxiety

The Modified Child Dental Anxiety Scale – faces version [$MCDAS_f$][21] is an eight-item measure to assess paediatric dental anxiety across eight aspects of the dental appointment and specific treatments. The items are presented with a numerical five-point Likert scale, alongside a corresponding facial expression response set. $MCDAS_f$ scores extend from five (minor/no DA) to forty (extreme/severe DA). Scores ≥26 represent significant DA[21], while the original non-faces MCDAS suggests ≥31 as a threshold for dental phobia[22]. The $MCDAS_f$ has good validity and reliability in children aged 5-to-12 years[21, 23].

Acceptability of behaviour management techniques

To quantify children's acceptability of BMTs, an eight-item measure was developed to assess dentist's communication and selected BMTs dental scenarios. Scenarios were used as it was felt children might not be able to understand some BMTs through verbal description of them alone. To inform development of the measure a dentist and dental receptionist were consulted. In the developed measure, child-friendly language was used to explain to participants what each BMT involved. The eight items assessed dentist's general communication, voice control, positive reinforcement, Tell-show-do, sensation information, stop signals, distraction and inhalation sedation. The items were presented with a five-point numerical Likert and faces scale identical to the $MCDAS_f$[36], except this response index evaluated acceptability of BMTs. The bipolarised index ranged from 1 ("this would be okay for me") to 5 ("this would not be okay for me"), with 3 representing a neutral response ("I would not be bothered"). After explaining each item, participants were asked how they would feel about receiving the BMT, and used the response index sheet to inform their answer. Figure 1 shows two examples of the eight items used in the measure.

[Figure 1 inserted around here]

Semi-structured interviews

Individual interviews (10–30 minutes) were conducted in a quiet open-spaced area within the school. The interview schedule covered the eight BMTs defined in the 'acceptability' scale. Participants' perspectives of BMTs were assessed twofold: qualitatively, through asking the child their experiences and perceptions of each BMT, and quantitatively through using the

'acceptability' scale. The interview schedule and explanation of BMTs were repeated for every participant. To establish rapport children were asked about their dental history, and their likes and dislikes about attending. In the second part of the interview, each BMT was explained and the participants were asked about their personal experiences of it and perceptions of its use. After each participant provided satisfactory detail, the researcher explained the corresponding question on the 'acceptability' scale and noted the participant's response.

Ethical considerations

Ethical approval was granted by the Departmental ethics committee of the authors' Institution. Permission to conduct research within the school was provided by the deputy head-teacher, and parents' consent was gained prior to interviews through opt-out consent. The lead researcher explained consent and withdrawal procedures to participants, and attained their consent through signing of a child-adapted consent form.

Procedure

To pre-evaluate the developed interview schedule and measures, five school-children took part in a pilot study (three girls and two boys; M=9.8yrs). Both one-to-one and group interviews were conducted. The group interviews demonstrated that participants' views could not be fully explored and increased potential conformity bias, thus one-to-one interviews were deemed more appropriate for the main study. Children generally understood the questions and the 'acceptability' measure, and therefore no changes were made.

The interviews for the main study were conducted in a quiet area in the participating school. Each child was informed of what the interview would involve, their right to withdraw and anonymity of their information. They were allowed to ask questions at any time, and asserted their consent verbally and by signing a consent form. The lead researcher explained the $MCDAS_f$ and respective response index to the participant and supported them in completing it. Audio-recorded semi-structured interviews were then conducted using the interview schedule. Each BMT was explained, and participants were asked standardised questions about their experiences and perceptions of its use, with follow-up prompts used as necessary. Once it appeared the participant had provided enough information, they were presented with a scenario-based question (see Figure 1 for examples) to assess their acceptability of the BMT. The 'acceptability' measure and its response index were explained to participants. Participants were asked to rate their responses on the response index This was repeated for each BMT. At the interview's conclusion, children were thanked for their participation and debriefed. Interviews were transcribed verbatim by the researcher. Figure 2 shows a flowchart of the interview procedure.

[Figure 2 inserted around here]

Data analysis

To explore differences between the $MCDAS_f$ scores and 'acceptability' measure data, SPSS v.18 (Chicago, Il., USA) was used to conduct ANOVA and t-test analyses. P-values ≤ 0.05 were considered statistically significant. Content thematic analysis[24] was applied to analyse interview data; this involves repeated reading of interview data to identify and categorise emergent

themes, and has been used to assess children's understanding of oral health[25]. The interviews were transcribed verbatim and repeatedly read to identify codes in the data. These codes were then sorted into related themes. Content analysis was used to identify occurrences of experiences of BMTs; when each BMT was described, the participant was asked whether they had experienced it. The BMTs represented *a priori* categories in analysing the interview data.

Results

Dental anxiety

$MCDAS_f$ scores ranged from 9 to 35, with mean of 23.3 ± 5.63. Using suggested cut-off points[21, 22], three groups (low=≤25; moderate=26-30; high=≥31) were established. Twelve participants had moderate (scores 26-30) dental anxiety [DA], with 7 indicating dental phobia (scores ≥31). A two-way between-groups ANOVA revealed a significant main effect of gender upon DA, $F(1, 57) = 4.25$, $p = .04$, $\eta p^2 = .07$. Females showed higher dental anxiety (DA) (M= 24.45 ± 5.80) than males (M= 21.28 ± 5.13). There were no significant differences between age and DA, and no interaction between gender and age on DA (both p=>.05).

Acceptability of behaviour management techniques

For the 'acceptability' measure, the Cronbach's alpha was 0.58 which is an acceptable level of internal consistency[26]. Mean acceptability for the BMTs are presented in Table 1; these indicate that overall the BMTs were considered favourably. However, as can be seen by Table 2, the response frequencies demonstrate that for three of the BMTs (voice control, sensation information and inhalation sedation) 19% - 29% of the children responded with a score of 4 or 5 indicating that they did not find them acceptable.

[Tables 1 and 2 inserted about here]

Stop signals were most acceptable (M=1.62) and voice control least favourable (M=3.03). A repeated-measures ANOVA revealed significant differences

between mean BMT acceptability ratings, F (7, 413) = 11.84, p=<.01, η^2=.16; however there was no effect of DA on differences in BMT acceptability, F (2, 59) =.44, p=>.05, η^2=.01. Voice control was significantly less favourable than five other BMTs: communication, positive reinforcement, tell-show-do, stop signals and distraction (all p=≤05). One-way between-groups analyses of variance and independent samples t-tests were conducted for each BMT to explore differences in participants' BMTs acceptability by DA, age, and gender. All analyses investigating the effect of these factors upon BMT acceptability were non-significant (p=≥.05). Table 3 shows mean BMT acceptability ratings by level of DA.

[Table 3 inserted about here]

Perceptions of behaviour management techniques

Children's perceptions of BMTs were explored through thematic analysis of the interview data. The findings are presented for each BMT; emergent themes are described and findings discussed with regards to participants' experiences and views. Comments regarding how themes related to participants' DA, age, and gender are discussed as appropriate. Quotes are presented to illustrate the themes that arose during the analyses.

Communication between dentist and child

Children were asked how their dentist generally communicated with them as patients. Nearly three-quarters of participants (n=45) could recall their dentist asking them questions upon entry into the surgery, and that these questions mainly referred to assessing their current oral health status prior to

examination. Verbal and non-verbal communicative aspects emerged as central themes relating to good communication by their dentists. Almost a third of participants (n=20) stated the main reason they felt their dentist was friendly was because they talked appropriately to them as patients. Children reported a number of positive aspects of verbal communication, and how it aided them when attending the dentist. Another positive factor contributing to the dentist's friendliness referred to how the dentist spoke. Participants commented on the appropriate tone of voice and the type of language used by dentists to discuss the patient's oral health and treatments.

She…talks to you, and helps you understand stuff a bit better.

(Female, 11yrs, low DA)*

If you need something done… they won't make it sound like it's bad.

(Female, 11yrs, low DA)

The use of body language, particularly facial expressions, was another aspect contributing to positive dental experiences. These verbal and non-verbal aspects of communication appeared to work in unison to contribute to the effective provision of dentistry, and subsequently maintain the dentist-patient relationship.

Every time you're looking up, you see this big smile, and they're just really comforting. (Female, 10yrs, low DA)

You got to know your…orthodontist or dentist before you actually kind of trust them…they'll talk to you nice, they'll smile at you.

(Male, 11yrs, high DA)

* The bracketed information states the gender, age, and level of dental anxiety of the participant. Dental anxiety level is based on $MCDAS_f$ score thresholds; scores ≤25 indicate low dental anxiety, scores between 26-30 indicate medium levels of dental anxiety, and scores ≥31 indicate high dental anxiety and possible phobia. Dental anxiety is abbreviated to 'DA'.

Voice control

A scenario of a behaviourally-disruptive child and dentist's use of voice control was explained to participants, and each was asked how they would feel in the situation. This produced two contrasting themes regarding its use: justification and heightened emotional response. Although only based on observation, children with lower DA appeared more likely to suggest the dentist's use of voice control was justified and reasonable, so that treatment could be performed.

They're [the dentist] only trying to do their job, they're not…trying to be mean to you or anything. (Female, 10 yrs, med DA)

A minority of the children suggested voice control would heighten their emotional states and increase worry. Participants did not report any previous experiences where their dentist had spoken to them in a similar loud or firm manner, and it appeared that voice control could potentially impact the dentist-patient relationship.

I'd be frightened… they [dentists] aren't really supposed to talk to children in that way. (Male, 10 yrs, med DA)

I would be quite scared …it would break my… confidence of going to the dentist. (Female, 11yrs, low DA)

Positive reinforcement

Positive reinforcement was perceived as acceptable (M=1.80). All participants reported experiences of positive reinforcement; 59 participants recalled receiving stickers on at least one occasion. Over half of the children reported receiving stickers as a positive aspect of attending; these were perceived as

being a personal reward for a number of different behaviours including behaving well at the dental clinic and brushing their teeth regularly. Receiving positive reinforcement facilitated positive dental attitudes in participants and promoted future dental attendance.

Sometimes going to the dentist wasn't exactly fun…I would quite enjoy that [received sticker], cos then it's like a reward for actually coming.

(Female, 11yrs, low DA)

It [sticker] was, like, a prize for being good … so next time I'd know I'd get a sticker, so I'd be good. (Female, 11yrs, med DA)

[Receiving stickers] encouraged me to brush them [teeth]… my mum said if you carry on doing your teeth right, then they'll give you sticker.

(Female, 11yrs, med DA)

Two themes emerged during discussion of receiving positive reinforcement: their suitability and their value. Participants favourably perceived token rewards, though the suitability of the token was paramount. A third of the sample considered sticker rewards as being inappropriate for their age, and this view was prevalent across age groups. An emergent theme related to suitability and the personal value attached to receiving positive reinforcement. Participants suggested that tokens vary in their value during childhood.

There's not really any point [receiving stickers] - if you're a younger kid they think it's special, but when you're my age, you just don't bother.

(Male, 10yrs, low DA)

Stickers … don't really mean that much. (Male, 10yrs, low DA)

Tell-Show-Do

Tell-show-do was perceived as moderately acceptable (M=2.04). Although dentally-anxious participants showed higher acceptability ratings (M=1.84), there was no significant effect of DA on tell-show-do acceptability. The most commonly experienced tell-show-do technique by participants was verbal explanation of the procedure, followed by showing the tools, and use of an anatomical model. Participants reported that these techniques were frequently combined. Two themes regarding tell-show-do emerged; these represented benefits and drawbacks of its use. Children, who had described self-reported experience and inexperience with tell-show-do, reported two significant benefits: being informed and reducing anxiety. Providing prior information of the procedure was the most commonly reported benefit (n=33). Explanations before a procedure appeared to familiarise patients with the procedure, and provided control.

It just makes me feel more safe [seeing tools], because I know what they're gonna do and I know what's gonna happen. (Female, 10yrs, low DA)

Being informed produced reports of several personalised benefits, such as being able to relax, preparation, and assurance of safety. A third of participants (n=21) reported prior explanation could decrease anxiety..

[Seeing a teeth model] made me…feel less nervous [prior to filling] because I knew what was happening. (Female, 11yrs, high DA)

The perceived negative consequence of tell-show-do was its potential to increase anxiety. This appeared to relate more to viewing, and explanation of, the dental instruments, and so the scenario may have influenced their answers. A

minority of the participants reported that tell-show-do and sensation information could both increase and decrease worry, suggesting other psychological and contextual factors influence anxiety and the effectiveness of BMTs.

If I saw what they [dentist] were using…then I would remember it for longer. (Female, 11yrs, low DA)

It [tell-show-do] might have made me a bit more nervous or it might have made me feel better. (Male, 10yrs, low DA)

I just think that [seeing tools] would make them worse for me, but you know what's coming then, so … it's okay. (Female, 10yrs, high DA)

Sensation Information

Sensation information was described to participants as being informed of the noises and sensations they would experience when they were actually having dental treatment. Sensation information was perceived as moderately acceptable (M=2.21). A limited number (n=6) of participants reported experiences of receiving sensation information. Similar themes from tell-show-do emerged regarding perceptions of sensation information. Being continuously informed was perceived as beneficial and provided control to the patient. Similarly, being made aware of upcoming noises was favourably viewed; audio-related information controlled worry as some children reported being startled by unexpected noise. Sensation information was perceived as useful in helping decrease anxiety and tension in the patient.

I like being warned if there's gonna be a loud noise cos I'm scared of loud noises. (Female, 10yrs, high DA)

It [SI] made me feel better through it [having a filling], so when…the noise did start, it wasn't gonna make me jump and be scared.

(Female, 10yrs, low DA)

The perceived drawback of sensation information was the potential for increasing anxiety and negative thoughts. However, it may be the case that participants were seeing sensation information as almost synonymous with having the actual dental treatment.

If they did say 'I'm gonna use a drill now', it would be a bit 'what if they drill my whole gum into two?!' (Female, 10yrs, low DA)

Stop signals

A fifth (n=12) of participants reported use of stop signals at their dentist. A variety of benefits – both by those who had experienced and not experienced stop signals – emerged from interviews. Almost half of participants reported relief of worry, distress and physical discomfort being the main benefits of allowing stop signals.

You feel really nervous, and sometimes it takes quite a long time. So it's just, a lot better with a break. (Female, 9yrs, med DA)

Of those who had not experienced stop signals, almost half (n=23) stated they would like the option - although they might not necessarily use it. A contrasting finding emerged; over a third of the children (n=22), mostly older participants, reported preferences for getting the treatment over and done with.

It would be nice to have a break, but then it's better to get it done out the way with, so you don't have to go back to it again.

(Female, 11yrs, low DA)

Another emergent benefit of stop signals was provision of control aiding the patient's active role during treatment. Although using stop signals may result in longer treatment, some patients reported that it would help them feel less tense.

You don't feel, like, you're forced to stay like there, you feel a bit more relaxed. (Female, 10yrs, med DA)

Distraction

Distraction was perceived as highly acceptable (M=1.69). 48 participants reported experiencing distraction in their dentist's surgery; the most commonly reported type experienced by these participants was visual-based stimuli (n=33), such as pictures on display, with music the second most reported. A minority of participants reported dentist's verbal communication acted as distraction (e.g., talking to them about non-dental topics while they received treatment). Three benefits of distraction emerged from the interviews: diverting attention, relaxation, and decreased anxiety. Over half of participants (n=34) who had self-reported experience and inexperience of distraction techniques reported the main benefit being the diversion of their attention and concentration away from the dental examination and procedure. Audio distraction further aided coping with the sounds of dental treatments, and a minority explained that distraction aided pain management during dental treatments.

You're…listening [to music], instead of listening to the noises in your mouth… you kind of forget about the tooth. (Female, 11yrs, low DA)

I had an injection once, and that [picture] distracted me from the pain. (Female, 11yrs, low DA)

Another benefit of distraction was that by displacing their concentration and attention, participants subsequently felt more relaxed and at ease in the chair. This also aided control of potentially-disruptive behaviours.

Helps me personally because I'm looking at them [pictures], it takes all the bad things off my mind. (Female, 10yrs, high DA)

It's quite nice cos it you can kind of relax more and just listen to it [music], feels like you're at home basically. (Female, 10yrs, low DA)

I think it's [distraction] good, cos otherwise I would be very, very bored and very, very nervous and twitchy. (Female, 9yrs, med DA)

Inhalation sedation

A minority of participants (n=8) reported experience of inhalation sedation , either at the dentist's surgery or at a dental or general hospital. Three benefits of inhalation sedation emerged: increased relaxation, decreased worry, and pain management. However with inhalation sedation use some participants reported concerns related to common dental and medical errors. There appeared to be no link between apprehension of inhalation sedation and level of dental anxiety.

If you get claustrophobic and there's people over you, then you might kind of feel…scared and nervous, so you might want it [inhalation sedation] to, like, control your breathing. (Female, 11yrs, med DA)

I always wonder if they're doing something like that [inhalation sedation], if they've got it mixed up with something—what if it's a totally different thing? (Female, 10yrs, med DA)

Discussion

This preliminary mixed-method study investigated children's perceptions of dental communication and behaviour management techniques [BMTs]. Compared to negative childhood experiences and perceptions of dentists described by British adults[27], children in the present study generally held favourable opinions of their dentists. Children spoke of their dentists' understanding, non-judgemental approach, and their use of appropriate language. This might suggest that the dentist-child patient relationship has moved from an authoritative to supportive position[7]. Encouragingly the majority of children stated their dentist asked them questions during appointments; by doing so, dentists could be introducing patient consultation into the dental environment as child patients have a right to be involved in their treatment options[6]. As found previously[20], children appreciated their dentist's use of age-appropriate and clear communication.

Statistical analyses showed significant differences between BMT acceptability ratings, but no significant differences in BMT acceptability by dental anxiety, gender, or age. It is understandable that there was no difference across age, as the age range was limited (9-11 years). Gender did not have an effect, though the trend for dentally anxiety to be higher in girls was evident. We might have expected that there would be a difference in BMT acceptability across anxiety level. However, it may be that individual differences such as the extent to which children want to attend to, or distract from, the dental situation are more important than anxiety level *per se*. As we discuss later on in this section, this may be an interesting avenue for future research.

Children's perceptions of BMTs were similar to those found previously[13]; children were favourable towards positive reinforcement and tell-show-do, and least accepting of voice control. Stop signals were considered most acceptable, however only 12 (19%) children in the sample had experience of this BMT. It has been noted that stop signals should be encouraged in paediatric dentistry[6]. However, self-control of anxiety and trustworthy dentist-patient relationships may result in children perceiving limited need for stop signals[14]. Some children preferred treatment to be "over and done with" nonetheless, it is important for children to be given the option of using stop signals, even if they do not use them.

The mean score, and response frequencies, for voice control would suggest participants held a range of perceptions about voice control; it can be viewed as punishment[2]. Interviews showed that the children understood why dentists may use this technique, but also perceived it as potentially anxiety-provoking; this is understandable as children may instinctively negatively react to verbal discipline[13]. Indeed, voice control is not accepted among all parents[11]; this study suggests it is also not acceptable to all children. Children showed logical reasoning in understanding dentists' point-of-view; this development of reasoning is typical among this age group[14]. There was no significant difference between voice control and inhalation sedation] acceptability scores, suggesting they are similarly perceived. Inhalation sedation may be unfavourable for similar reasons; children had little familiarity, and they spoke of medical concerns regarding its use – such as side effects, or potential errors in administration. Children's health-related knowledge refines with age, and educational, social and environmental sources may influence their comprehension and perceptions of BMTs.

Overall, children appreciated positive reinforcement although some perceived stickers as not having value to them and being age-inappropriate. This validates Roberts et al's views[6]; tokens have to be valued by patients to maintain behaviour. When asked about receiving positive reinforcement, some children were indifferent regarding rewards - suggesting tokens may no longer be needed to maintain positive dental experiences. This perception could reflect child development; transitioning into adolescence, children may discontinue 'childish' behaviours. Despite this indifference towards positive reinforcement, receiving relevant tokens - such as toothbrushes - may be beneficial; it combines novelty alongside tokens useful for oral health and so may further encourage positive health behaviours. Dentists' body language and use of verbal reinforcement can also socially reinforce behaviours[2]; as children valued the friendly communication style of their dentist, this may act as positive reinforcement and encourage positive dental behaviours.

Children's acceptability of tell-show-do demonstrates its value. However, some children were less accepting of tell-show-do as it could increase anxiety; the interview data suggests this may relate more to viewing the dental tools rather than the verbal explanation. Children's perceptions of sensation information may crossover with monitoring and blunting coping styles; 'monitors' prefer receiving information regarding their treatment, while 'blunters' avoid information and prefer distraction[23]. Depending on their coping style, receiving procedure-related information – as through tell-show-do and sensation information - could increase or decrease patient's anxiety[23]. Whether sensation information is a distinct BMT is subject to interpretation; it could be defined as an aspect of tell-show-do. BMTs are often combined, and it is difficult to assess each one's individual value. Finally, distraction provided

various benefits for child patients, and supports guidelines regarding its use[2]. Dentists used several easily-implemented distraction methods, which varied in how they diverted attention. This simple BMT was highly accepted by children, and appeared effective in aiding anxiety and coping.

This preliminary study demonstrates children's awareness of their dentist's behaviours, and builds upon limited investigation into children's dentistry perceptions[19]. Indeed, this study begins to address some of the limitations from a recent systematic review regarding gaining child-sourced opinions of BMTs[11]. However, this is a preliminary investigation, and caution is needed in interpreting the findings. We only sampled from a restricted age group, and their age may affect experiences (such as emergence of permanent teeth and orthodontic experiences) and acceptability of BMTs; we can only generalise our present results to this age group. Future research should recruit children from younger and adolescent age groups. In addition, our sample attended school in a relatively affluent rural area which may have affected the findings. The children generally had positive attitudes to dentistry, and were articulate and mature in their responses. The link between socioeconomic inequalities and oral health is well established, and relationships between socioeconomic status and DA have also been suggested[29]. Interviewing children from a range of socioeconomic and geographic areas would provide heterogeneous samples with varied dental experiences, providing opportunities to further explore attitudes and compare them across socioeconomic factors.

Despite children showing understanding of the 'acceptability' measure through piloting, the measure would have benefited from further evaluation and development. Although the scale's Cronbach's level (α=.58) can be

considered acceptable, the literature varies in agreeing upon what level indicates scale reliability[26]. Combining a visual analogue scale with a faces scale could resolve this; Rodd et al[20] used this to assess children's dental treatment satisfaction. This combination may be better in estimating attitudes as children place their own score on the scale instead of discrete numerical categories. Complexity in describing BMTs in child-friendly terms could affect findings, as how BMTs are described affects attitude ratings[30]. BMTs were presented within a scenario; children may have focused on the treatment aspect of the description. Visual stimuli, such as video-recorded demonstrations of BMTs, could provide explicit comprehension of these concepts[12, 13].

Several psychological factors, such as coping styles and parents' DA, can affect children's responses to dental situations[2, 23]; the influence of these psychological factors needs to be explored in future research. Some participants reported attending the dentist with siblings; observing siblings having dental treatment acts as modelling – which is another BMT used in dentistry[2]. The dentist-child relationship is also triangulated to include parental involvement[28]. Dentists perceive parental accompaniment as aiding the effectiveness of BMT delivery[15] and their accompaniment can aid the child's anxiety; their supervision and input can affect the coping mechanisms of their child[6]. Additionally, oral health history was not assessed in the present study; although participants were asked about prior treatments, naturally there may be recall problems. Future research could explore the impact of parental accompaniment on BMT perceptions, investigate perceptions between parents and their children, and work with parents to assess their child's dental history.

Conclusion

This preliminary mixed-method study showed that children aged 9-11 years found most of the commonly-used BMTs generally acceptable, and appeared satisfied with their dentist's communication skills. However, several of the BMTs were not found to be acceptable by some of the children. Importantly interviewing children provided evidence that the children in our sample appear to be treated in a patient-centred and age-appropriate manner by their dentists. The study demonstrates this age group's capability to provide their own viewpoints and show comprehension of BMTs. Therefore, dentists may want to discuss the possibility of using different BMTs with this age range of children, to help tailor these to individual preferences and (further) facilitate good child patient-practitioner communication.

Why this paper is important to paediatric dentists

Point 1: Children aged 9-11 years are able to voice their opinions regarding their dentist's communication and use of behaviour management.

Point 2: Children were generally positive about dentist's communication and established BMTs. Voice control was the least favourable BMT. Stop signals were perceived most favourably, and could be employed easily in practice.

References

1. Cohen SM, Fiske J, Newton JT. The impact of dental anxiety on daily living. *Br Dent J* 2000; **189**: 385–390.

2. Bhatia S, Chadwick B. Behaviour management of anxious children. *Dental Nursing* 2009; **5** (10).

3. Nuttall NM, Gilbert A, Morris J. Children's dental anxiety in the United Kingdom in 2003. *J Dent* 2008; **36**: 857–860.

4. Locker D, Liddell A, Dempster L, Shapiro D. Age of onset of dental anxiety. *J Dent Res* 1999; **78** (3): 790–796.

5. Tickle M, Jones C, Buchannan K, Milsom KM, Blinkhorn AS, Humphris GM. A prospective study of dental anxiety in a cohort of children followed from 5 to 9 years of age. *Int J Paediatr Dent* 2009; **19**: 225–232.

6. Roberts JF, Curzon MEJ, Koch G, Martens LG. Review: behaviour management techniques in paediatric dentistry*. Eur Arch Paediatr Dent* 2010; **11** (4): 166–174.

7. Curzon M. Behaviour management in paediatric dentistry: historical perspectives*. Int J Paediatr Dent* 2008; 9 (Suppl. 1): 3-5.

8. Eli I, Baht R, Blacher S. Prediction of success and failure of behaviour modification as a treatment for dental anxiety. *Eur J Oral Sci 2004;* **112**: 311–315.

9. Pawlicki R E. Psychological/behavioural techniques in managing pain and anxiety in the dental patient. *Anesth Prog* 1991; **38**: 120–127.

10. Wardle J. Psychological management of anxiety and pain during dental treatment. *J Psychosom Res* 1983; **27** (5): 399–402.

11. Zhou Y, Cameron E, Forbes G, Humphris G. Systematic review of the effect of dental staff behaviour on child dental patient anxiety and behaviour. *Patient Educ Couns* 2011, 85 (1): 4-13.

12. Murphy MG, Fields Jr. HW, Machen B. Parental acceptance of pediatric dentistry behaviour management techniques. *Pediatr Dent* 1984; **6** (4): 193–198.

13. Kantaputra PN, Chiewcharnvalijikit K, Wairatpanich K, Malikaew P, Aramrattana A. Children's attitudes towards behaviour management techniques used by dentists. *J Dent Child* 2007; **74** (1): 4-9.

14. Chadwick B, Hosey MT*. Child taming: how to manage children in dental practice*. London: Quintessence Publishing Co. Ltd: 2003.

15. Crossley ML, Joshi G. An investigation of paediatric dentists' attitudes towards parental accompaniment and behaviour management techniques in the UK. *Br Dent J* 2002; **192**: 517-521.

16. Gill P, Stewart K, Treasure E, Chadwick B. Conducting qualitative interviews with school children in dental research. *Br Dent J* 2008; **204**: 371–374.

17. Adair SM. Behaviour management conference: panel I report-rationale for behaviour management techniques in paediatric dentistry. *Pediatr Dent* 2004; 26 (2): 167-170.

18. Marshman Z, Gibson BJ, Owens J, Rodd HD, Mazey H, Baker S, Benson PE, Robinson PG. Seen but not heard: a systematic review of the place of the child in 21st-century dental research. *Int J Paediatr Dent* 2007; **17**: 320–327.

19. Marshman Z, Hall MJ. Oral health research with children. *Int J Paediatr Dent* 2008; **18**: 235–242.

20. Rodd HD, Abdul-Karim A, Yesudian G, O'Mahony J, Marshman Z. Seeking children's perspectives in the management of visible enamel effects. *Int J Paediatr Dent* 2011; 21: 89-95.

21. Howard KE, Freeman R. Reliability and validity of a faces version of the Modified Child Dental Anxiety Scale. *Int J Paediatr Dent* 2007; **17**: 281-288.

22. Campbell C, Hosey MT, McHugh S. Facilitating coping behaviour in children prior to dental general anaesthesia: a randomised controlled trial. *Paediatr Anaesth* 2005; **15**: 831-838.

23. Howard KE, Freeman R. An evaluation of the PALS after treatment modelling intervention to reduce dental anxiety in child dental patients. *Int J Paediatr Dent* 2009; **19**: 233–242.

24. Burnhard P, Gill P, Stewart K, Treasure E, Chadwick B. Analysing and presenting qualitative data. *Br Dent J* 2008; **204** (8): 429-432.

25. Gill P, Stewart K, Chetcuti D, Chestnutt IG. Children's understanding of and motivations for toothbrushing: a qualitative study. *Int J Dent Hyg* 2011; **9**: 79-86.

26. Bowling, A. *Research Methods in Health* (3rd Ed.) Maidenhead: Open University Press; 2009.

27. Smith PA, Freeman, R. Remembering and repeating childhood dental treatment experiences: parents, their children, and barriers to dental care*. Int J Paediatr Dent* 2009; **20**: 50–58.

28. Wright GZ. Psychological management of children's behaviours. In: McDonald RE, Avery DE (Eds.). *Dentistry for the child and adolescent* (7th Ed). St Louis, MI: Mosby, Inc; 2000. p34-51.

29. Doerr PA, Lang WP, Nyquist LV, Ronis DL. Factors associated with dental anxiety. *J Am Dent Assoc* 1998; 129: 1111-1119.

30. Peretz B, Zadik D. Parents' attitudes toward behaviour management techniques during dental treatment*. Pediatr Dent* 1999; 21 (3); 201–204.

Figure 1. Two examples from the measure developed to assess participants' acceptability of BMTs.

Figure 2. Flowchart showing sequence for the semi-structured interviews.

Table 1. Mean BMT ratings in order of acceptability.

Behaviour management technique	*Mean ± SD*
Stop signals	1.62 ± 0.89
Distraction	1.69 ± 1.03
Communication	1.70 ± 0.94
Positive reinforcement	1.80 ± 0.88
Tell-show-do	2.04 ± 1.13
Sensation information	2.27 ± 1.20
Inhalation sedation	2.61 ± 1.13
Voice control	3.03 ± 1.30

Table 2. Response frequencies reported for each scale point on the 'acceptability' measure.

Behaviour management technique	Numerical responses on the 'Acceptability' measure*				
	1	2	3	4	5
General communication	35	13	12	1	1
Voice control	6	12	26	10	8
Positive reinforcement	31	12	19	0	0
Tell-show-do	27	14	14	5	2
Sensation information	22	15	13	10	2
Stop signals	37	13	11	1	0
Distraction	37	13	8	2	2
Inhalation sedation	12	17	19	11	3

*Lower numbers indicate higher acceptability, higher numbers indicate lower acceptability. The middle number indicates a neutral response.

Table 3. Mean acceptability scores* (standard deviation) for each BMT by level of dental anxiety

	Behaviour management techniques							
Dental anxiety	*General communication*	*Voice control*	*Positive reinforcement*	*Tell-show-do*	*Sensation information*	*Stop signals*	*Distraction*	*Inhalation sedation*
Low (n=43)	1.55 (.76)	2.93 (1.14)	1.74 (.87)	2.13 (1.16)	2.27 (1.18)	1.74 (.95)	1.62 (.97)	2.51 (1.18)
Moderate (n=12)	1.75 (.96)	3.25 (1.21)	2.00 (1.04)	1.83 (1.11)	2.33 (1.30)	1.50 (.79)	2.16 (1.33)	3.00 (.95)
High (n=7)	2.57 (1.51)	3.28 (.95)	1.85 (.69)	1.85 (1.06)	2.14 (1.34)	1.14 (.37)	1.28 (.487)	2.57 (1.13)
Overall participants (n=62)	1.70 (.94)	3.03 (1.13)	1.80 (.88)	2.04 (1.13)	2.27 (1.20)	1.62 (.89)	1.69 (1.03)	2.61 (1.13)

*Higher scores on the 'acceptability' measure indicate lower acceptability of BMTs. Lower scores on the 'acceptability' measure indicate higher acceptability of BMT.