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Children's views on the experience of a visual examination and intra-oral photographs to detect dental caries in epidemiological studies

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Aim: To elicit children's views on the established visual examination method used for the epidemiological surveillance of dental caries and an experimental intra-oral photographic examination method. ***Method:*** Focus group interviews were conducted with 5-year-olds (with the aid of a puppet) and 10/11-year-olds (without puppet) after experiencing both methods. Ten focus groups were conducted in each cohort. ***Results:*** The children's views on the methods related to the acceptability of their experience. The key factors affecting acceptability and preferences related to the combined effects of contextual factors prior to the examination and experiences during the examination. These included communication and children's expectations. These factors influenced the examination experience along with their feelings about the environment and the tactile sensation from instruments in the mouth. Most children preferred the experimental photographic method as a means of caries detection over the traditional visual examination. They also wanted feedback on their oral health and more communication on what was happening during the examination. ***Conclusion*** Appropriate communication, attention to the examination environment and handling of instruments can enhance the dental examination experience for children in the school setting. The children's preferences indicated that generally, the intra-oral camera was well received as a means of caries detection for epidemiological studies within the school setting. These results may have implications for seeking ethical approval and conducting epidemiological studies on children in the future.

Key words: *children's views, caries detection, dental epidemiology, qualitative, intra-oral photographs, visual dental examination*

Introduction

Children are examined in dental caries research and surveillance programmes and yet we know little about their views on participation in these studies. Children are not miniature adults, therefore undertaking research involving children using adults' perceptions of what they suppose are children's views is at best inadequate.

In the UK, dental caries remains the disease most commonly affecting children and National Health Service (NHS) epidemiological dental health surveys of children provide data for monitoring caries trends and commissioning dental services. These nationally coordinated surveys use dentists, trained and calibrated in the use of a visual examination method developed by the British Association for the Study of Community Dentistry (Pitts *et al*., 1997) as the means of detecting dental caries. The dentists visit schools to examine participating children.

To produce top level evidence, studies evaluating the effectiveness of caries interventions require that examiners collecting research data are "blind" to certain attributes of participants e.g. area of residence. Using traditional visual examination methods, the usual way to "blind" examiners to participants' places of residence is by transporting participants to examination sites outside the test and control areas (Milsom and Mitropoulos, 1990). Ethically and logistically this is impractical in studies involving thousands of children. Although the use of radiographs in epidemiological surveys has been advocated (Gowda *et al.,* 2009), their use may be more appropriate in longitudinal studies to monitor inter-proximal caries progression in permanent teeth (Arrow, 2007). Other novel caries detection methods may not be suitable for epidemiological studies because they are cumbersome to use in the field on children or are dependent on user expertise or the physical environment (Pretty, 2006). An alternative method of "blinding" examiners would be for examiners to inspect intra-oral photographs of participants' teeth.

Before this alternative method can be recommended for use in research and surveillance programmes, it ought to be tested for acceptability, validity and reliability as a caries detection method. There is little information available on children's views on the NHS epidemiological surveys. Although the literature records how challenging it can be to obtain accurate reflections of children's views on issues that affect them, evaluation of therapies and/or services for children would be incomplete without inclusion of their views. Attempts should be made to understand what children truly think of the dental health surveys they participate in. These surveys regularly involve 5-, 10-, 11- and 12-year-olds to allow regional, national and

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international comparisons. Therefore the development of new caries detection methods for use in these surveys should involve the same or similar age groups.

Methods used to appraise children's views and experiences originated from research assessing pain experienced by children. These included simple visual analogue scales like the Oucher scale and the Children's Hospital of Eastern Ontario Pain Scale (Beyer *et al.,* 1992; Lyon and Dawson, 2003). Their core feature is the use of facial expressions as a response scale to indirectly measure subjective attitudes. Applying these scales to elicit children's views can be simplistic. Other techniques have been used to elicit the views of young children across a wide range of themes. These include the use of focus groups and semi-structured interviews, storytelling, art/drawing, writing, role play and the use of puppets (Chapparo and Hooper, 2005; Fredman *et al.,* 2007; Heary and Hennessy, 2002).

To obtain children's views on both the intra-oral photographic and the visual examination methods, age-appropriate techniques should be employed. Very young children find it easier to communicate with and through puppets in role plays (Hay *et al.,* 1992; Lewis *et al.,* 1992). If this is carried out in small groups, children feel more at ease than having their views sought in isolation. The aim of the study was therefore to elicit children's views on the visual examination and an intra-oral photographic assessment examination method for detecting caries in epidemiological studies.

Method

Ethical approval was obtained for the study from the National Research Ethics Service, UK (Reference Number: North West 10 09/H1011/57).

The study population comprised 2 groups of children: 5-year-olds and 10/11-year-olds attending 5 primary schools in Rochdale, a town in north-west England. These age groups were chosen to match those of national and international caries surveys.

Study information sheets, letters and consent forms were sent to parents of eligible children via the schools. The 10/11-year-olds were also given study information sheets. Only children who had experienced both the visual and photographic examination methods in the last week, whose parents gave explicit consent, and themselves agreed, were included in the study.

In each school, the research team liaised closely with teachers to determine a purposive sample comprising 2 focus groups of five 5-year-olds and 2 groups of five 10/11-year-olds, a total of 20 groups. Interviews were conducted separately with each focus group in their school and digital audio recorded.

For the 5-year-olds, the children and the interviewer (with the puppet) sat in a circle in a quiet room familiar to the children. Before starting each interview, the children were familiarised with the recording equipment, the puppet and the rules of engagement for the interview. The visual prompts were used to help the children recall their examinations. Told that the puppet was going to have both examinations the children discussed what the puppet could expect and how it might feel. Interviews lasted on average about 30 minutes.

The 10/11-year-olds' interviews were conducted in a similar fashion without the use of the puppet. The children were asked directly their individual views on the two examination methods.

The audio recordings of the interviews were transcribed and analysed using a grounded theory approach, the constant comparative method (Green and Thorogood, 2004; Strauss and Corbin, 1998). After each 4 interviews, transcripts were analysed using line-by-line open coding. The words and short phrases generated summarised the substance of the text. Data collection and analysis proceeded concurrently, allowing the emerging findings to be developed (Pope *et al.,* 2000) and refine the interview guide for subsequent interviews and so clarify the data being captured. Data were scrutinized for deviant cases and confirming views across the range of children. Data collection halted once there were little new data emerging from the analysis. To validate the analysis transcripts were scrutinized by an independent reader not otherwise involved in the study. Quotes indicative of the children's views are reported to show that the analysis is grounded in their accounts.

Results

From 5 primary schools, 100 children participated in the study: fifty 5-year-olds and fifty 10/11-year-olds. The male to female ratio was 1:1. There were no drop-outs as the sample was purposefully obtained.

Six categories emerged from the analysis: Communication – recall of information given pre-examination and desired explanation or reassurance; Expectation – perceptions of what examinations would entail; Initial Impressions – feelings on entering the examination room; Experiences – relates to the examination itself; Preferences – choice of examination method; and, Improvements – suggested enhancements. The Experiences category was sub categorised as: dental examinations in general (further divided into environmental and feelings properties); examination with mirror (sensations in the mouth and feelings properties); the camera (also sensations in the mouth and feelings properties); and, seeing camera images of one's teeth. Each property had positive and negative dimensions.

Overarching these categories was the perception of the acceptability of the dental examination. The main and sub-categories were constructed to present a preliminary model of the dental examination in a school setting and how these contribute to children's acceptance of the intra-oral camera and mirror (Figure 1).

Most children preferred the photographic method to the visual examination. A third were equally happy with both methods while a minority expressed negative views on both methods.

Discussion

The main finding of this study was that the children's experiences affected their views on the examination methods' acceptability. Factors affecting acceptability and the preference related to the combined effects of contextual factors before examination and experiences during the examination including communication and

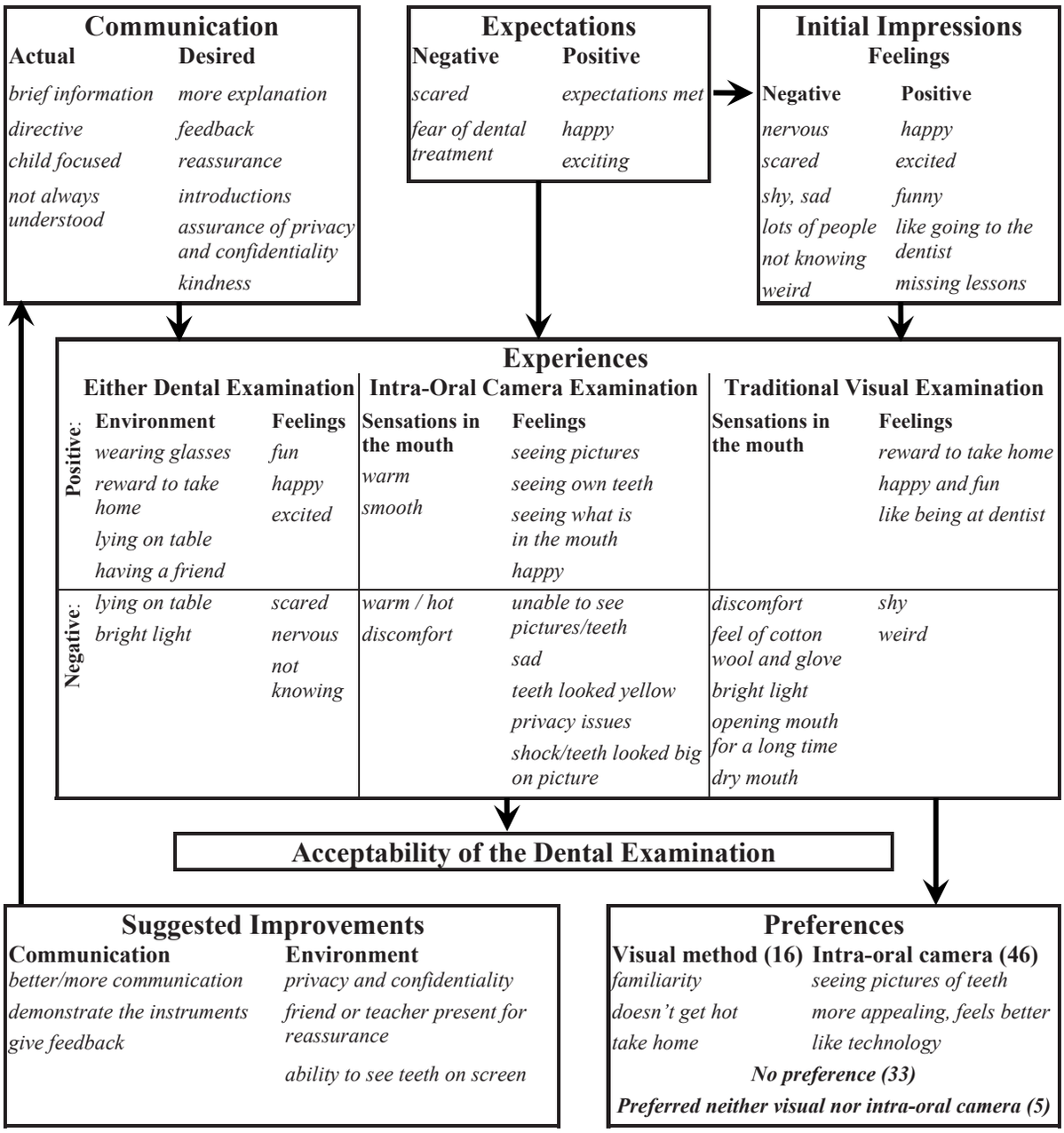

Figure 1. *A grounded theory of children's acceptability of the dental examination in the school setting*

children's expectations. These factors influenced the examination experience along with their feelings about the environment and the tactile sensation in their mouths from instruments. They also wanted more communication during the examination and feedback on their oral health.

The responses about communication indicated that in general the examiners gave directive instructions and brief information to the children about what was happening and in some cases this was child focused. The level of fear, nervousness and lack of understanding in some cases however, suggests that those children had not been fully informed about the dental examination or had misunderstood the information given. The responses about the communication they would have liked revealed a discontinuity with the communication actually received.

"They could have given us more information on what they were actually like doing and how the teeth were. Not just say they are OK, like tell us" Child 15-1

The children in this study considered communication between the dental epidemiology team and themselves to be a factor which contributed to their level of acceptability of the examination methods. This was emphasised in the improvements suggested by children for the examinations.

Past dental experiences and preconceived ideas shaped the children's expectations of dental examination which in turn seemed to affect their initial impressions of the examination room in both examination methods. This is not surprising as generally dentistry produces anxiety and fear in a number of children (Tickle e*t al.,* 2009). Although some children were not daunted by the dental examination and had resilience to what was a new experience, the responses showed that for others their expectations were negative, dominated by fear, uncertainty and nervousness.

"At first before I walked in to the room, I felt really happy and excited". Child 4-4

"When we first walked in we were all scared and nervous because I didn't know what we were going to do..." Child 4-2

It was apparent from the children's responses that the environment in which the examinations were performed played a part in determining the acceptability of both methods as did sensations in the mouth from instruments and items such as cotton wool used for the examinations.

"when they put the light on and I put my sunglasses on, you know that mirror thing, it looks like a knife but, then I took my glasses off and it was, it didn't look like a knife so I just put them back on while they counted my teeth" Child 8-3

This is consistent with findings in the literature that the environment in which dental care is provided and the manner in which care is received influences how patients perceive the experience. A supportive dental environment with strategies to make patients feel relaxed and in control, increases the patient's acceptability of the dental care provided (Law and Blain, 2003). An important part of these strategies is communication between the dental team and the patients.

Fewer participants preferred the visual examination method over the photographic method. Of those children who preferred the visual examination method, familiarity with the process and the fact that they could keep the disposable examination mirrors used contributed considerably to its acceptability. Others complained of a dry mouth and disliked the taste of the examination gloves used. Although gloves were also worn for the intra-oral camera examination method, the children did not comment on their taste. This could be explained by the children being distracted by their interest in the intra-oral camera's images of their teeth.

Children generally liked the intra-oral camera. Some liked the technology, others liked seeing images of their teeth.

"I liked it when I saw my teeth because naturally humans don't get to actually look inside their mouth, because of the positioning of their eyes, and except looking at them in the mirror when you are brushing your teeth, there is a brush in the way so you can't actually see right at the back, wherever the photo was took so quite interesting actually, to see what they actually looked like". Child 7-5

Some children would have preferred to see these images throughout the examination though others found the magnified view and yellow teeth shocking.

"It felt horrible because ... the teeth had like yellow stuff on… I really hate yellow so when I grow up I might get my teeth whitened" Child 8-2

Another characteristic of the camera commented on was its temperature after repeated use. The warmth was liked by some but painful or uncomfortable for others. Switching periodically to a new camera might overcome this difficulty..

Very few children were happy with both examination methods and even fewer expressed negative views on both. The latter group were generally those who had negative experiences and expectations of dental examinations.

Although children may consent by their conduct to partake in epidemiological studies, dental epidemiological teams could enhance the experience for child participants by conducting the dental examinations in conducive environments with more explanatory and effective communication.

Other improvements suggested by the older children related to privacy and confidentiality issues. Peer victimisation, teasing and bully among school children are still major issues (Lunde *et al.,* 2007) even though most schools have policies to control these problems. Physical appearance such as malocclusion has been listed as one of the characteristics for which children are bullied (DiBiase and Sandler, 2001). A few of the children in the study were worried by other children seeing or hearing what the examiners had to say about their teeth. For dental examinations taking place in the school setting, the environment that dental epidemiology teams have to work in is often dictated by the space schools can spare. This can result in children being examined in a non-confidential manner. Other children especially those with negative experiences and preconceived ideas about dentistry however requested reassurance from the presence of a friend or teacher if required.

As far as we can discover, this is the first study to use a grounded theory to explore children's views and experiences of the established visual examination method and obtaining intra-oral photographs for dental examinations in schools. The findings demonstrate that children should not be considered passive participants in the dental examination but rather as a group able to express their views on their experiences and exercise discernment in their attitude regarding what happens to them. Dental epidemiology teams need to be sensitive to children's needs and improve the acceptability of the dental examination experience by managing the contextual factors including communication, the examination environment and handling instruments in the mouth.

Intra-oral photographs enable archiving of images which can be revisited for a number of purposes, for example longitudinal studies; enable examiner blinding in research studies; offer the possibility of remote dental examination and screening; and support the use of a single examiner to assess all participants in epidemiological studies thus eliminating concerns about inter-examiner reliability.

In order to progress the development of the use of intra-oral photographs as a means of detecting caries in dental public health epidemiological studies, as well as the children's views, the views of other stake-holders especially those of the dental epidemiology team should be sought on how user-friendly and cost effective the experimental method is compared to the established method.

Conclusion

Children's views on the examination methods related to the level of acceptability of their experience. The key factors affecting acceptability and children's preferences related to the combined effects of contextual factors prior to the examination and experiences during the examination. Appropriate communication, attention to the examination environment and sensitivity in handling instruments could enhance the dental examination experience for children in the school setting. The children's preferences indicated that generally the intra-oral camera

was well received as a means of caries detection for epidemiological studies within the school setting.

These results may have implications for seeking ethical approval and conducting epidemiological studies on children in the future.

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