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Children's understanding of and motivations for toothbrushing: a qualitative study

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Abstract: *Objective:* To explore children's understanding of why they do or do not brush their teeth and their motivations for toothbrushing. *Methods:* Individual semi-structured interviews were conducted with 66 children aged 6–7 years and 10–11 years in four purposively selected primary schools in Cardiff, UK. Data were analysed using a constructive process of Thematic Content Analysis and techniques of open and selective coding. *Results:* While a routine activity, toothbrushing was prompted rather than monitored by parents and easily fell by the wayside because of tiredness, excitement or distraction. Rationalizations for toothbrushing were poorly formed in the children's accounts and related to 'doom scenarios' such as teeth falling out, or to issues of personal grooming and cleanliness rather than caries prevention. Electric (powered) toothbrushes were popular and had engaged the children's interest. Social and domestic circumstances, such as when children stayed with different parents at different times, impacted on toothbrushing routines. *Conclusion:* This study has revealed information that is of value in directing oral health education messages, oral health promotion programmes and has identified issues that potentially affect compliance with toothbrushing that merit further investigation.

Key words: child; children; dental caries; oral health education; oral hygiene; toothbrushing

Introduction

Despite being preventable, dental caries is one of the most common childhood diseases in the world (1). In many developed countries, oral health has improved in older children in recent decades, but remains a significant problem in younger

children. In the United States of America, 42% of children aged 2–11 years had dental caries in their primary teeth in the period 1999–2004 (2). In the United Kingdom, 43% of 5 year-olds and 57% of 8 year-olds were similarly affected (3).

Systematic reviews have shown that the provision of fluoride is a key element in the prevention of tooth decay (4, 5). In the absence of sufficient fluoride in drinking water, the most effective way of bringing fluoride into contact with the teeth is by brushing regularly with a fluoride containing toothpaste, with frequency of toothbrushing being related to effectiveness in caries prevention (6, 7).

The motivations for oral health care among adolescents have been relatively well documented. However, there is a lack of research that explores younger children's understanding of why they brush their teeth or the factors that motivate them to do so. Motivators directed through school-based initiatives and parents have traditionally focused on health issues related to adopting positive oral health behaviours (8–10). In adolescence, research suggests that aesthetic and psychosocial factors (e.g. family and peer pressure) are significant in motivating oral health behaviours, with toothbrushing characterized as more of a personal hygiene than health-related behaviour (11, 12).

In teenagers, toothbrushing behaviour and frequency are closely associated with a variety of factors such as personal grooming, general cleanliness (e.g. hair washing) and especially a good personal appearance (11, 13). Differences in toothbrushing habits in 14 and 15 year olds have also been found to been related to factors such as social groups, gender, self esteem, life variables (e.g. time of getting up, going to bed, dietary habits) and reasons for brushing (11).

Thus, while motivation for toothbrushing in adolescents has been thoroughly investigated, there is a need to understand better young children's perceptions of why they should brush their teeth. This information is potentially useful in directing oral health promotion initiatives, in designing health education material directed at younger age groups and in examining issues surrounding compliance with toothbrushing and toothpaste use.

This study explored the understandings and motivations of children aged 6–7 years and 10–11 years. These age groups were selected as children are at an age where parental supervision of toothbrushing is generally ending and the role of adolescent motivators may not yet be prominent. These ages also represent a crucial stage of childhood development when health-related behaviours adopted routinely are more likely to be sustained into adulthood (14, 15).

Aims

The aims of the study were to explore children's understanding of why they do or do not brush their teeth and their motivations for toothbrushing.

Study population and methods

Approach

For reasons of lack of relevant research in this area, particularly among this age group, and the need for a detailed understanding of children's perspectives of the topic, a qualitative research approach was used. Qualitative methods, such as interviews, can offer a unique insight into people's personal perspectives, providing a more comprehensive understanding of their beliefs, knowledge and attitudes as well as offering greater depth and methodological flexibility than quantitative research methods such as structured questionnaires (16, 17). Recent projects undertaken by the researchers have highlighted the deeper understanding qualitative methods can offer healthcare research. These include studies of infant feeding practices (9), children's understandings about food (18) and opportunities and barriers to promoting oral health in primary schools (19). Research has also shown that, with the appropriate support from experienced researchers, interviews can yield detailed, reliable and trustworthy accounts from young children and lead to revelations of knowledge not commonly known by adults (20). Consequently, the research focus has recently shifted from seeking information about children to seeking information directly from them, with most researchers generally now agreeing that the best sources of information about children are children themselves (20).

Recruitment and sampling

The research was conducted in Cardiff, South Wales, UK. Cardiff is the capital city and administrative centre of Wales, with a population of approximately 320 000. The city has areas of high and low deprivation adjacent to one another and also includes the highest proportion of ethnic minorities in Wales (21). All primary schools in Cardiff (n = 106) were invited, by letter, to participate in this study. From the 27 schools (25%) who responded, four were purposively selected from demographically diverse areas of the city. For example, to compare and contrast perspectives, schools were purposively selected from recognized areas of socioeconomic deprivation and affluence and outer and inner city locations (the latter of which also

had a high proportion of children from ethnic minority groups).

Parents of all children in Years 2 (aged 6–7 years) and 6 (aged 10–11 years) at each school were sent information packs asking if they would permit their children to be interviewed at school. In total, 66 consent forms were returned and all of these children participated in the study; 38 in Year 2 (21 girls, 17 boys) and 28 in Year 6 (16 girls, 12 boys) (Table 1).

Data collection

Individual, semi-structured interviews were conducted with the children from the two age groups, to explore issues in a manner sensitive to the understandings, interpretations, priorities and vocabulary of the participants. A semi-structured interview schedule was devised to explore issues relating to the children's understanding of toothbrushing and factors that motivated them (or not) to brush their teeth. Interview questions informed the discussions and areas explored in the interview schedule included opinions about; what the children understood about toothbrushing, the implications of not brushing, diet, parental and peer issues.

The focus of the interviews was not to establish verifiable 'facts' about these issues, but to gain an understanding of personal views, perspectives and what the children understood and thought about the topic areas. The interviews were conducted in a quiet, observable area of each school by the project researcher (PG), an experienced childhood researcher, who had previously visited the schools prior to data collection and had been introduced to all of the children in the years sampled (to establish familiarity and rapport) by the head teachers. The interview schedule was piloted on four children (two from year 2 and two from year 6) in school 1, to establish its understandability to the children and ability to address the aims of the study, prior to the main phase of data collection. These interviews were subsequently reviewed by the research team and deemed satisfactory. Consequently, no changes were made to the interview schedule.

Table 1. **Demographics of study participants**

	Year 2		Year 6		
School	Girls	Boys	Girls	Boys	Total
1	4	3	4	0	11
2	5	2	3	4	14
3	6	4	4	4	18
4	6	8	5	4	23
Total	21	17	16	12	66

Interviews were conducted between June and July 2007 and lasted between 10 and 30 min.

Data analysis

All interviews were digitally recorded, transcribed verbatim and analysed using a constructive process of thematic content analysis. Analysis of the transcripts was managed using the software packages QSR N6 for initial coding and the compatible NVivo 2 for theory building and reporting functions (QSR Victoria, Australia).

Analyses of the data were also validated using a process of 'inter-rater reliability' within the research team (PG and KS). This is a process whereby at least two researchers analyse the data separately before agreeing on a thematic framework. It has been argued that the involvement of an additional experienced qualitative researcher may help guard against the potential for lone researcher bias and help provide additional insights into theme and theory development (22, 23).

The analysis stages were:

1 The identification of initial broad thematic areas from research aims, interview schedules and initial familiarization with interview data;

2 Coding of transcripts and development of more detailed thematic codes;

3 Reflective discussion of emerging coding, further re-interrogation, refinement and application of coding categories;

4 Identification of relationships between coding categories;

5 Development of key themes identified by these categories and relationships.

Data extracts have been systematically used in this paper to highlight and illustrate key issues within each central theme, which in turn were identified by systematic analysis of the interviews.

Ethics

Ethical approval for this study was granted by the Medical and Dental Research Ethics Committee at Cardiff University in March 2007. As children are legal minors, written informed consent was provided by the parents/guardians. However, children's assent (agreement to participate) was also sought prior to all interviews. Interviews were conducted by PG (who has worked with children before) and has the appropriate CRB (Criminal Records Bureau) clearance. Children and parents were assured of anonymity and confidentiality and advised that they could stop the interview and, or withdraw from the study at any time, if they so wished, without prejudice.

Results

The findings are presented below according to these areas of inquiry:

1 Why do the children brush their teeth?
  a. Because they are told to
  b. To clean or refresh their mouth
  c. For health reasons
  d. Because it is routine
2 How do they brush their teeth?
3 What do they think causes them to need fillings?
4 Where do the children say they get oral health information?

1. Why do the children brush their teeth?

a. Because they are told to

Overwhelmingly, the children describe being reminded to brush their teeth by parents or other relatives (mostly grandparents), but that this prompting amounts to no more than a verbal reminder: either to instruct the child to go and brush or to enquire if they already have.

My mum tells me sometimes to brush my teeth … she says before you go to bed you must brush your teeth so I do that and then and then I go to bed and stuff **(Girl, year 6)**

PG: *Does someone tell you to brush your teeth those times?*
Girl, year 6: *My mum*
PG: *What does she say?*
Girl: *[Have] you brushed your teeth?*

My mum sometimes has to nag me to brush my teeth and sometimes she asks if I did brush my teeth **(Girl, year 6)**

On the whole, the children reported that they are not being monitored or supervised beyond these verbal reminders. Children in both age groups (as young as 6) brush their teeth alone and without direct instruction.

I just brush 'em on my own **(Girl, year 2)**

PG: *and where does she tend to be when tells you or asks if you've brushed them?*

Boy, year 6: *Erm, well she's probably looking after the baby, and I make sure I'm brushing my teeth because I don't want bad teeth*

While the consistency of prompting at children's primary home was evident, it varied greatly when they stayed away from their main home: usually either with grandparents, a parent who lived elsewhere, or a friend's house. While grandparents prompted as much as (if not more than) parents at home, parents whose children visited prompted much less. This lower prompting by non-resident parents could be due to the irregular or less frequent presence of the child, preventing the establishment of a routine to remind. However, prompting by parents at friends' houses was also extremely unreliable, indicating the fragility of the routine and the ease with which the routine to remind is disrupted among contemporary parents of this age group, and suggesting a lack of prioritization of toothbrushing.

PG: *So, when you say you have one at your dad's, do you keep a toothbrush or something there?*

Girl, year 6: *Yeah, I keep extra stuff there as well*

PG: *Right ok, and do you do anything differently when you stay at your dad's?*

Girl: *I um, tend not to take my mouthwash with me, I only use it when I'm at my house*

PG: *Ok and does your dad ever ask you or tell you about brushing your teeth?*

Girl: *No, but I erm, a couple of times he asked me, and when he doesn't I say oh I've brushed my teeth, I've brushed my teeth!*

Some of this lapsing at others' houses may be, in part, related to how easily toothbrushing lapses because of tiredness, distraction or excitement in any setting. When the usual routines and habits of the child's day are disrupted, it is usual for toothbrushing to be forgotten about. This is sometimes the case at home, and more usual at a sleepover[1] or access visit.

PG: *And do you brush your teeth if you have a sleepover?*

Boy, year 6: *Erm yeah, well I try anyway! … You have so much fun you forget about it*

This apparent abrogation of close monitoring of toothbrushing is also suggested in the children's accounts of the products they use to brush their teeth. The use of electric (powered) toothbrushes were very popular, with some children mentioning electric toothbrushes with a timer. This suggests that strategies are being adopted to replace rather than enhance parental roles in supervision.

I have two of 'em, one that lights up and tells me when to stop, and spits out, and one I can brush my teeth with and brush my tongue. **(Boy, year 2)**

Aside from toothbrushes with timers, some children mentioned other artificial reminders, which may also point to replaced rather than enhanced parental supervision.

Girl, year 2: *my nan got me a sign that says have you cleaned your teeth and it's and it's in the bathroom and I, whenever I see it I just go and, go up and clean my teeth*

[1]Sleepover – an activity common amongst children in the UK where they stay overnight with a group of friends. Usually involves copious amounts of sugar rich food and little sleep!

Girl, year 6: *[the dentist] gave me this the timer*

Most children, in both age groups, used adult toothpaste rather than products targeted at children, although there was more evidence of these being used in the younger age group, especially among those with younger siblings.

b. To clean or refresh their mouth

The consequences of maintaining toothbrushing were discussed with the children. The most prominent reasons given related to appearance, freshness and cleanliness:

PG: *Ok, why, you said you brush them in the morning and in the evening as well, why do you brush them those times?*

Girl, year 6: *Because I want 'em nice and fresh for school*

PG: *Right*

Girl: *And because I eat between the morning and the evening so I get rid of all the food …*

PG: *Ok, and why do you brush them at those times?*

Girl, year 2: *Because you might have all food stuck in them and they and you might have a smelly breath after a while*

c. For health reasons

Vague concepts of health, and stopping teeth falling out were also cited by the children as reasons to maintain toothbrushing. Although tooth loss was frequently cited, the children did not relate caries prevention to toothbrushing.

Once, I was at, for my mum, said that you've gotta brush your teeth cos your teeth might go all grotty … And they might fall out **(Boy, year 2)**

Girl, year 6: *She would just tell me to go and brush my teeth, cos like I forget sometimes at night*

PG: *Yeah, and why do you think she does that?*

Girl: *So I can stay healthy*

d. Because it's routine: they just do

The data give a very clear picture of toothbrushing as a routine activity, which (as discussed above) is a home-based routine prompted, but not monitored or supervised by parents, and easily falls by the wayside as a result of tiredness, excitement or distraction. Related to this easy lapsing, rationalizations for toothbrushing are poorly formed in the children's accounts.

Because brushing your teeth is important cos of … it's just important … **(Girl, year 6)**

This picture of a poorly rationalized routine is supported by the evidence (discussed below) on how well the children understood how to brush their teeth, and what the consequences of toothbrushing (or not) were.

2. How do they brush their teeth?

Children seemed unclear as to what toothbrushing achieved or how best to brush their teeth, and this was the case across both age groups and all schools. When asked about how they brush their teeth, they almost all replied immediately and confidently that they brush twice a day. Yet when probed further, they did not convey a sense of knowing the time they devoted to brushing or more precise details of brushing technique.

Girl, year 2: *My mum told me to brush my teeth twenty times*

PG: *Ok, how long do you brush your teeth for?*

Girl: *Twice*

PG: *Twice, as in?*

Girl: *A day*

PG: *Twice a day, ok and when you brush them, about how long do you brush them for each time, can you think?*

Girl: *… [silence]*

PG: *No? Ok, that's alright.*

PG: *And do you know roughly about how long you brush your teeth for?*

Girl, year 6: *I brush my teeth for about five, six minutes*

PG: *and about how long do you brush your teeth for?*

Girl, year 6: *Um … about twenty, twenty-seconds something like that*

3. What do they think causes them to need fillings?

The children spoke of how brushing cleared debris and germs, or improved smell and appearance, but did not connect these to the consequences of good oral health care and, in particular, caries prevention. In the latter parts of the interviews, the children were asked about whether or not they had had any fillings.[2] Most had had fillings at some point, and they were asked about what they knew about why they had needed the treatment and how they might avoid future fillings. Overwhelmingly the children attributed the need for fillings to diet: chiefly sweets and soft drinks. While this is encouraging, it is notable that the children did not see a role in oral health care routines in their own susceptibility to caries.

Girl, Year 6: *I had my tooth out here but I've gotta have the one up here out, I've had fillings*

PG: *Right ok, and do you know why you had to have fillings?*

[2]Filling is the colloquial term for restoration in the UK.

Girl: *Because I had a hole in my tooth*

PG: *Right, ok. Did the dentist say to you why he thought maybe that had happened?*

Girl: *Yeah*

PG: *What did he say?*

Girl: *Erm he said why do you think like you've got a hole in your tooth? I said I'm not sure, from eating too much sweets*

PG: *Have you had any treatment recently at the dentist like a tooth out or a filling or anything?*

Boy, year 6: *No I, I've had like two fillings*

PG: *Right, and why do you think you had to have fillings?*

Boy: *Erm, cos erm I used to drink loads of coke, I used to drink about one every day, but now I drinks probably one bottle a week*

PG: *Right, ok, and did the dentist say anything to you at the time?*

Boy: *She said erm what do you drink regularly, and I said well I drink coke once a day and she said um you need to cut down on it*

PG: *Right*

Boy: *Erm, that's all really*

PG: *Ok, alright, um do you think it matters if you brush your teeth?*

Boy: *Yeah, cos it make a better appearance of you and feels like better of you cos, when I, if I forget, it just feels wrong on my teeth and that and when I goes and brush 'em, then it feels wrong*

The children's understanding of the role of oral health care routines in caries prevention was not noticeably better among the older age group than the younger group.

4. Where do the children say they get oral health information?

When children revealed information they understood about their oral health (such as the role of diet in caries), they were asked to identify where they had learned the information. The results from these questions were startling. Although qualitative methods do not lend themselves to quantification, the transcripts can be used to examine issues such as emphasis, proportion of talk given to a particular topic and other strategies that allow an ordering of the prominence of certain answers. Using such techniques on these data suggests that the following information sources are drawn on, grouped by in descending order of regularity:

1 Teachers;

2 Dentists; relatives other than parents; literature sources (such as books and magazines);

3 Television; parents.

The prominence of teacher sourced information may be in part because the interviews were conducted in schools, prompting a greater recall of school-sourced information and thus the overwhelming prominence of this should be treated with caution. There is little information in the literature about where children obtain their knowledge about oral hygiene. Clearly, it is important that education relating to oral health and self-care is incorporated into the school health-care curriculum (e.g. Personal, Social and Health Education) and that such education is evidence-based. Oral health educators need to work closely with schools to ensure that appropriate messages on dental health are incorporated into a common-risk factor approach to promoting children's health. How this can be achieved is worthy of further research.

Discussion

In the United Kingdom, as in many other areas around the world, regular use of fluoride containing toothpaste is a key element of dental caries prevention strategies. While previous research has investigated older children's perceptions of this activity, little is known about younger children's concepts of why they should brush their teeth. For maximal effectiveness, fluoride toothpaste should be used more than once daily (7). While the children interviewed in this study reported brushing as a routine activity, this was often undertaken unsupervised by parents and carers, their role being frequently restricted to one of prompting and verbal reminders. National guidelines in the UK recommend that toothbrushing be supervised until age 7 years (24). Therefore, while it is not surprising that the older age group in this study did not mention parental supervision, it is a concern that the younger group had established habits and routines that did not involve parental supervision. Indeed, the lack of demographic variation within the data across all the topics covered (according to age, gender or any socioeconomic status that might be inferred by school catchment area) suggests that the concerns raised by these findings are more universal than traditional notions of oral health disadvantage might suggest.

Compliance in use of medicines has been widely researched in relation to prescription medicines in the wider health field. Non-compliance of patients with medical instructions is a well documented phenomenon in the medical literature and it has been shown that physicians have difficulties in appraising the compliance behaviour of their patients (25). In the dental world, studies on compliance have concentrated mainly on adults, with an emphasis on periodontal therapy (26). In one of the few studies in children, Ashkenazi *et al.* (27) have shown compliance with preventive measures to be low, even in regularly attending paediatric patients. The fac-

tors affecting patient compliance with dental preventive regimes are complex (28). In children, these factors are equally so, as evidenced by the findings of this study. Children are reliant on their parents for the provision of toothbrushes and toothpaste. The changing nature of family structures also complicates parental supervision of toothbrushing. The proportion of children living with one parent in the UK has more than trebled in the past 35 years to 23% in 2007 (29). As illustrated by the children's comments, this means that different arrangements for oral care may prevail when visiting non-resident parents.

The widespread reported use of powered toothbrushes by the study participants is a fairly recent development and the incorporation of timers and other devices has obviously caught the attention of the children. In ensuring compliance, a clear and precise definition of the problem is a key step in ensuring compliance (28). It is clear that the children who took part in the study did not clearly associate toothbrushing with concepts of caries prevention. Vague notions of 'teeth falling out' or future tooth loss as the doom scenario consequence of not toothbrushing were mentioned by some. Consistent with previous research in adolescents (11, 13), when children were able to define why they should brush their teeth, this related more to social concepts of cleanliness, fresh breath and personal grooming.

Conclusion

This study has provided an insight into children's understanding of a fundamental aspect of self care, namely, toothbrushing. It is apparent that children often do not have well defined perceptions of why they should brush their teeth and certainly prevention of tooth decay did not readily come to mind for many. These accounts are cause for concern on a number of levels. The poor levels of awareness among parents regarding oral health messages is suggested by the low prominence of parents as information sources cited by the children in our study, and suggests the need to target education in parents as well as children. The abrogation of parental responsibility for the supervision of toothbrushing is both clear and alarming. To tackle this phenomenon, it is important that it is set within the social factors which may precipitate it, such as changes to family structures and routines. In encouraging toothbrushing and home-care programmes, oral health educators need to bear in mind the complex domestic arrangements of many children as well as the need to engage both children and their parents or carers in ensuring compliance. The role of technical aids in this increasingly technophilic generation of youngsters should also be borne in mind. While children's understandings of and motivations for their own oral health care routines therefore draw on a range of factors, the sum of these factors is not resulting in ideal outcomes in terms of either their behaviours or reasoning.

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