



# **Designed to Smile**

## **Evaluation of a national child oral health improvement programme**

### **Part II Evaluation**

### **Interim Report II**

**December 2013**

**R.J. Trubey and I.G.Chestnutt**

**Dental Public Health Unit**

**Clinical and Applied Public Health Research**

**Cardiff University School of Dentistry**

## Contents

---

<b>1. Executive Summary .....</b>	<b>2</b>
<b>2. Introduction .....</b>	<b>6</b>
<b>3. Parent Survey .....</b>	<b>9</b>
3.1 Aims of the current report.....	9
3.2 Methods.....	10
3.3 Findings.....	13
3.3.1 Response rate and demographics .....	13
3.3.3 Age toothbrushing commenced .....	14
3.3.4 Parental supervision of toothbrushing at home.....	15
3.3.5 Toothbrushing frequency and perceived social norms .....	18
3.3.6 Morning and evening brushing: motivation and habits .....	26
<b>4. Conclusions .....</b>	<b>39</b>
<b>5. Acknowledgements .....</b>	<b>41</b>
<b>6. Appendices .....</b>	<b>42</b>

## **1. Executive Summary**

---

This report is the second in a series of three reports evaluating the expanded Designed to Smile national oral health improvement programme. It follows a series of three previous reports submitted to the Welsh Government between December 2009 and December 2011, evaluating the Super Pilot scheme.

The report details findings from a questionnaire survey of 300 parents of children aged between 3-6 years old who take part in the Designed to Smile toothbrushing programme in nursery or school. The questionnaire was developed as a result of in-depth interviews with parents, exploring the reasons that they do or do not brush their children's teeth at home.

Data are presented on the frequency of children's toothbrushing at home, as well as parental and family factors which influence children's oral hygiene routines. The findings will help to inform future oral health promotion and education efforts which supplement the supervised toothbrushing element of the programme. The recommendations contained in this report reflect that focus.

The key findings and recommendations are summarised below:

### **1.1 AGE WHEN TOOTHBRUSHING COMMENCED AND PARENTAL SUPERVISION OF TOOTHBRUSHING AT HOME**

There are two aspects of children's oral care where many parents are not currently following best practice. Firstly, the majority of parents report that they did not begin brushing their child's teeth until they were at least twelve months old, rather than beginning as soon as the child's primary teeth erupted. Secondly, a quarter of parents reported that their child typically brushes their teeth without any supervision, despite guidelines suggesting that all children should be supervised until at least seven years old. These two aspects of oral hygiene

represent two areas which should be further reinforced through effective oral health promotion messages aimed at parents.

## **1.2 SOCIAL NORMS AND TOOTHBRUSHING FREQUENCY**

The report presents data which suggests that parents' decisions about how often to brush their child's teeth are influenced by 'perceived social norms', that is how often they think other parents brush their children's teeth. Parents who believe that the 'norm' for weekly brushing is relatively low (0-9 times per week) tend to miss brushing their own child's teeth significantly more often than the average. Comparisons with peers also affected how satisfied parents were with their own child's brushing routine. It is suggested that oral health messages given to parents will be more persuasive if they include some form of social normative element ('most other parents do this') rather than simply prescriptive advice ('you should do this').

## **1.3 MORNING AND EVENING BRUSHING: MOTIVATION AND HABITS**

The results show that parents had a tendency to brush their children's teeth more often in the morning than the evening. Most parents were focused on short-term, cosmetic benefits for morning brushing, but longer-term factors were more influential when thinking about evening brushing. Parents who were motivated by short-term benefits tended to miss evening brushing more often. The findings of this work suggest that health promotion staff will need to be aware that parents have different reasons for brushing children's teeth in the morning and evening, and tailor messages accordingly. It is particularly important that they stress the health benefits of brushing children's teeth in the evening.

Finally, the data underline the importance of developing a toothbrushing 'habit'. When brushing the child's teeth becomes automatic and part of the parent's daily routine, they tend to miss brushing far less often. Parents and families with more stable day-to-day routines

were more likely to establish a habit of brushing their child's teeth twice a day. It is suggested that parents should be encouraged to build daily toothbrushing around other routine activities (eating breakfast, getting dressed for school, putting on the child's pyjamas, going to bed, etc) in order to promote the development of a brushing habit. Advice needs to be tailored to parents' circumstances in order to be effective: those parents with more unstable day-to-day routines may find it more difficult to establish a twice-daily brushing habit for their child.

#### **1.4 RECOMMENDATIONS:**

The following recommendations are made based on the findings of the parent survey:

##### **Recommendation #1:**

The current study suggests that many parents begin brushing their child's teeth much later than recommended. Dental staff should collaborate with health workers outwith the dental team to ensure that parents understand the need to begin toothbrushing as soon as the child's primary teeth begin to erupt.

##### **Recommendation #2:**

A large number of parents currently let their infant children brush at home without any supervision. Oral health promotion staff should reinforce the message that parents need to supervise children's brushing until at least seven years old.

##### **Recommendation #3:**

This work shows that parents' decisions about brushing are influenced by what they think other parents do – oral health education activities which incorporate a social normative message ('the vast majority of parents brush their child's teeth twice a day') may be more

persuasive for many parents than simply telling them what they should do ('you should brush your child's teeth twice a day').

**Recommendation #4:**

This work has demonstrated that parents have different rationales for brushing children's teeth in the morning and the evening, and tend to skip evening brushing more often. Oral health promotion messages should treat morning and evening brushing as separate events and place particular stress on the importance of evening brushing for good oral health.

**Recommendation #5:**

Oral health promotion should encourage parents to build their child's daily toothbrushing around other routine activities (eating breakfast, getting dressed for school, putting on their pyjamas, going to bed, etc) in order to promote the development of a consistent brushing habit. Staff should be aware that some parents with more unstable day-to-day routines will find it more difficult to establish a regular brushing habit for their child, and tailor advice accordingly.

## **2. Introduction**

---

### **2.1 BACKGROUND AND PREVIOUS EVALUATION WORK**

In their *Eradicating Child Poverty in Wales* strategy, the Welsh Government set a target that by 2020 the dental health of 5 and 12 year olds in the most deprived fifth of the Welsh population will improve to that presently found in the middle fifth. In March 2008, the Welsh Government laid out plans for the commissioning and implementation of a school-based fluoride supplementation programme called Designed to Smile, aimed at meeting these targets. The programme is one of the principle initiatives of the National Oral Health Action Plan for Wales (NOHAP).

The core programme comprises three elements: (i) supervised in-school/nursery toothbrushing for 3-5 year olds; (ii) oral health promotion for 6-11 year olds; and (iii) promoting oral health from birth.

The Community Dental Service (CDS) has been responsible for organising, coordinating and delivering the programme, including the production and translation of resources, the sourcing of materials and recruitment of new staff members to the project.

The scheme was originally piloted in two areas: in South Wales, in Cardiff, the Vale of Glamorgan, Bridgend, Rhondda Cynon Taf and Merthyr Tydfil; and also in the North Wales region.

The Dental Public Health Unit previously submitted three evaluation reports to the Welsh Government, in December 2009, 2010 and 2011, while the programme was being piloted in South East and North Wales. These reports were based on interviews of Community Dental Service staff, a survey of participating schools and interviews with parents whose children

took part in the scheme. A summary of the findings from those reports is presented in Appendix A.

## **2.2 THE CURRENT EVALUATION PROJECT**

In October 2009, the Welsh Government expanded the programme to cover those areas not included in the Super Pilot, namely Aneurin Bevan, Abertawe Bro Morgannwg, Hywel Dda and Powys Health Board areas.

The Welsh Government has contracted the Dental Public Health Unit at Cardiff University to carry out a formal process evaluation of the Designed to Smile programme, with interim reports to be delivered in December 2012, December 2013 and December 2014. Table 2.1 shows the three stages of the evaluation project, with the current interim report highlighted in yellow.

The first report of the evaluation project was delivered in December 2012, focusing on the views of teaching staff at participating schools in the four Health Boards that had recently joined the scheme. The report also presented data from a parent survey pertaining to the effect of participation in the Designed to Smile programme on children's home brushing and attitudes towards toothbrushing in general. A summary of the findings from that report can be found in Appendix B.

**Table 2.1: Part II Evaluation Plan 2012-2014**

Stage	Subject	Method	Report date
Stage 1	(1) School staff (2) Parents of children	(1) Questionnaire survey of all participating settings in four Health Boards  (2) Questionnaire survey of parents of children taking part in D2S	December 2012
Stage 2	Parents of children	Questionnaire survey of parents of children taking part in D2S	December 2013
Stage 3	CDS staff	Questionnaire survey of CDS staff from across Wales	December 2014

### **3. Parent Survey**

---

This chapter reports on findings from a questionnaire survey of 300 parents whose children take part in the scheme in the Abertawe Bro Morgannwg Health Board area.

A previous report (Appendix B) presented data from the parent survey relating to the effect of Designed to Smile participation on children's subsequent toothbrushing at home, and both parents and children's attitudes towards oral hygiene in general. The work reported in this stage of the evaluation focuses on parental and family factors which are associated with how often children brush their teeth (or have their teeth brushed) at home. The way in which this information might be used to improve oral health promotion and education aimed at parents and caregivers of young children is discussed.

#### **3.1 AIMS OF THE CURRENT REPORT**

The current report presents data from this questionnaire pertaining to how often parents brush their children's teeth at home, and other parental and family factors which may influence their decisions about oral hygiene.

Specifically, the aims of the current report were to:

- Establish the extent to which parents adhere to current guidelines about when to begin brushing their child's teeth at home and whether or not they should supervise their child's brushing
- Establish parental and family factors which are associated with how often parents brush their children's teeth at home, both in the morning and in the evening
- Make suggestions about how this data might be used to inform future oral health education messages aimed at parents

## **3.2 METHODS**

### **3.2.1 Participants**

The sampling frame for the study consisted of all parents whose children were participating in the Designed to Smile scheme via their nursery school or school, in the Abertawe Bro Morgnwg Local Health Board in South-West Wales.

Based on previous studies, it was estimated that around 75% parents would report brushing their child's teeth twice per day (or 14 times per week). In order to determine the proportion to within  $\pm 5\%$  with a 95% confidence interval (2-sided), it was calculated that a final sample size of at least 289 parents was required.

Twenty of the 127 participating schools in Swansea and Neath Port Talbot were randomly selected and 625 parents of children aged between 3-6 years old (nursery, reception and Year 1) were invited to take part in the survey, based on an estimated 50% response rate.

### **3.2.2 Questionnaire**

A 6-page questionnaire (Appendix C) was developed to assess a number of elements of children's home toothbrushing behaviour, as well as parents' attitudes towards and beliefs about toothbrushing. The questions were developed as a result of in-depth interviews with parents, and with the help of the Community Dental Service. The survey was piloted extensively before being finalised.

Questions included:

- How often parents brushed their child's teeth each week, in the morning and in the evening
- How often parents thought an 'average' parent in their child's school class brushed their child's teeth each week
- How satisfied parents were with their child's weekly brushing routine
- Parents' motivation for brushing their child's teeth, in the morning and in the evening
- The degree to which morning and evening brushing were 'habitual', as measured by a 12-item habit scale
- The degree to which every day home events (waking up, eating breakfast) were consistent from day-to-day, in the morning and in the evening
- Various demographic details about the children and family



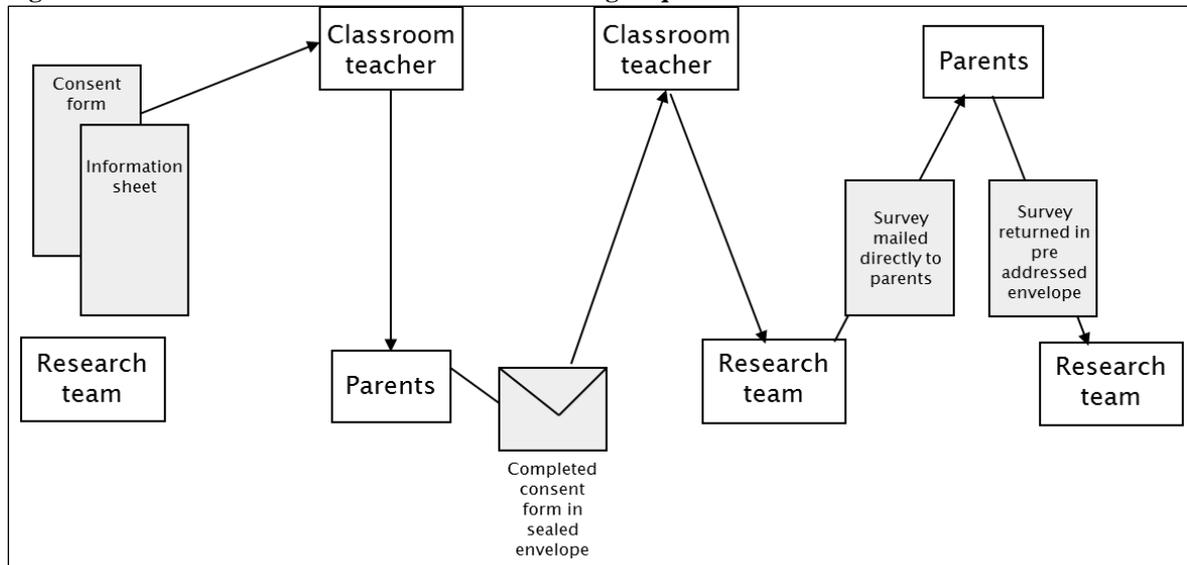
### 3.2.3 Procedure

The 625 selected parents were given an invitation letter and information sheet about the survey via their child's nursery or school. Parents who agreed to take part completed a consent form providing their name, address and a contact telephone number.

All consenting parents were mailed a copy of the questionnaire survey, as well as a covering letter and a pre-paid and addressed envelope for returning the form (Figure 3.1). After 4 weeks, those parents who had not returned a form were contacted by telephone to encourage them to complete the form or to ask if they required a replacement. Those parents who decided that they didn't want to take part in the study were not contacted any further. Two

weeks later, non-respondents were contacted for a final time and again offered a replacement copy of the questionnaire.

**Figure 3.1: Flow chart of the recruitment and mailing of questionnaires**



### 3.3 FINDINGS

#### 3.3.1 Response rate and demographics

297 parents returned a completed survey, comprising a 48% response rate (Figure 3.2). The baseline figures used for the current analysis vary slightly between questions, due to small levels of item non-response.

**Figure 3.2: Flow chart showing response rate**

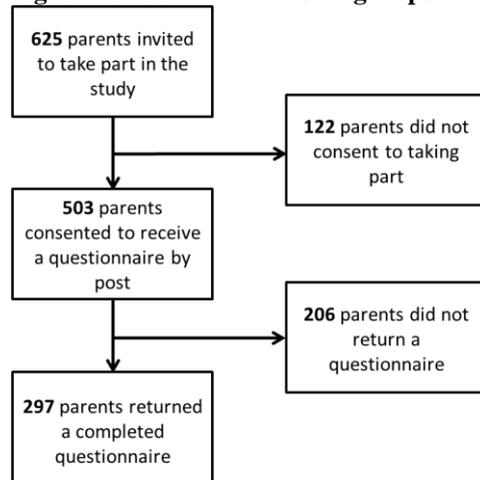


Table 3.1 shows a summary of the demographic details of the children whose parents took part in the survey, and includes the socio-economic status of the neighbourhood in which each family lived, according to home post-code data.

**Table 3.1: Summary data for key variables**

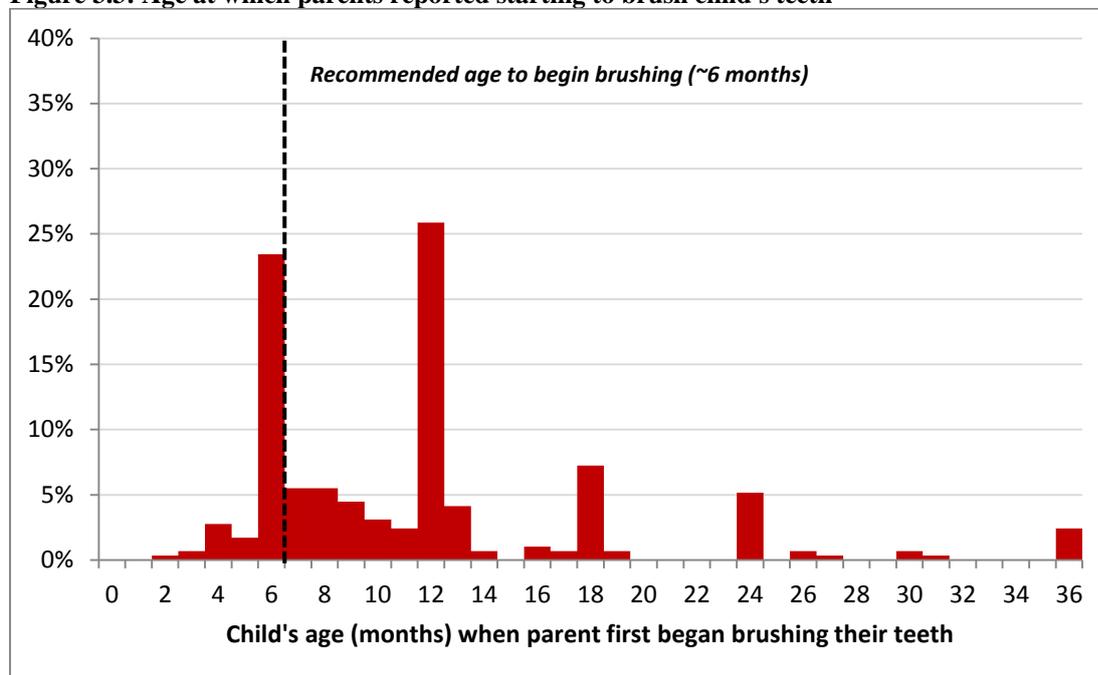
<b>Demographics</b>					
	<b>N*</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Child's age (months)	290	59.3	13.6	18	82
No. of younger siblings	289	0.5	0.6	0	3
No. of older siblings	291	0.8	0.9	0	6
	<b>N*</b>	<b>%</b>			
Child's gender					
<i>Male</i>	139	47.3			
<i>Female</i>	155	52.7			
Socio-economic status (deprivation quintile, WIMD)					
<i>Most deprived</i>	102	34.3			
<i>Next most deprived</i>	83	27.9			
<i>Middle deprived</i>	66	22.2			
<i>Next least deprived</i>	25	8.4			
<i>Least deprived</i>	11	3.7			
<i>Unknown</i>	10	3.4			

Children about whom the parents were questioned were aged between 3 and 6-years old, with a mean age of 59 months, or just under 5 years. The majority of the parents surveyed were resident in areas of high socio-economic deprivation, in keeping with the targeted nature of the Designed to Smile scheme.

### 3.3.3 Age toothbrushing commenced

Current recommendations are that parents should begin brushing their child's teeth with a small amount of fluoride toothpaste as soon as the primary teeth erupt, normally at around six months<sup>1</sup>. The vast majority of parents reported that they began brushing later than this: around half of parents surveyed (144, 49%) reported that they did not start brushing their child's teeth until the child was at least 12 months old. One in ten parents (29/10%) reported that they did not begin brushing their child's teeth until at least 24 months (Figure 3.3).

**Figure 3.3: Age at which parents reported starting to brush child's teeth**

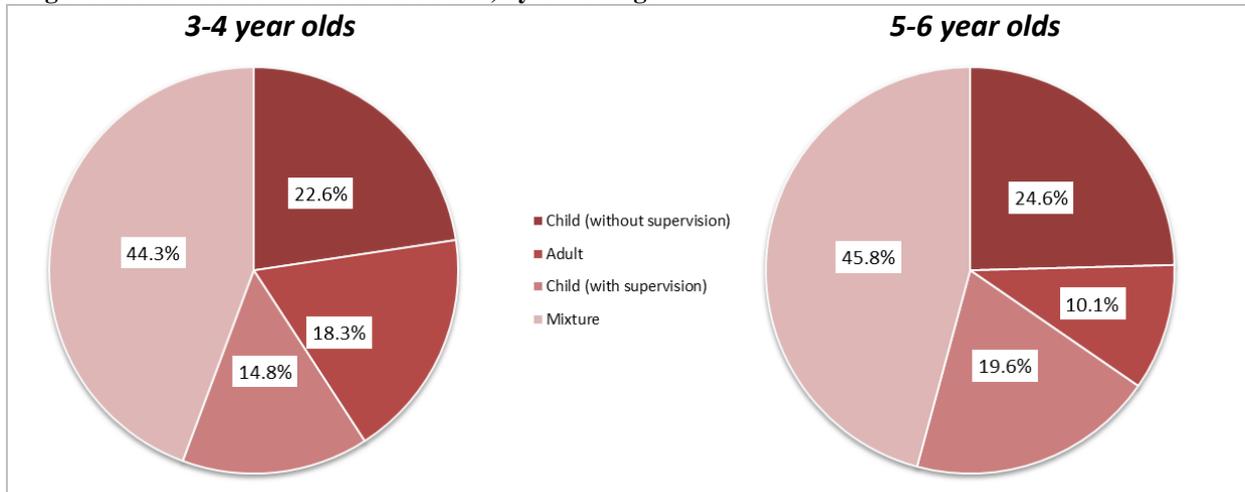


<sup>1</sup> Department of Health/BASCD: Delivering Better Health: An evidence-based toolkit for prevention (2<sup>nd</sup> edition, April 2009)

### 3.3.4 Parental supervision of toothbrushing at home

Current clinical guidelines suggest that parents should closely supervise their child's toothbrushing until the age of seven <sup>1</sup>. The results show that 24% (70) of parents report that they normally let their child brush their teeth without any supervision. Figure 3.4 gives a breakdown of who brushes the child's teeth according to the child's age: even at 3-4 years old, the data show that almost a quarter (23%) of children typically brush without any adult supervision.

Figure 3.4: Who brushes the child's teeth, by child's age



### COMMENTARY & RECOMMENDATIONS

While this report is primarily focused on factors relating to how often children brush their teeth at home, it is important to highlight two aspects of brushing which can also influence children's oral health: the age at which parents first begin brushing their child's teeth, and who actually carries out the brushing.

This work shows that the majority of parents did not start brushing their child's teeth until the child was at least twelve months old, rather than starting as soon as the primary teeth erupted

as is clinically recommended. This represents at least six months in which deciduous teeth are not exposed to fluoride and so vulnerable to decay.

This is perhaps an area where advice is best provided during pregnancy or early in infancy, so close collaboration with health visitors and other health workers may be important in order to ensure that this message is clearly communicated to parents at an appropriate time.

About one quarter of parents surveyed report that their child usually brushes their teeth on their own, without any adult supervision. This was the case even when children were as young as 3 or 4 years old and runs contrary to the best practice of parents supervising children until at least 7 years old<sup>2</sup>. Children who brush unsupervised may not use the correct amount of toothpaste or brush for the recommended two minutes – and of course, without a parent or caregiver to check, it is possible that they may not brush their teeth at all.

The data clearly suggest that these are two areas in which the oral health messages and guidance given to parents need to be further reinforced.

**Recommendation #1:**

The current study suggests that many parents begin brushing their child's teeth much later than recommended. Staff should collaborate with appropriate health workers to ensure that parents understand the need to begin toothbrushing as soon as the child's primary teeth begin to erupt.

---

<sup>2</sup> Department of Health/BASCD: Delivering Better Health: An evidence-based toolkit for prevention (2<sup>nd</sup> edition, April 2009)

**Recommendation #2:**

A large number of parents currently let their infant children brush without any supervision.

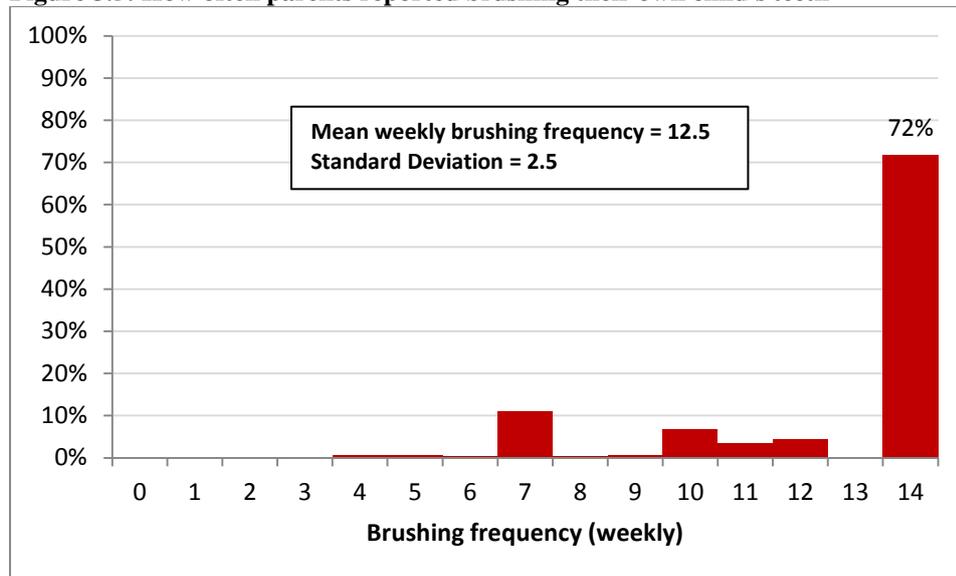
Staff should reinforce the message that parents need to supervise children's brushing until at least seven years old.

### 3.3.5 Toothbrushing frequency and perceived social norms

#### *Self-reported brushing frequency and estimates of what other parents do*

Parents were asked how often they brushed their child's teeth (or their child brushed their own teeth) at home, in a typical week. Figure 3.5 shows the distribution of weekly brushing frequencies reported.

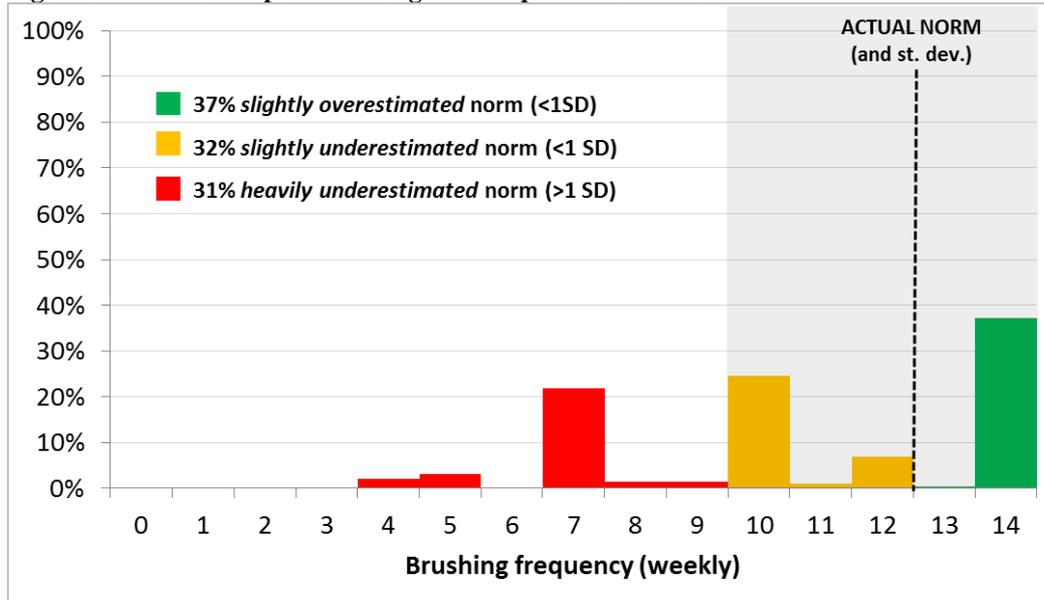
**Figure 3.5: How often parents reported brushing their own child's teeth**



Overall, self-reported brushing was high. A total of 214 (72%) parents reported brushing their child's teeth 14 times per week, or twice per day. On average, parents reported brushing their child's teeth 12.5 times per week.

In order to understand what parents thought of as 'the norm' for brushing, respondents were asked to estimate how often they thought an average parent in their son or daughter's class in school would brush their child's teeth each week. Figure 3.6 shows what parents thought other parents did, and how that compares to the self-reported average of 12.5 times per week.

**Figure 3.6: How often parents thought other parents brushed their child's teeth**



The mean estimate of how often other parents brushed in a week was 10.6 times per week, meaning that across the sample, parents believed that they brushed their child’s teeth around 2 times per week more often than their peers did.

Just over one a third of parents (106, 37%) thought the norm for brushing was slightly higher than was actually reported (within one standard deviation), and a further third (92, 32%) thought it was slightly lower. Of interest, 89 (31%) parents heavily underestimated the norm (more than one standard deviation lower), estimating that the average parent brushed their child’s teeth between 0 and 9 times per week.

A Wilcoxon signed-rank test confirmed that, across the sample, there was a statistically significant discrepancy between the frequency with which parents reported brushing their own child’s teeth and their estimates of how often their peers did ( $Z = -8.078, p < 0.001$ ).

*The effect of perceived social norms on how often parents brush their own child's teeth*

To check whether parents’ beliefs about the social norm for brushing had any effect on how often they brushed their own child’s teeth, a multiple regression analysis was performed

(Table 3.2). The dependent variable was ‘missed sessions’ – the number of times a parent fell below the recommended 14 times per week brushing standard. The variables entered into the regression included perceived norm (a parent’s estimate of how often the average parent brushes their child’s teeth in a normal week), the socio-economic status of the area in which the family lived and various demographic factors.

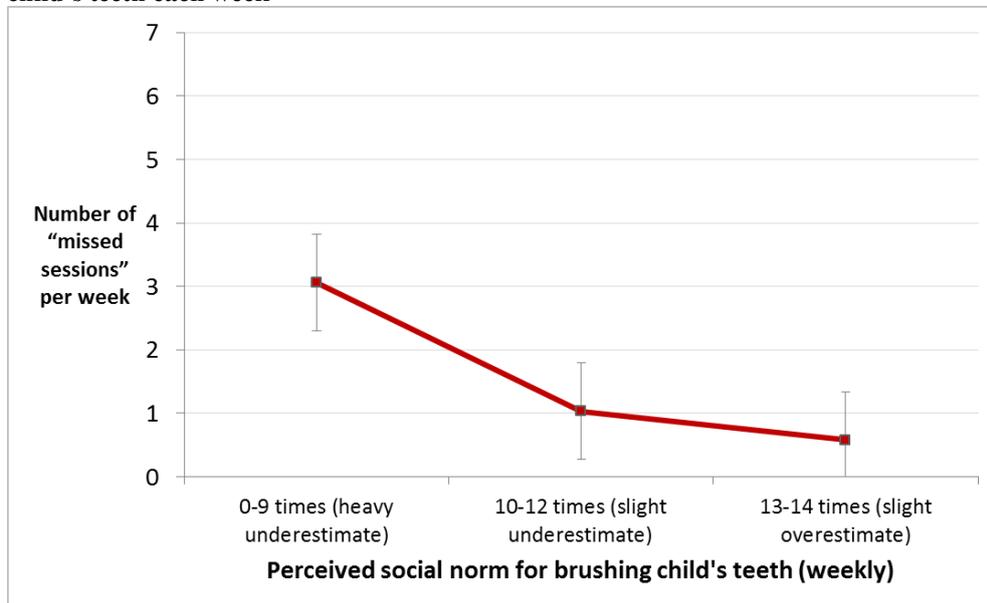
**Table 3.2: Regression analysis - factors predicting how often parents missed brushing each week**

Variable	B	Std. Error	p-value	Summary
Perceived norm	-0.193	0.043	<b>p&lt;0.001</b>	<b>Parents more likely to miss brushing child’s teeth if they believe others brush less often</b>
Child’s gender (male)	0.102	0.246	NS	No sig. effect of child’s gender on missed brushing sessions
Child’s age	0.011	0.006	NS	No sig. effect of child’s age on missed brushing sessions
Number of older siblings	0.107	0.240	NS	No sig. effect of number of older siblings on missed brushing sessions
Number of younger siblings	-0.185	0.164	NS	No sig. effect of number of younger siblings on missed brushing sessions
Socioeconomic status (Most or next most deprived)	0.355	0.189	<b>p&lt;0.05</b>	<b>Parents more likely to miss brushing child’s teeth if resident in more deprived areas</b>

A parent’s perceived norm was the strongest predictor of how many times they missed brushing their child’s teeth each week: those parents who thought the norm was lower missed more toothbrushing sessions (p<0.001) even when controlling for socio-economic status and demographic details.

Figure 3.7 further illustrates this relationship between what a parent thinks other parents do (their perceived social norm) and how often they miss brushing their own child’s teeth.

**Figure 3.7: Relationship between perceived norm and number of times parents missed brushing own child’s teeth each week**

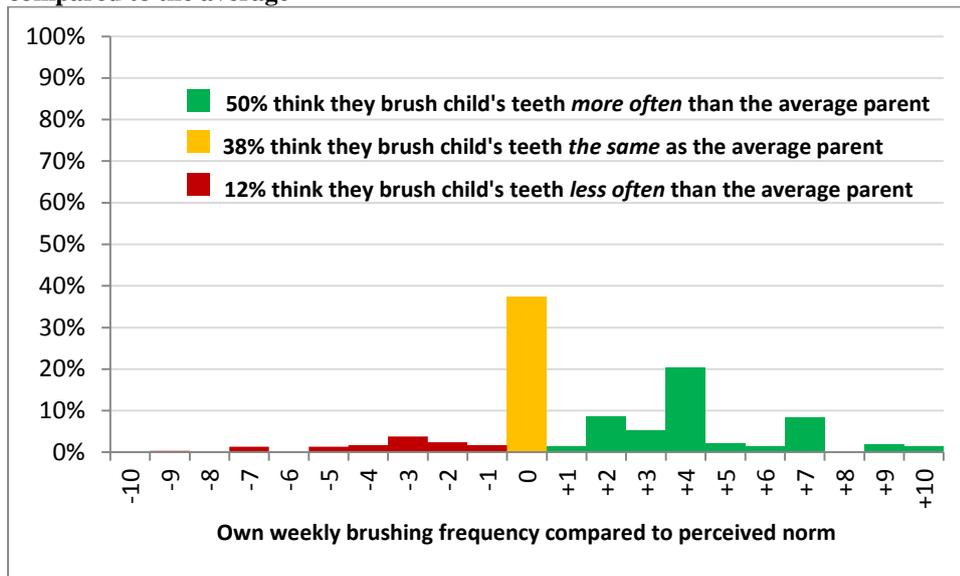


Those parents who estimated that the average for brushing was 9 times a week or fewer (the parents highlighted in red in Figure 3.6) missed brushing their own child’s teeth significantly more often than the average: 3.1 times per week, compared to an average of 1.4 times per week for all parents.

*Social comparisons: comparing their own child to what they think others do*

For each parent, a ‘social comparison’ score was calculated based on how often they reported brushing their own child’s teeth each week compared to how often they thought the ‘average’ parent did so. For instance, a parent who brushed their own child’s teeth 14 times per week and estimated that the average parent did so 10 times per week would receive a social comparison score of +4 (14-10=4). Figure 3.8 shows the distribution of the social comparison scores.

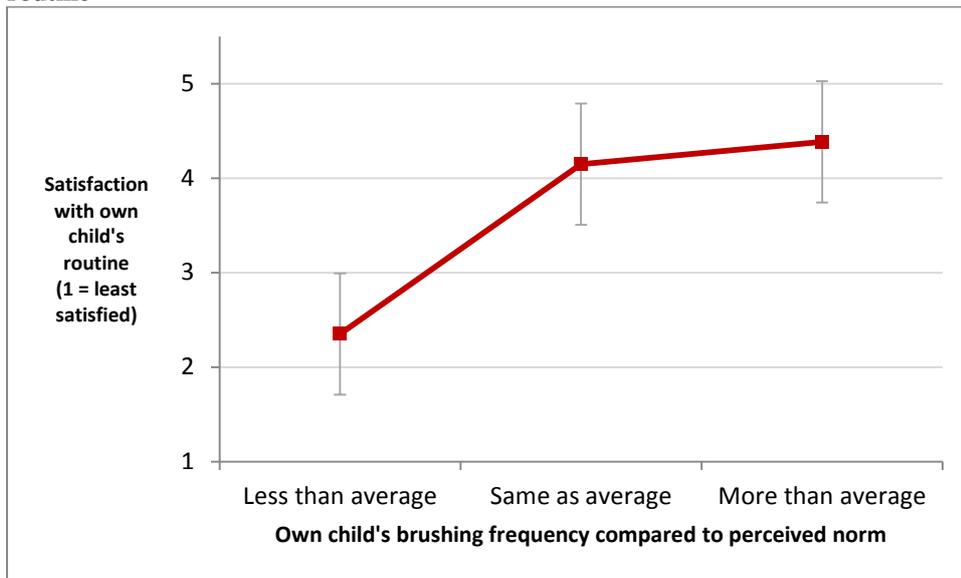
**Figure 3.8: Social comparison scores - how much better or worse parents think their child's routine is compared to the average**



Half of the parents surveyed (143, 50%) believed that their own child’s brushing routine was better than average, while only 34 (12%) parents thought their child brushed less often than the average.

Parents’ satisfaction with their own child’s brushing routine was measured by their level of agreement or disagreement with the statement “I am happy with how often my own child brushes their teeth (or has their teeth brushed) each week at home”. Figure 3.9 shows the relationship between social comparison scores and satisfaction scores:

**Figure 3.9: Relationship between social comparison score and parental satisfaction with child's brushing routine**



Those parents who thought their child brushed less than the 'average' were significantly less satisfied with their child's routine than those who thought their child's routine was average or better than average.

Ordinal logistic regression showed that parents' social comparison scores significantly predicted how satisfied they were with their child's brushing routine ( $B=0.22$ ,  $p<0.001$ ), even when controlling for brushing frequency alone and other demographic factors. This means that parental satisfaction was not simply based on how often they brushed their child's teeth – but instead, it depended on how much better or worse they thought it was than an average child.

## COMMENTARY & RECOMMENDATIONS

The results presented in this section show that a parent's decision about how often to brush their child's teeth can be influenced by their belief about what other parents do.

There was a strong relationship between what a parent perceived to be the 'average' weekly brushing frequency and how often they reported brushing their own child's teeth. Parents who thought that the average was relatively low tended to brush their own child's teeth less often than those who thought the average was relatively high.

Importantly, these perceived social norms also had an influence on how satisfied parents were with their child's brushing routine. It was not simply a case that parents who brushed their child's teeth more regularly were more satisfied – instead, satisfaction was related to how much better or worse they thought their child's routine was compared to what they saw as the average.

The implication of this is that a parent who brushes their child's teeth just once a day (or seven times a week) would not necessarily see that as a problem if they believed that most other parents did something similar. As a result, parents who heavily underestimate the norm may feel justified in brushing their own child's teeth less often and so lack motivation to try and improve their child's oral hygiene routine.

The results support findings from previous in-depth interviews with parents (Appendix D), where many acknowledged the 'twice a day' message but did not think it was relevant to them if they believed that most other parents brushed their child's teeth less often.

It is not clear why parents from similar areas and backgrounds have such a wide range of beliefs about how often the 'average' parent would brush their child's teeth. The cross-sectional nature of the study means that we cannot know whether parents' beliefs about what

others do influences their decision about how often to brush their own child's teeth or vice versa.

However, in either case, providing parents with information which shows them that almost three-quarters of parents report brushing their child's teeth twice a day (14 times per week) may provide a more persuasive argument for many than simply telling them what they *should* do ("brush your child's teeth twice a day").

Such an approach has been relatively successful in reducing levels of alcohol consumption and smoking in adolescents, through messages aimed at correcting misperceptions (Figure 3.10).

Figure 3.10: Examples of materials from 'social normative' interventions



### Recommendation #3:

There is evidence that parents' decisions about brushing are influenced by what they think other parents do – oral health promotion which incorporate a social normative message (ie, 'the vast majority of parents brush their child's teeth twice a day') may be more persuasive for many parents than simply telling them what they should do ('you should brush your child's teeth twice a day').

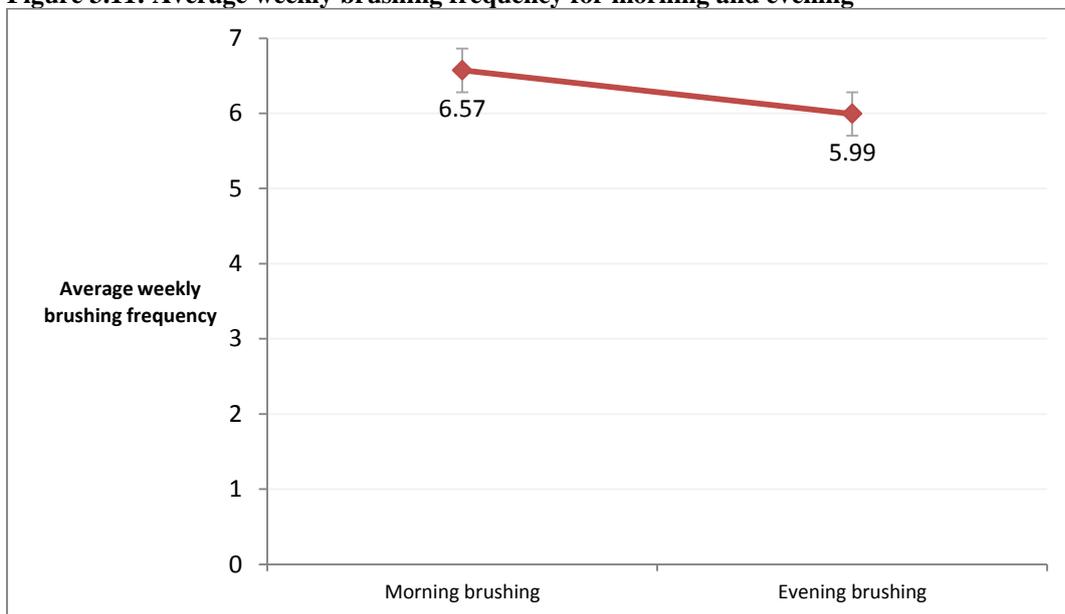
### 3.3.6 Morning and evening brushing: motivation and habits

#### *Morning v evening brushing frequency*

In addition to asking how often they brushed their child's teeth each week in total, parents were also asked how often they brushed their child's teeth each morning and each evening.

Figure 3.11 shows how often parents brushed their child's teeth in the morning and in the evening, in a typical seven-day week.

**Figure 3.11: Average weekly brushing frequency for morning and evening**



Across the sample, there was a tendency to brush children's teeth more often in the morning (mean = 6.57 times per week) than in the evening (mean = 5.99 times per week). A Wilcoxon signed-rank test confirmed that morning brushing was significantly more common than evening brushing ( $p < 0.05$ ).

#### *Motivation for brushing child's teeth: morning and evening*

In order to understand whether parents had different reasons for brushing their child's teeth in the morning and in the evening, each respondent was presented with two vignettes, an

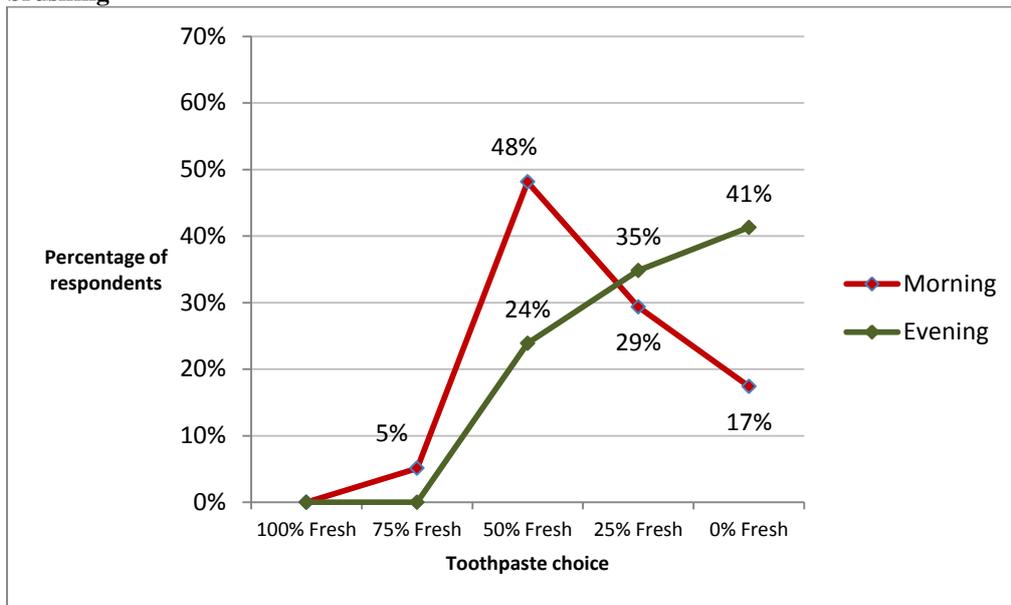
example of which is shown in Figure 3.12. In the vignette, parents were asked to choose a type of toothpaste that they would want their child to use for brushing in the morning and then asked to make the same choice for brushing their child’s teeth in the evening. The toothpastes varied according to their fictional ingredients: one of which was called ‘fresh’ (which had short-term, cosmetic benefits but no health benefits) and the other ‘health’ (which had long-term clinical benefits but no cosmetic benefits). Parents could choose between five options, which had more or less of each of the two ingredients.

**Figure 3.12: Toothpaste choice question from the parent survey**



Figure 3.13 shows the distribution of toothpaste choices that parents made, for both morning and evening brushing.

**Figure 3.13: Proportion of parents who chose different toothpaste options for morning and evening brushing**

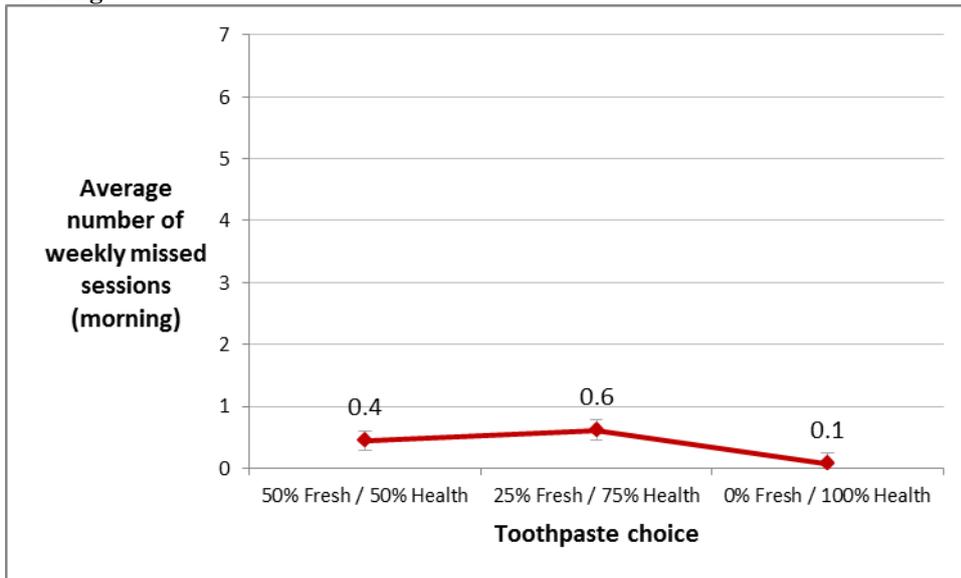


There were clear differences between parents' choices according to whether they were choosing toothpaste to use for morning or evening brushing. In the morning, the majority of parents (151,53%) emphasised short-term benefits, choosing a toothpaste which had at least 50% of the 'fresh' ingredient. By contrast, parents preferred toothpaste which had mostly long-term benefits for evening brushing, primarily choosing options which had 75% or 100% of the 'health' ingredient.

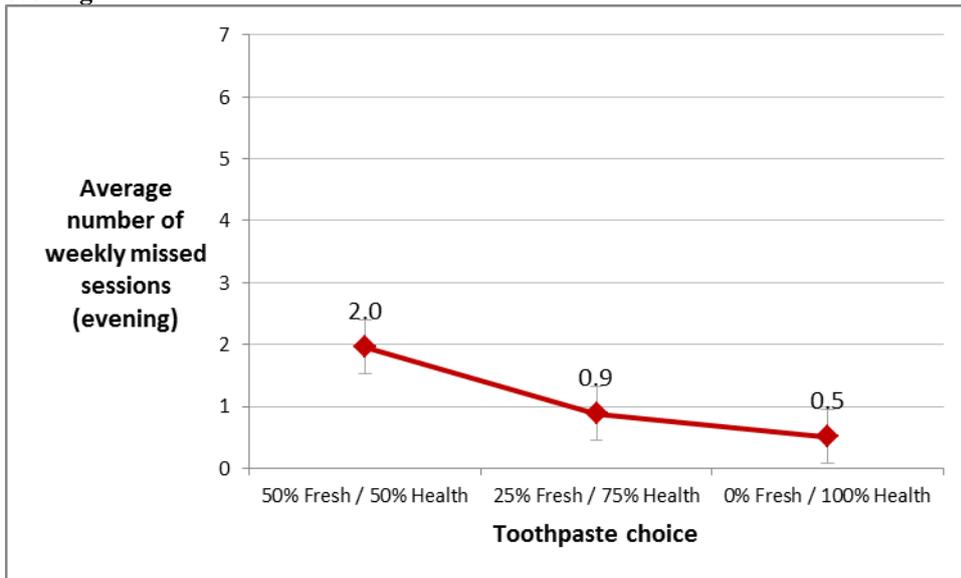
*Brushing motivation and brushing frequency*

Figure 3.14 and Figure 3.15 show the relationship between parents' toothpaste choice and how often they missed brushed their child's teeth in the morning and the evening.

**Figure 3.14: Relationship between toothpaste choice and number of 'weekly missed sessions' in the morning**



**Figure 3.15: Relationship between toothpaste choice and number of 'weekly missed sessions' in the evening**



While there was no effect of toothpaste choice on the prevalence of morning brushing, parents who emphasised short-term benefits (by choosing toothpaste with at least 50% of the 'fresh' ingredient) typically brushed their child's teeth less often in the evening than those who focused on the 'health' ingredient.

*Brushing habits in the morning and the evening*

Parents answered a series of questions about brushing their child’s teeth in the morning and evening which were designed to assess how automatic or ‘habitual’ it was for them to make sure their child brushed their teeth each day. The questions were taken from the ‘Self Report Habit Index’ (Figure 3.16) which is a validated survey tool which has been used to measure habit strength for various behaviours such as transport choice, food choice and exercise. Parents filled out the 12-item measure for both morning and evening brushing, and were assigned a score ranging from 12 (strongly disagreed with each question) to 60 (strongly agreed with each question).

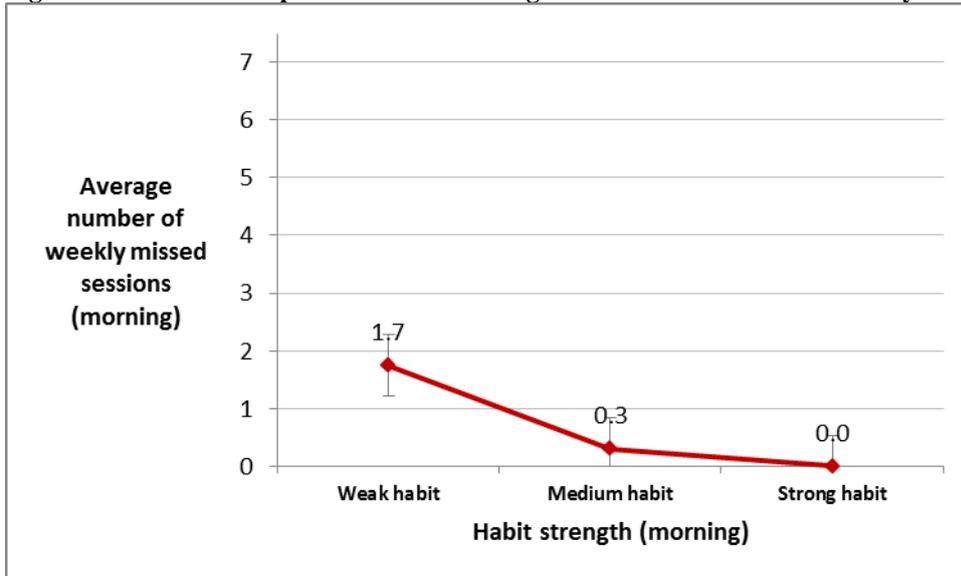
**Figure 3.16: Example questions from the parent survey, using the 'Self-report Habit Index'**

<b><i>Brushing my child’s teeth or making sure they brush their teeth IN THE MORNING is something....</i></b>	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I do frequently	<input type="checkbox"/>				
I do automatically	<input type="checkbox"/>				
I do without having to consciously remember	<input type="checkbox"/>				
that makes me feel weird if I don't do it	<input type="checkbox"/>				
I do without thinking	<input type="checkbox"/>				
that would require effort not to do it	<input type="checkbox"/>				
that belongs to the daily routine	<input type="checkbox"/>				
I start doing before I realise I'm doing it	<input type="checkbox"/>				
I would find hard not to do	<input type="checkbox"/>				
I have no need to think about doing	<input type="checkbox"/>				
that's typically 'me'	<input type="checkbox"/>				
I have been doing for a long time	<input type="checkbox"/>				

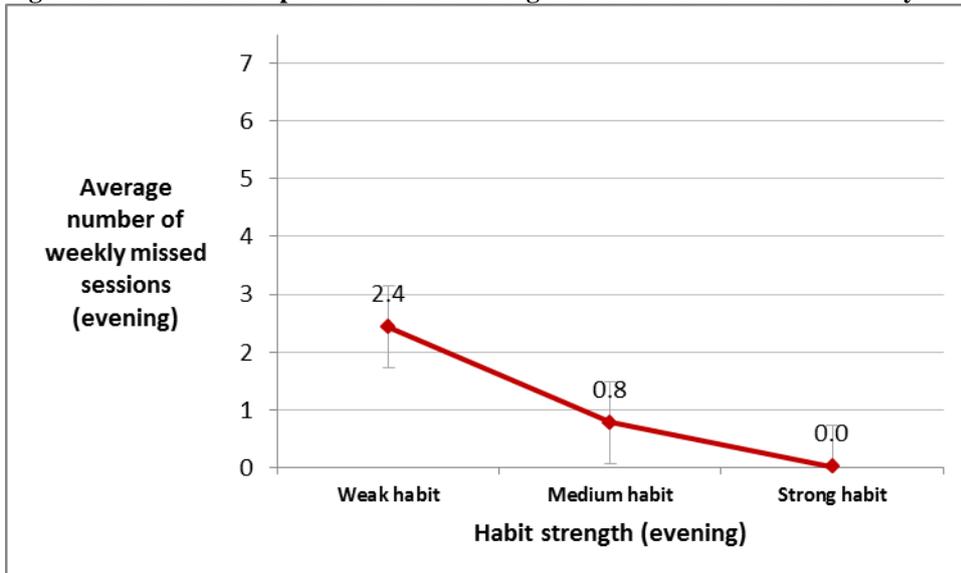
Based on the scores from the habit strength measure, parents were divided into those who had a weak, medium or strong habit for making sure that their child brushed their teeth each morning and evening.

Figure 3.17 and Figure 3.18 show how those habit strengths related to the frequency with which parents brushed their child’s teeth in a typical week.

**Figure 3.17: Relationship between habit strength and number of 'missed weekly sessions' in the morning**



**Figure 3.18: Relationship between habit strength and number of 'missed weekly sessions' in the evening**



There was a clear pattern for both morning and evening brushing, where parents for whom brushing their child's teeth was automatic or 'habitual' were much less likely to forget to (or choose not to) do so.

Table 3.3 and Table 3.4 show the results of a multiple regression analysis, looking at factors associated with how often morning and evening brushing sessions were missed respectively.

**Table 3.3: Regression analysis: factors predicting how often parents miss brushing their child's teeth each week (morning)**

Variable	B	Std. Error	z	p-value	Explanation
Habit score (morning)	-0.174	0.030	-5.72	p<0.001	<b>Stronger habits associated with fewer missed sessions in the morning</b>
Brush motivation (morning)	-0.151	0.277	-0.55	NS	No sig effect of brushing motivation on missed sessions in morning
Child's age	0.004	0.012	0.34	NS	No sig effect of child's age on missed sessions in the morning
Child's age when brushing began	-0.012	0.037	-0.32	NS	No sig effect of age began brushing on missed sessions in the morning
No of older siblings	-0.132	0.445	-0.30	NS	No sig effect of number of older siblings on missed sessions in the morning
No of younger siblings	-0.221	0.485	-0.45	NS	No sig effect of number of younger siblings on missed sessions in the morning
Socioeconomic status (Most and next most deprived)	1.008	0.491	2.05	p<0.05	<b>Parents from more deprived areas miss more brushing in the morning</b>

**Table 3.4: Regression analysis - factors predicting how often parents miss brushing their child's teeth each week (evening)**

Variable	B	Std. Error	z	p-value	Explanation
Habit score (evening)	-0.121	0.014	-8.86	p<0.001	<b>Stronger habits associated with fewer missed sessions in the evening</b>
Brush motivation (evening)	-0.356	0.171	-2.09	p<0.05	<b>More long-term focus associated with fewer missed sessions in the evening</b>
Child's age	0.003	0.009	0.30	NS	No sig effect of child's age on missed sessions in the evening
Child's age when brushing began	0.031	0.020	1.58	NS	No sig effect of age began brushing on missed sessions in the evening
No of older siblings	0.813	0.292	2.78	p<0.01	<b>A larger number of older siblings associated with more missed sessions in the evening</b>
No of younger siblings	-0.323	0.287	-1.12	NS	No sig effect of number of younger siblings on missed sessions in the evening
Socioeconomic status (Most and next most deprived)	0.821	0.306	2.68	p<0.01	<b>Parents from more deprived areas miss more brushing in the evening</b>

The regression analysis shows that the strength of a toothbrushing habit is an important predictor of toothbrushing frequency in both the morning and the evening: those parents for whom brushing their child's teeth is more automatic or habitual tend to miss brushing far less often.

Socioeconomic status was also associated with brushing – parents from relatively more deprived areas missed brushing more often, consistent with findings from the wider oral

health literature. Finally, parents who were focused on the shorter-term benefits of brushing tended to miss brushing their child's teeth in the evening more than those who were focused on longer-term outcomes.

### *Brushing habits and home routines*

During previous qualitative interviews with parents, we found that most parents reported that their child's brushing was closely associated with other routine events in the morning and evening – brushing usually took place before or after waking up, having a wash or having breakfast, for instance.

The extent to which a family's day to day routines were consistent from one day to the next was measured for both the morning and the evening (Figure 3.19) in order to see whether this might have any association with brushing habits. In both the morning and evening, parents were asked the extent to which various routine events happened at the same time each day. A higher score on the five-item measure indicated a more stable day-to-day routine, while a lower score suggested that each day was unpredictable.

**Figure 3.19: Example questions measuring routine stability**

<b><i>IN THE MORNING.... (Mon-Fri)</i></b>	Always the same time ▼	Usually the same time ▼	Sometimes the same time ▼	Rarely the same time ▼	Never the same time ▼	Not applicable ▼
Waking up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having breakfast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having a wash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Getting dressed for school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leaving the house for school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b><i>IN THE EVENING....(Mon-Fri)</i></b>	Always the same time ▼	Usually the same time ▼	Sometimes the same time ▼	Rarely the same time ▼	Never the same time ▼	Not applicable ▼
Getting home from school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having dinner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having a wash before bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Getting changed for bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Going to bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A more stable morning routine was positively associated with a stronger habit for brushing in the morning ( $r=0.14, p<0.05$ ) and a more stable evening routine was positively associated with the strength of the evening brushing habit ( $r=0.18, p<0.01$ ).

In contrast, there was no significant relationship between habit strength and the length of time that a parent had been brushing the child’s teeth (the child’s age minus the age which the parent reported first brushing their teeth).

### **COMMENTARY & RECOMMENDATIONS**

When we conducted interviews with parents about brushing their children’s teeth at home (Appendix D), one of the clearest findings was that parents considered morning and evening brushing to pose different challenges, and often had different reasons for brushing their child’s teeth at different times of day.

The results presented here show that the parents surveyed had a tendency to brush children's teeth more often in the morning compared to the evening.

Similarly, responses to a question about toothpaste choice suggested that parents tended to focus on short-term benefits of morning brushing, while emphasising longer-term benefits when thinking about evening brushing. However, there were still many parents who had a short-term focus when thinking about brushing their child's teeth in the evening, and those parents had a tendency to miss brushing sessions more often than the average parent.

Overall, the results suggest that it is important to consider morning and evening brushing as separate events when designing oral health education aimed at parents. There is unlikely to be any harm in focusing on short-term benefits of toothbrushing like 'clean teeth' and 'fresh breath' when discussing brushing children's teeth in the morning (in our previous interviews described in an earlier report, parents were actually strongly driven to brush their child's teeth for these cosmetic reasons). However, a short-term focus might be detrimental to regular evening brushing, and it is important to emphasise to parents that evening brushing is just as important (if not more important) for the health of children's teeth.

Perhaps most importantly, parents were more likely to brush their child's teeth in the morning and the evening when brushing was reported to be automatic or 'habitual' – when it required little conscious thought and had become part of a child's everyday routine.

The results mirror findings from other areas of health. Research has shown that people exercise more regularly, for instance, when the behaviour becomes more automatic and gradually involves less deliberation and conscious thought.

One factor which may be important in establishing regular brushing is the extent to which the day-to-day activities in the home environment are stable and predictable. In interviewing

parents, for example, it was clear that those who worked unpredictable shift patterns, or who worked late in the evening (especially single parents) had understandable difficulty with establishing a toothbrushing routine for their child in the evening, even when they clearly wanted to do so. The results presented here support that – those with more predictable day-to-day routines had stronger brushing habits.

It is important that oral health promotion efforts consider the individual contexts in which toothbrushing takes place in the home – what works for some parents and families may not work for others.

Research on habits from the wider health literature suggests that strong habits are most likely to form when a behaviour is repeated in a stable context – meaning in a similar place, at a similar time, and before or after certain events. To form a regular brushing habit, then, parents should be encouraged to brush their child’s teeth in a similar context each day – for example, immediately after the child has a wash in the morning, or last thing before going to bed at night.

**Recommendation #4:**

There is evidence that parents have different rationales for brushing children’s teeth in the morning and the evening, and tend to skip evening brushing more often. Oral health promotion messages should treat morning and evening brushing as separate events and place particular stress on the importance of evening brushing for good oral health.

**Recommendation #5:**

Oral health promotion should encourage parents to build their child’s daily toothbrushing around other routine activities (eating breakfast, getting dressed for school, putting on their pyjamas, going to bed, etc) in order to promote the development of a consistent brushing

habit. Staff should be aware that some parents with more unstable day-to-day routines will find it more difficult to establish a regular brushing habit for their child, and tailor advice accordingly.

## 4. Conclusions

---

While in-school supervised toothbrushing with fluoride toothpaste is a key element of the Designed to Smile scheme, it remains crucial to complement this approach with efforts to promote twice-daily toothbrushing at home. Providing children with “home packs” of toothbrushes and toothpaste is one important step towards promoting toothbrushing at home, but this must be supported by effective oral health education for children, and more importantly parents.

The scope of the Designed to Smile programme provides Community Dental Service staff with a unique opportunity to communicate with large numbers of parents and caregivers, through parent meetings, written materials sent home as part of the toothbrushing programme and through collaboration and liaison with other health workers and school staff.

It is important that such oral health education and promotion is evidence-based and grounded in an understanding of the factors which are relevant to parents from socio-economically deprived areas. The current report provides data from a survey of parents whose children take part in the programme, the design of which was informed by previous in-depth interviews with parents.

Data is presented showing that parents’ decisions about how often to brush their child’s teeth can be influenced by perceptions of what other parents do, their motivation for brushing their child’s teeth in the morning and the evening, and the stability of their day-to-day routines. Brushing children’s teeth in the evening was more commonly missed than brushing in the morning, suggesting that messages focusing on the importance of evening brushing may be particularly important. There is also evidence that there is room for improvement in terms of when parents begin brushing their child’s teeth and the extent to which they supervise children when they brush.

This data should provide a basis for designing more effective and persuasive oral health messages aimed at parents, in order to complement and build on the supervised toothbrushing element of the Designed to Smile programme.

## **5. Acknowledgements**

---

We would like to gratefully acknowledge the support of the school staff and the parents who took time to complete the questionnaire surveys, as well as the Community Dental Service staff for assisting in the distribution of the surveys.

## **6. Appendices**

---

### **Appendix A – Summary of Part 1, Stage I-III process evaluation findings**

## Summary of the Designed to Smile process evaluation (Stage 1, 2009-2011)

---

### *Evaluation process*

The Welsh Assembly Government contracted the Dental Public Health Unit at Cardiff University to carry out a formal evaluation of the Designed to Smile programme. The table below shows the three stages of the evaluation project, and the submission dates of the associated reports.

Stage	Participants	Method	Report date
Stage 1	CDS staff	Face-to-face interviews with 14 staff in South Wales and North Wales	December 2009
Stage 2	School staff	Questionnaire survey completed by 298 schools in South Wales and North Wales pilot regions	December 2010
Stage 3	Parents of children	Telephone interviews with 15 parents in South Wales and North Wales	December 2011

### *Key findings*

#### *STAGE 1: CDS STAFF INTERVIEWS*

The overall impression of the scheme that arose from the fourteen interviews was positive. Staff felt that the implementation of the scheme had gone well and were genuinely enthusiastic about their involvement in the programme. They considered the scheme to be on course to meet its aims. This was very encouraging given the short time since the commissioning of the scheme.

As with the implementation of any scheme of this size, there were inevitably a number of threats and opportunities communicated by the interviewees.

**Consent:** Consent to participate in the programme was reported to be high. However, considerable effort and staff time has been expended to ensure high coverage, which is compounded by the multiple consent forms associated with different elements of the programme and the need for rolling, year-on- year consent.

**Staff:** The introduction of non-clinical Support Workers was to felt to have been beneficial to the Designed to Smile programme. There was some variation in how these staff were being deployed in different areas. Consideration should be given to the training needs of this new category of staff and their developing role within the Designed to Smile team.

**Flexibility vs. protocol:** Staff described the need for a flexible approach to programme implementation. There is a need to ensure that, while steps are taken to secure schools' participation, this doesn't compromise the clinical and cost effectiveness of the programme.

**Relationships with schools:** Positive feedback and encouragement to schools is important both to recognise and reward involvement and as a means of securing ongoing participation in the scheme. It was felt that there was a misconception among some schools with regard to how long the scheme might take to implement in their classes, so methods of better communicating the straightforward nature of the toothbrushing programme should be considered.

**Wider health and education context:** There exists a need to integrate the Designed to Smile programme in the wider school curriculum, and ensure schools are rewarded for their involvement. Links to the wider health promotion agenda were evident, but could probably be exploited further.

**Written materials, translation and resources:** Staff reported some initial difficulty with the translation of written resources. This has now been largely resolved, but the translation

process would benefit from a review. Overall, staff were content with the quantity and quality of the physical resources available.

**Monitoring and audit:** Although there were clear guidelines for audit/quality inspections of schools participating in the scheme, it was not clear that they were being implemented in a consistent fashion. It is important to ensure that schools are clear about, and comply with the programme's protocols, and that this is rigorously monitored and documented.

**Communication between teams:** Although there was sharing of information between pilot sites, staff were of the view that opportunities for sharing best practice, particularly at an operational level, could be exploited further.

#### *STAGE 2: SCHOOL SURVEY*

Overall, schools were extremely positive about their experience of taking part in the programme. They commented particularly on the children's enthusiasm to brush their teeth in class alongside their friends. They felt that the scheme fitted well with their wider aims, and were complimentary about the training and support offered by the CDS teams. Inevitably, the results also highlighted some risks to the programme. These relate primarily to compliance with the toothbrushing protocol and future participation in the programme.

**Awareness of the scheme:** Despite the scope of the programme and the investment to date, 73% of school headteachers reported that they had not heard of the scheme before being approached by the CDS teams. It reflects well on the CDS staff that participation rates are nevertheless very high amongst targeted schools.

**Fit with the school and overall impact:** Almost all schools reported that they felt the scheme fitted well with their school curriculum and their wider health promotion efforts.

Similarly, all but a handful of schools were of the view that the programme had impacted positively on the school as a whole.

**Future intentions:** 90% of schools were either very or fairly sure that they would continue taking part in the scheme in the future. The remaining 10% (representing 1,520 children in 30 schools) were either unsure of their plans or unlikely to take part going forward, with the majority citing time constraints. It is obviously of great importance that the CDS are able to work with such schools to ensure their ongoing involvement in the programme.

**Class size and age groups:** The majority of classes surveyed were nursery or reception age (3-5 years old), with some Year 1 and Year 2 classes (5-7 years old). There was an average of 23 children per class, which was consistent between both South and North Wales and between age groups.

**Brushing frequency:** One third of schools reported that they missed at least one brushing session per week. Overall, it is estimated that children in South Wales miss a total of 3 weeks of brushing sessions over the course of the 39 week academic year, whereas children in North Wales miss 7 weeks. There are large variations by local area, however: children in Denbighshire, for instance, miss around 10 weeks of sessions. Non-compliance with daily brushing is identified as the most important finding of this evaluation. From both a clinical and cost-effectiveness perspective, it is crucial that as the programme matures, all schools are encouraged to work towards daily brushing.

**Brushing duration:** On average, brushing took around 11 minutes per session. Crucially, schools that brushed for more than 15 minutes were more than twice as likely as others to miss out sessions each week, or to express doubts about their involvement in the scheme going forward. Longer brushing times were associated with larger class sizes to some extent,

but teachers reported that a range of factors, including manpower and classroom facilities, were influencing factors.

**Satisfaction with training and support:** All but a handful of schools were happy with both the length of their training session and the amount of information they had received.

Likewise, most schools felt that they received adequate day-to-day support from the CDS staff.

**Satisfaction with brushing materials:** Satisfaction with toothbrushes, toothpaste, Brush Buses and other materials was generally high. There were some reports of problems cleaning Brush-Buses and occasions where the re-supply of materials had caused delays in the scheme. Perhaps most pressingly, there still appear to be problems in some schools with labelling toothbrushes. It is strongly recommended that the CDS amend their yearly school feedback forms in order to collect reliable information on brushing frequency, brushing duration and future intention to participate in the programme. This data would allow each team to focus their resources on the schools in need of the most support in their local area.

### *STAGE 3: PARENT INTERVIEWS*

The overall impression of the scheme that arose from the fifteen interviews was positive. Parents supported the scheme and most felt that it had been a positive experience for their child. Many reported that their child had shown an improved attitude towards toothbrushing, and had improved their brushing technique considerably.

**Communication of the scheme to parents and dentists:** All parents had received consent forms before taking part in the scheme and were happy with the information they had received. It was felt that parent meetings had been difficult to attend for those working full-time, and most parents reported that they would prefer more ongoing communication about

the scheme the school or the CDS staff. Some parents noted that their dental practitioner was unaware of the scheme.

**Parents' thoughts about the scheme:** Parents' attitude towards the scheme depended partly on their home brushing habits before the scheme began.

Those who brushed regularly were still largely supportive of the scheme, feeling that it reinforced their own messages and that many children in their school probably did not brush as often as their children. A minority of those whose children brushed regularly did however worry that the time spent on toothbrushing might mean that their children missed out on other learning opportunities – they perceived that there was not enough being done to educate parents about home brushing, in conjunction with the toothbrushing sessions in class.

Those parents who did not brush their children's teeth regularly at home were broadly supportive of the scheme. They felt that their children's attitude towards brushing had changed for the positive, facilitating their own efforts to brush their child's teeth at home.

**Children's thoughts about the scheme:** Parents reported that their children had taken very well to the scheme, and most considered part of their daily school routine. Parents highlighted the positive social aspect of children brushing in class with their friends, which they felt had led to greater enjoyment of toothbrushing in general. Similarly, many parents reported that children benefited from feeling ownership of their own toothbrush, both in class and through the 'home packs' of toothpaste and toothbrushes sent home to those taking part.

**Effect of the scheme on children's home brushing habits:** Those parents who brushed their child's teeth regularly typically saw the school sessions as a 'bonus brush', rather than a replacement for what they did at home. However, two parents of children whose school or nursery carried out the brushing scheme in the morning did report that they did occasionally

miss brushing their child's teeth before school. Those who brushes less frequently at home did not report any adverse effects on home brushing – indeed, a number of parents reported that the school sessions facilitated home brushing, due to improvements in their child's attitude towards brushing.

**Effect of the scheme on children's attitude towards toothbrushing:** Parents reported that their children had particularly enjoyed the oral health promotion talks given by CDS staff, and the involvement of the Dewi the Dragon puppet. Many pointed out that positive oral health messages given by teachers seemed to carry more authority, and so have more of a positive effect, than what they told their children at home.

Parents commonly reported that children enjoyed the social aspect of brushing with friends and that this positive association had carried over to home brushing. Many parents also felt that their child's brushing technique had noticeably improved as a result of the scheme – some were now happy to let their child brush with little or no supervision.

Finally, some parents reported that their child's positive experience with the Designed to Smile scheme had helped reduce anxieties related to visiting their own general dental practitioner.

**Effect of the scheme on parents' attitude towards toothbrushing:** Many parents reported that the main effect of the scheme was simply to raise awareness about toothbrushing and oral health, in general. They referred to a 'drip drip' effect of the talks, information sheets and feedback from their children. More than one parent reported that discussions about toothbrushing had prompted them to make dental appointments for their children, or to find them a dentist. Two parents of younger children (2-3 years old) reported that the scheme had made them aware of the need to brush their child's teeth at home, where they had previously been unsure of the appropriate age to begin brushing.

**Home packs:** Parents were extremely positive about the ‘home packs’ – free packs containing toothpaste and a toothbrush for children to use at home. Children were reportedly enthusiastic about having their own brush and parents felt that children were far more enthusiastic about brushing in the weeks following a new pack. Parents were grateful that the brushes and adult toothpaste were similar to those used in school, allowing continuity between school and home brushing.

There did, however, appear to be some discrepancy in how often parents received the home packs, according to which school their child attended. Some parents reported receiving packs each school term, whereas others had only received one or two over the course of a year or more.

**Appendix B – Summary of findings from Part II, Stage I process evaluation (December 2012)**

## **Executive Summary: Designed to Smile Evaluation Part II, Report I (December 2012)**

---

This report is the first of a series of three reports evaluating the Designed to Smile national oral health improvement programme. It follows a series of three previous reports submitted to the Welsh Government between December 2009 and December 2011, evaluating the Super Pilot scheme.

Findings from two questionnaire surveys are reported: the first, a survey of staff from 215 schools and nurseries in Mid, East and West Wales; the second, a survey of 297 parents of children taking part in the brushing scheme in the Abertawe Bro Morgannwg University Health Board.

### **School Survey**

Questionnaire surveys were sent to 215 schools taking part in the programme based in the Anuerin Bevan, Hywel Dda, Powys and Abertawe Bro Morgannwg University Health Boards. The questionnaires asked both headteachers and classroom teachers about their views on the scheme and collected details of how often toothbrushing sessions were carried out and how long each session lasted.

Overall, schools were extremely positive about their experience of taking part in the programme. They commented particularly on the children's enthusiasm to brush their teeth in class alongside their friends. They felt that the scheme fitted well with their wider aims, and were complimentary about the training and support offered by the CDS teams. Inevitably, the results also highlight some risks to the programme. These relate primarily to compliance with the toothbrushing protocol and future participation in the programme.

The findings are split in to a number of sub-sections:

**Awareness of the scheme:** Just under half of the headteachers surveyed (47%) were aware of the scheme before being contacted by the CDS staff. This is an improvement compared to the previous survey of settings in Super Pilot regions, and awareness should be further boosted by a recent letter to schools and nurseries from the Ministers for Health and Education.

**Fit with the school and overall impact:** Almost all schools reported that they felt the scheme fitted well with their school curriculum and their wider health promotion efforts. Similarly, all but a handful of schools were of the view that the programme had impacted positively on the school as a whole.

**Future intentions:** 93% of schools and nurseries were very or fairly sure that they would continue taking part in the scheme in the future. The remaining 7% (representing 728 children) were either unsure or unlikely to continue with the scheme, with the majority citing time constraints. It is important that CDS staff work with such schools and nurseries to dissuade them from discontinuing their involvement with the scheme.

**Class size and age groups:** The majority of the classrooms surveyed were nursery or reception age (3-5 years old), while the rest were infant age, Year 1 or Year 2 (4-6 years old). There was an average of 24 children to a class, though classes in Powys tended to be smaller.

**Brushing frequency:** One fifth (21%) of schools reported missing at least one toothbrushing session in a normal school week. Overall, children miss around four weeks of brushing sessions in a normal 39-week school year, but the problem is worse in Powys and Abertawe Bro Morgannwg. Non-compliance with daily brushing is identified as the most important finding of this evaluation. From both a clinical and cost-effectiveness perspective, it is crucial that as the programme matures, all schools are encouraged to work towards daily brushing.

**Brushing duration:** On average, brushing took around 11 minutes per session. Crucially, schools that brushed for more than 15 minutes were far more likely than others to miss out sessions each week, or to express doubts about their involvement in the scheme going forward. Longer brushing times were associated with larger class sizes to some extent, but teachers reported that a range of factors, including manpower and classroom facilities, were influencing factors.

**Satisfaction with training and support:** All but a handful of schools were happy with both the length of their training session and the amount of information they had received. Likewise, most schools felt that they received adequate day-to-day support from the CDS staff.

**Satisfaction with brushing materials:** Satisfaction with toothbrushes, toothpaste, Brush-Buses and other materials was generally high. There were some reports of difficulties where re-supply of materials had caused delays in the scheme.

## Parent survey

The second survey chapter reports on preliminary findings from a questionnaire survey of 297 parents whose children take part in the scheme in the Abertawe Bro Morgannwg Health Board area.

Findings are presented with regard to four questions from the survey, which asked parents about how their child's participation in Designed to Smile had impacted on their home toothbrushing habits and their child's and their own attitude towards toothbrushing in general.

**Effect of Designed to Smile participation on home toothbrushing:** Around a third (31%) of children were more likely to brush their teeth at home in the morning since taking part in

the scheme, while around a fifth (21%) of children were more likely to brush at home in the evening since starting Designed to Smile. Only a very small number of children were less likely to brush at home in either the morning or the evening as a result of taking part in the programme.

### **Effect of Designed to Smile participation on children and parents' attitude towards**

**home toothbrushing:** A third of parents (33%) and two-thirds of children (67%) reportedly had a more positive attitude towards home toothbrushing since taking part in the school toothbrushing programme.

## **Recommendations**

The following recommendations are made based on the findings of the two surveys:

**Recommendation #1:** CDS staff need to highlight the importance of the daily brushing protocol to schools and nurseries, and follow-up on this advice with regular auditing.

**Recommendation #2:** The average time taken to brush my schools and nurseries (11 minutes) is significantly less time than many teaching staff anticipate and should be emphasised by CDS staff when promoting the scheme to new schools and nurseries.

**Recommendation #3:** Teacher training should heavily emphasise the importance of organising the scheme so that it takes up as little time as possible, and seek to learn and communicate lessons from schools that carry out the scheme more efficiently.

**Recommendation #4:** It would be advisable for CDS staff to keep up-to-date information on participating schools and nurseries in terms of how often they carry out the scheme and how long it takes them to do so. This sort of information would allow staff to target schools and nurseries that need the most support.

**Recommendation #5:** Although flexibility is important, schools and nurseries should be encouraged where possible to carry out the toothbrushing scheme at lunch-time or later in the day to minimise any risk that parents will see morning brushing as a replacement for brushing their child's teeth at home.

## **Appendix C – Parent questionnaire survey**



**GIG**  
CYMRU  
**NHS**  
WALES

Bwrdd Iechyd Prifysgol  
Abertawe Bro Morgannwg  
University Health Board



Thank you for agreeing to take part in the Designed to Smile survey.

When you have finished completing the survey, you just need to place the questionnaire in the pre-paid and pre-addressed envelope provided and return it by post.

If you have any questions about the form, feel free to get in touch with survey coordinator Rob Trubey on 029 2074 5469.

### About your child

All questions in this survey refer to the child who is currently taking part in Designed to Smile, and who is named in the covering letter.

This first section asks some basic questions about your child's age and gender, and their birth order.

#### 1 How old is your child?

Write the age in the space below

..... years ..... months

#### 2 What gender is your child?

Tick one box only

Male

Female

#### 3 How many *older* brothers or sisters does your child have?

Write a number in the space below

They have ..... older brothers/sisters

#### 4 How many *younger* brothers or sisters does your child have?

Write a number in the space below

They have ..... younger brothers/sisters

### Toothbrushing at home

The following questions are about your child's toothbrushing at home. If your child doesn't brush at home, just tick no to question 5 and skip straight to question 13.

#### 5 Does your child brush their teeth (or have their teeth brushed) at home?

Tick one box only

Yes

No  go to .....> **13**

#### 6 Excluding what they do in school, how many times does your child brush their teeth (or have their teeth brushed) *each day*?

Write number in space below

..... times per day

#### 7 Who normally brushes your child's teeth at home?

Tick one box only

Child brushes on their own

Adult brushes child's teeth for them

Sometimes child brushes, sometimes adult brushes

Child brushes with adult supervision

**Please note – all questions from this point on that talk about 'your child brushing' at home can mean either them brushing their own teeth, or you or another adult brushing their teeth for them.**

**8 At what age did your child start toothbrushing?**  
*Write age in the spaces below*

..... Years      ..... Months

---

**9 Excluding what they do in school, how many times does your child brush their teeth each week?**  
*Write number in space below*

..... times per week

---

The next question asks you to agree or disagree with a statement about how often your child brushes their teeth.

**10 Please indicate whether you agree or disagree with the following statement:**  
  
**“I am happy with how often my child’s teeth are brushed each week”**  
*Tick one box only*

- |                   |                          |
|-------------------|--------------------------|
| Strongly agree    | <input type="checkbox"/> |
| Agree             | <input type="checkbox"/> |
| Neutral           | <input type="checkbox"/> |
| Disagree          | <input type="checkbox"/> |
| Strongly disagree | <input type="checkbox"/> |
- 

**11 In a normal week, how often does your child brush their teeth in the morning?**  
*Write number in space below*

..... times per week

---

**12 In a normal week, how often does your child brush their teeth in the evening?**  
*Write number in space below*

..... times per week

---

### Other children at school

These four questions ask your opinion of how often you think other children in your child’s school year brush their teeth (or have their teeth brushed) at home.

**13 What do you think is the maximum number of times that any child in your child’s school year brushes their teeth each week?**  
*Write number in space below*

..... times per week

---

**14 What do you think is the minimum number of times that any child in your child’s school year brushes their teeth each week?**  
*Write number in space below*

..... times per week

---

**15 What do you think is the average number of times that a child in your child’s school year brushes their teeth each week?**  
*Write number in space below*

..... times per week

---

**16 How do you think your child’s brushing compares to other children in their school year?**  
*Tick one box only*

- |  |                          |
|--|--------------------------|
| They brush less than all other children          | <input type="checkbox"/> |
| They brush less than most other children         | <input type="checkbox"/> |
| They brush about the same as most other children | <input type="checkbox"/> |
| They brush more than most other children         | <input type="checkbox"/> |
| They brush more than all other children          | <input type="checkbox"/> |
-

The next two questions ask you whether you agree with a set of statements about brushing your child's teeth, or making sure that they brush their teeth in the morning or the evening.

Please tick one box for each of the statements, to say whether you agree, disagree or are neutral towards it.

**17 Please indicate how strongly you agree or disagree with the following statements about your child's toothbrushing at home:**

Please tick one box in each row

<b><i>Brushing my child's teeth or making sure they brush their teeth IN THE MORNING is something....</i></b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>
I do frequently	<input type="checkbox"/>				
I do automatically	<input type="checkbox"/>				
I do without having to consciously remember	<input type="checkbox"/>				
that makes me feel weird if I don't do it	<input type="checkbox"/>				
I do without thinking	<input type="checkbox"/>				
that would require effort not to do it	<input type="checkbox"/>				
that belongs to the daily routine	<input type="checkbox"/>				
I start doing before I realise I'm doing it	<input type="checkbox"/>				
I would find hard not to do	<input type="checkbox"/>				
I have no need to think about doing	<input type="checkbox"/>				
that's typically 'me'	<input type="checkbox"/>				
I have been doing for a long time	<input type="checkbox"/>				

<b><i>Brushing my child's teeth or making sure they brush their teeth IN THE EVENING is something....</i></b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>
I do frequently	<input type="checkbox"/>				
I do automatically	<input type="checkbox"/>				
I do without having to consciously remember	<input type="checkbox"/>				
that makes me feel weird if I don't do it	<input type="checkbox"/>				
I do without thinking	<input type="checkbox"/>				
that would require effort not to do it	<input type="checkbox"/>				
that belongs to the daily routine	<input type="checkbox"/>				
I start doing before I realise I'm doing it	<input type="checkbox"/>				
I would find hard not to do	<input type="checkbox"/>				
I have no need to think about doing	<input type="checkbox"/>				
that's typically 'me'	<input type="checkbox"/>				
I have been doing for a long time	<input type="checkbox"/>				

## Morning and evening activities at home

The questions below refer to the daily tasks your child carries out in the morning and the evening, such as waking up, having breakfast, having an evening meal, etc. We just want to get an idea of whether or not there is a set routine for these things, or whether they are flexible and change from day to day.

**18** In a typical week from Monday to Friday, to what extent does your child carry out the following morning and evening activities at the same time each day?

Please tick one box in each row

<b>IN THE MORNING.... (Mon-Fri)</b>	Always the same time ▼	Usually the same time ▼	Sometimes the same time ▼	Rarely the same time ▼	Never the same time ▼	Not applicable ▼
Waking up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having breakfast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having a wash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Getting dressed for school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leaving the house for school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>IN THE EVENING....(Mon-Fri)</b>	Always the same time ▼	Usually the same time ▼	Sometimes the same time ▼	Rarely the same time ▼	Never the same time ▼	Not applicable ▼
Getting home from school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having dinner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having a wash before bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Getting changed for bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Going to bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## The Designed to Smile scheme

We now want to ask you a few questions about the Designed to Smile scheme and how it affects your child's toothbrushing at home.

**19** Since they have been brushing in school with Designed to Smile, how has this affected toothbrushing at home in the morning?

*Tick one box only*

They're more likely to brush in the morning

They're less likely to brush in the morning

It hasn't changed brushing in the morning

**20** Since they have been brushing in school with Designed to Smile, how has this affected toothbrushing at home in the evening?

*Tick one box only*

They're more likely to brush in the evening

They're less likely to brush in the evening

It hasn't changed brushing in the evening

**21** Since your child has started brushing in school, how has that affected *their* attitude towards brushing their teeth at home?

*Tick one box only*

They're more positive about brushing at home

They're more negative about brushing at home

It hasn't changed

**22** Since your child has started brushing in school, how has that affected *your* attitude towards brushing their teeth at home?

*Tick one box only*

I'm more positive about brushing at home

I'm more negative about brushing at home

It hasn't changed

## The cost of brushing

The following questions are about the cost of various toothbrushing materials like toothbrushes and toothpaste.

**23** What is your impression of the cost of buying a toothbrush for your child in the shops?

*Tick one box only*

Very expensive

Fairly expensive

Not sure

Fairly cheap

Very cheap

**24** Has the cost of buying a toothbrush for your child ever put you off buying one?

*Tick one box only*

Yes

No

**25** What is your impression of the cost of buying toothpaste for your child in the shops?

*Tick one box only*

Very expensive

Fairly expensive

Not sure

Fairly cheap

Very cheap

**26** Has the cost of buying toothpaste for your child ever put you off buying it?

*Tick one box only*

Yes

No

These two questions ask you to choose between five different types of toothpaste, and select the one that you would choose to use for your child in the morning, and then which one you would choose to use for your child in the evening.

Again, there are no right or wrong answers to these questions – we're just interested in your own preference.

**27** *Imagine there was a toothpaste made from two ingredients. The first ingredient, "Fresh", made children's breath smell fresh and their teeth look bright and shiny. The other ingredient, "Health", prevented tooth and gum disease for five years.*

*Imagine you can choose how much of each ingredient went into your child's toothpaste - but more of one ingredient means less of the other.*

*If you choose to have toothpaste made only from "Fresh" you get no "Health" and your child is more likely to have problems with their teeth and gums in five years. However, if you choose more "Health" then, while they are much less likely to suffer problems with their teeth and gums in the future, their mouths will not look or smell like they have been cleaned.*

**If you had the following five choices of toothpaste to use in the morning, which one would you choose to use for your child?**

*Please tick one box only*

FRESH		HEALTH		Choose <i>one</i> type of toothpaste to use in the morning	
(1)	100%	FRESH		0%	<input type="checkbox"/>
(2)	75%	FRESH HEALTH		25%	<input type="checkbox"/>
(3)	50%	FRESH HEALTH		50%	<input type="checkbox"/>
(4)	25%	FRESH HEALTH		75%	<input type="checkbox"/>
(5)	0%	HEALTH		100%	<input type="checkbox"/>

**28** *If you had the following five choices of toothpaste to use in the evening, which one would you choose to use for your child?*

*Please tick one box only*

FRESH		HEALTH		Choose <i>one</i> type of toothpaste to use in the evening	
(1)	100%	FRESH		0%	<input type="checkbox"/>
(2)	75%	FRESH HEALTH		25%	<input type="checkbox"/>
(3)	50%	FRESH HEALTH		50%	<input type="checkbox"/>
(4)	25%	FRESH HEALTH		75%	<input type="checkbox"/>
(5)	0%	HEALTH		100%	<input type="checkbox"/>

The following three questions ask you to make a choice between two imaginary options – an immediate reward, or a reward that you would receive at some point in the future.

We often make these types of choices in everyday life – there are no right or wrong answers, it's just a matter of preference.

We are interested in the way that people budget for certain things, and how this might relate to decisions about toothbrushing at home.

**29** *Imagine you had a lottery ticket and had won £87, but you could not claim the £87 immediately – instead, you had to wait a while before you could claim your winnings.*

**What is the least amount of money you would sell the ticket for today, if you had to wait 30 days (a month) before claiming the prize?**

*Write amount in spaces below*

\_\_\_\_\_ pounds \_\_\_\_\_ pence  
\_\_\_\_\_

**30** **What is the least amount of money you would sell the ticket for today, if you had to wait 90 days (3 months) before claiming the prize?**

*Write amount in spaces below*

\_\_\_\_\_ pounds \_\_\_\_\_ pence  
\_\_\_\_\_

**31** **What is the least amount of money you would sell the ticket for today, if you had to wait 7 days (a week) before claiming the prize?**

*Write amount in spaces below*

\_\_\_\_\_ pounds \_\_\_\_\_ pence  
\_\_\_\_\_

At some point later this year, we plan to carry out some pen-and-paper exercises with parents, to follow up on the findings of this survey. The exercises would last no more than 30 minutes, and would be conducted somewhere convenient for you. Any travel costs would be paid in full.

If you would be willing to be considered for these exercises, please let us know by ticking the appropriate box below.

**32** **Would you be willing to be contacted at a later date?**

*Tick one box only*

Yes

No

**Thank you very much for taking the time to fill out this survey.**

**Please return the completed questionnaire using the pre-paid and addressed envelope that came with it.**

**If you have the lost the envelope, please return to:**

**Rob Trubey,  
School of Dentistry,  
Cardiff University,  
Heath Park,  
Cardiff  
CF14 4GZ**

## **Appendix D - Parent interview journal article**

The following article was submitted to the International Journal of Paediatric Dentistry and published online on in April 2013.

It details findings from in-depth interviews with 15 parents whose children were taking part in the Designed to Smile scheme, focusing on factors which influence the parents' decisions about their child's toothbrushing at home. The interview findings provided the basis of the parent survey, the data from which is discussed in the current report.

**Parents' reasons for brushing or not brushing their child's teeth: a  
qualitative study**

R.J. Trubey

Research Assistant, Applied Clinical Research and Public Health, Cardiff University School  
of Dentistry

S.C. Moore

Reader, Violence & Society Research Group, Cardiff University School of Dentistry

I.G. Chestnutt

Professor and Hon. Consultant in Dental Public Health, Applied Clinical Research and Public  
Health, Cardiff University School of Dentistry

**Running title:**

Parental influences on toothbrushing at home

**Corresponding author:**

Rob Trubey

Research Assistant

Applied Clinical Research and Public Health

Cardiff University School of Dentistry

Heath Park

CARDIFF CF14 4XY

Tel: 029 2074 5469

E-mail: [trubeyrj@cardiff.ac.uk](mailto:trubeyrj@cardiff.ac.uk)

## **Acknowledgements**

The authors thank the Welsh Government for supporting the research. We are grateful for the assistance of the Community Dental Service in Wales in helping to recruit participants, and to the parents themselves for taking part in the interviews.

This work was supported by the Welsh Government, grant code C-110/2008/09.

## **Summary**

**Background:** Despite recent improvements in oral health, dental caries remains a significant source of morbidity for young children. Research has shown that regular toothbrushing with fluoride toothpaste reduces the risk of dental caries, but the factors which influence parental decisions about whether or not to brush their infant children's teeth at home are poorly understood.

**Aim:** To develop an in-depth understanding of the issues that face parents from socio-economically deprived areas when trying to brush their young children's teeth at home.

**Design:** Fifteen parents of children aged 3-6 years old took part in semi-structured telephone interviews, discussing factors relating to brushing their child's teeth at home. Thematic analysis was used to develop three themes.

**Results:** Parents discussed the difficulty of brushing their children's teeth in the evening, due to changing day-to-day routines, and the subsequent difficulty of forming a toothbrushing habit. Motivating factors for brushing children's teeth were largely short-term. Satisfaction with brushing frequency was influenced more by perceptions of how often other parents brushed children's teeth than by the 'twice a day' norm or health outcomes.

**Conclusion:** Results are discussed in relation to research and theories from the psychology and behavioural economics literature, and comparisons are drawn with assumptions inherent in more traditional oral health promotion messages.

## Introduction

Despite great improvements in oral health in recent decades, dental caries continues to be a significant source of morbidity for young children (1). As with many other health outcomes, there is a well-established link between childhood dental caries and socioeconomic deprivation (2), with children from socioeconomically deprived areas typically experiencing more dental decay compared to those from more affluent areas.

Despite this social gradient in disease, there exists large variation in oral health outcomes for children within socioeconomic groups. For instance, recent epidemiological data shows that 5 year-old children resident in areas designated as the most deprived quintile in Wales experience a wide range of oral health outcomes (3). While 42% of this cohort are caries free, the remaining 58% have on average 4.6 decayed, missing or filled teeth.

The role of fluoridated toothpaste in preventing dental caries in children is beyond doubt (4). Less than daily toothbrushing is a known risk factor for oral disease (5), and research has demonstrated a clear benefit of twice daily brushing compared to brushing just once a day or less (5, 6). The variation in oral health outcomes for young children from similar socioeconomic backgrounds is therefore suggestive of underlying differences in oral health behaviour such as toothbrushing and diet in the home environment, while under the guidance of their parents or caregivers.

There has been relatively little research exploring the influence of parent's psychosocial attributes on their children's oral health behaviour (7). A handful of cross-sectional studies have found children's oral health behaviour to be related to parental oral health knowledge (8), attitude towards oral health (9) and beliefs about oral health (10). However, in terms of oral health promotion and intervention, there appears to be little evidence that changing

people's attitudes, beliefs or knowledge brings around long-term changes in oral health outcomes (11).

The current study used qualitative interviews to explore issues facing parents from socio-economically deprived areas when trying to brush their children's teeth at home. Qualitative research is particularly useful for 'giving a voice' to groups of people who are often overlooked in more conventional, quantitative research and provides the opportunity to 'gain an in-depth understanding of people's views, behaviour and decision-making processes from their own perspective (12).

The aim of this study was to gain an in-depth understanding of the issues facing parents from socio-economically deprived backgrounds in relation to brushing their child's teeth at home.

## **Method**

### *Recruitment and sampling*

In total, 15 parents took part in the study. Parents were purposely recruited on the basis of their child's involvement in a national, school-based toothbrushing scheme called Designed to Smile. The programme involves children aged between 3-6 years old and is run in nurseries and schools in areas of high socio-economic deprivation. As nursery and infant schools are populated by children from surrounding 'catchment areas', the parents and guardians of the children recruited were all from socio-economically deprived areas.

In order to access a varied group of participants and viewpoints, recruitment was facilitated by staff from the Community Dental Service (CDS). The CDS staff oversee the day-to-day running of the Designed to Smile scheme and have good relationships with schools and parents through their experience of working in the community.

Initially, six parents were recruited. After the initial interviews had been analysed, theoretical sampling (13) was used, whereby parents of slightly older (5 or 6 year-old) children and parents who brushed their children's teeth infrequently were purposely recruited in order to inform and broaden some of the emerging themes and ideas from the earlier interviews.

All parents were approached in the school setting by oral health promotion staff from the Community Dental Service, and asked if they would be willing to take part in a telephone interview about their experience of toothbrushing with their child at home. They were given an information sheet explaining each aspect of the research. Parents who were interested in taking part were asked to complete a consent form with a contact number and were then contacted by the researcher to arrange a suitable time to conduct the interview.

Recruitment of participants ended when saturation occurred – that is, successive interviews were offering no new insights or challenges to the developing ideas and themes (14).

### *Data collection*

Data were collected via a series of in-depth interviews carried out over the telephone.

The interviews were semi-structured, following a brief interview schedule which was initially piloted with two parents, resulting in minor amendments. The interviews initially included three open questions:

- Tell me about your experience of brushing your child's teeth at home...
- What things make toothbrushing at home with your child easier, for you?
- What things make toothbrushing with your child at home harder, for you?

The questions served only as a starting point, with the remainder of the interview directed by participant's reported experiences. A series of simple, probing follow-up questions or responses ('tell me more about that', 'why do you think that is?') were employed to motivate the interviewee to share as much information as possible.

As the research progressed, and the initial stages of data analysis took place, the original interview schedule was added to and refined in order to elicit more information on emerging concepts and theories. For example, the first group of participants spoke about toothbrushing as being part of their morning 'routine'. As a result, subsequent interviewees were asked about their typical morning and evening activities, to further explore the concept of 'daily routines' in relation to toothbrushing.

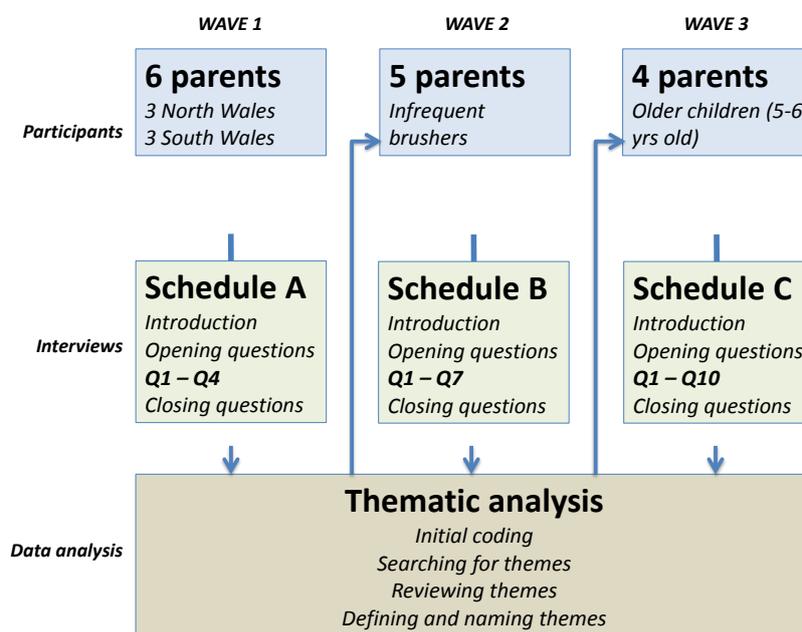
## Data analysis

Each of the interviews was digitally recorded and transcribed in full.

Data analysis was guided by the principles of thematic analysis, an approach to analysing qualitative data which provides a method for “identifying, analysing and reporting patterns (themes) within data” (15).

Importantly, the research process was iterative: data analysis therefore took place throughout the research cycle, and recruitment and data collection were guided by the on-going analysis and development of provisional concepts and themes. Figure 1 gives an overview of this iterative approach.

**Figure 1: Iterative approach to data collection and analysis**



The stages of analysis were:

1. Reading through interview transcripts in full in order to become familiar with the data

2. Going through transcripts in detail, creating 'primary codes' by labelling words, phrases or sentences which represented parents' key ideas and thoughts about brushing their children's teeth at home
3. Combining together thematically similar primary codes to produce initial themes
4. Meeting with a second researcher, IGC, to read through transcripts and discuss codes and themes, to ensure inter-rater reliability and stimulate discussion and reflection about themes
5. Constantly reviewing themes throughout the research process in order to add, refine or sometimes remove themes based on new primary codes or patterns in the data
6. Eventually defining and naming a small number of themes which are felt to adequately represent the full data set.

### *Ethics*

The study was conducted as part of a larger service evaluation of the Designed to Smile toothbrushing scheme, on behalf of the Welsh Government. All parents gave informed consent before taking part in interviews, were aware of their right to withdraw from the study at any point, and gave permission for the interviews to be digitally recorded. Interview transcripts were all anonymised.

## Results

Table 1 gives basic demographic details for each of the 15 participants in the study.

*Table 1: Demographic details of participants*

Participant	Parent gender	Child gender	Child age	Reported brushing frequency
1	F	F	3	Twice a day
2	F	F	4	Once a day
3	F	M	4	Twice a day
4	F	M	4	Twice a day
5	M	F	5	Once/twice a day
6	F	M	3	Twice a day
7	F	F	3	Once a day
8	F	F	5	Rarely
9	F	M	4	Once a day
10	F	F	4	Once a day
11	F	M	4	Twice a day
12	F	M	5	Once/twice a day
13	F	F	6	Twice a day
14	M	F	6	Once a day
15	F	M	5	Twice a day

Three themes were generated from the data analysis, which were felt to represent the most salient issues addressed by the interviewees:

- 1) Toothbrushing routines and habits
- 2) Motivation for toothbrushing

### 3) Toothbrushing norms

These themes are considered below, with illustrative quotes provided.

#### *Theme 1: Toothbrushing routines and habits*

During early interviews, when parents were asked to talk in detail about their experiences of toothbrushing at home with their child, they frequently made reference to the context in which toothbrushing took place among all their other daily activities.

The result was that toothbrushing was essentially cued by these other events. For parents whose children brushed in the morning, for instance, it fitted in either before or after an event like waking up, eating breakfast, having a wash, bath or shower, getting dressed in school clothes and leaving home for school; while for those parents whose children brushed in the evening, it fitted in either before or after an event like getting home from school, having dinner, doing homework, having a wash, bath or shower, putting on pyjamas and going to bed.

*We're quite predictable – things happen in a certain order! So we always get up, have breakfast, then brush their teeth, then it's get changed and out we go!*

*Yeah, they have their bath, they come down and they have their supper, which is normally a glass of milk and a cookie and they go back up and brush their teeth before bed. Toilet and teeth! Toilet and teeth and then bed.*

In subsequent interviews, parents were asked to describe a typical morning or evening at home, in order to get a sense of how – or if – brushing their children’s teeth fitted in to their overall routine.

It was evident that, for a number of parents, evenings were a lot less stable or predictable than mornings. Mornings were reported to be ‘hectic’, but generally followed a similar pattern, whereas evening routines often changed from one day to the next.

There were a number of reasons for this, including changing work patterns and shifts and other parental distractions, and for slightly older children, occasional homework and after-school clubs. The result was that children were often left with friends or family after school, and so got home and ate at different times throughout the week.

*If we’re really late, we’ll eat out. Or general days, when we’re back about five, you know, we’ll have our dinner, then half past six, it’ll be bath and we’ll do their teeth whilst we’re in the bathroom and they’ll go to bed then. That’s most days, but a hectic day we’ll maybe just have tea and go straight to bed.*

*They just... at the end of the day, it’s just hectic. Especially with after school things now. Because we’ve only just got in now [7:15pm] and I like the kid’s in bed for seven. That’s their routine. But because we’ve started doing these extra outside of the school things now, we’re rushing about and doing things. I’m reading books and we’re doing homework now, so it’s just hectic, so you just sometimes miss it. They need to be in bed, don’t they?*

Those parents whose routines – particularly evening routines – changed from one day to the next typically reported that brushing their children’s teeth was a challenge or a struggle each day, and was often missed as a result even when parents saw the value in evening brushing.

In contrast, parents whose morning or evening routines seemed to be consistent from one day to the next talked of children being in the ‘habit’ of brushing, implying that there was less deliberating about toothbrushing – it was something that ‘just happened’.

*They’re just in a habit now. We don’t have to talk about it really, they’re just used to doing it... it’s something they do, just like getting dressed or anything else.*

#### *Theme 2: Toothbrushing motivation*

It was apparent that parents had a number of different reasons and motivations for brushing their children’s teeth. Parents offered these explanations for brushing without any prompting initially, but later interviews were structured so that parents were asked more directly about the reason that they brushed their children’s teeth in the morning and the evening.

Overwhelmingly, the motivation for brushing in the morning was short-term: hygienic, in the sense that it made teeth *feel* clean and ensured fresh breath, and cosmetic in that it made teeth *look* clean.

*You know, you want to make sure he has clean teeth, nice shiny teeth, when he goes to school.*

The motivation for brushing children’s teeth in the evening was more varied. Whereas parents were quick to give reasons for brushing their child’s teeth in the morning, many parents (even those whose children regularly brushed twice a day) struggled to explain their

reason for toothbrushing in the evening. In general, though, the benefits of evening brushing were seen as long-term, occurring at some point in the future. There was a sense that evening brushing helped keep teeth 'healthy' and reduced the risk of future problems when children were 'older'.

*I suppose it's getting rid of any bacteria and stuff, so that it doesn't cause her teeth to be rotten in the long run.*

*It's about putting on that toothpaste, and then it's all got night to work on his teeth, hasn't it? He's not eating then, so it's better, it's got time to work.*

It was noticeable that the cosmetic and hygienic reasons most often given for morning brushing were strong motivating factors for a lot of parents. Evening brushing was, by some parents, seen as something of a bonus by contrast. Indeed, a couple of parents struggled to see the point in evening brushing if their children were brushing in the morning.

*I think in the morning, you just want to make sure they've got fresh breath and everything, but in the evening, well for me it's not as big a deal if they're brushing the next morning anyway.*

One of the reasons that cosmetic factors were seen as important was that parents felt that their children's teeth were part of their overall appearance, likening it to their clothes or hair for instance. In this sense, parents felt that their children having dirty teeth would be obvious to teachers and other school or nursery staff, and reflect badly on them as parents.

*It's just general hygiene, isn't it? And their appearance. You wouldn't let them out of the door with muddy trousers, or food all over them, and their hair all scruffy, and everything, that wouldn't look good.*

### *Theme 3: Toothbrushing norms*

Over the course of the fifteen interviews, almost every parent made an unprompted reference to the twice-a-day toothbrushing 'norm' when discussing home brushing.

However, the extent that such a message was considered relevant to parents' decision making appeared to depend on their perception of how often they imagined other parents brushed their children's teeth. For parents who believed that very few other parents brushed their child's teeth twice a day, the message about what you *should* do was not considered credible.

Overall, there was a wide range of views on how often other parents were perceived to brush their children's teeth. Often it followed that parents who brushed their children's teeth frequently thought that most parents did the same, and those who brushed their children's teeth less often were sceptical of the idea that other children brushed regularly.

*I imagine most parents brush their children's teeth twice a day, yeah?*

*That's the message, isn't it? I don't think it's that big a thing, really, so yeah, I think most parents would be the same as us.*

*And everyone says it's twice a day you should do. But you're supposed to do lots of things! I think most parents are realistic... they don't all brush their children's teeth every day. You've got so much going on. It's just not going to happen is it? A lot of them won't ever do it, I bet!*

When parents were asked how satisfied they were with how often their child brushed their teeth, they tended to focus more on making comparisons with ‘other’ parents and children than they did on tangible outcomes such as tooth decay or pain.

Some parents felt content with brushing their child’s teeth once a day because they felt that was about average compared to other parents, while others expressed guilt or a desire to brush more often because they felt other parents may do more than themselves. One parent of a child who brushed twice a day even expressed anxiety about their routine, because she thought that some other parents might brush their child’s teeth three times a day.

*Well we do it twice a day because that’s what I’ve always been told, I guess. I don’t know if some people brush their children’s teeth after lunch as well, on the weekend, I don’t know... I guess I haven’t thought about that... maybe that’s something we could do, I suppose.*

## **Discussion**

The current study adopted a qualitative approach in order to explore some of the issues facing parents from socio-economically deprived backgrounds when trying to brush their children's teeth at home. Silverman (16) has discussed the importance of establishing reliability and validity in qualitative research. In the present study, internal reliability was sought by means of involving a second researcher in reading through transcripts and discussing codes and themes, often referred to as inter-rater reliability (17). In order to increase the validity of the findings, a form of respondent validity (16) was employed, where later interviewees were asked more direct questions relating to ideas and themes that had been developed from earlier analysis.

Although there is naturally a limit to which findings in qualitative research can be generalised to the wider population, it is hoped that the broad themes discussed below will prove helpful in understanding some of the reasons that parents from socio-economically deprived backgrounds do or don't brush their children's teeth at home.

Consistent with previous research (18), the current study found that toothbrushing at home was closely linked to other routine events that take place in the morning or evening. To the extent that toothbrushing appeared to be cued by other events, the day-to-day stability of morning and evening routines seemed to be an important factor in whether or not parents could initiate a toothbrushing 'habit' in their children. With children often left with friends or family in the evening, there is less opportunity for children to develop toothbrushing routine through primary socialisation – through learning from or receiving reinforcement from their parents or primary caregivers.

In the wider psychology literature, habits are defined as behaviours that exhibit ‘automaticity’, requiring minimal or no conscious thought (19). Importantly, habits have been shown to be strong predictors of future behaviour, more so than having positive intentions to perform a behaviour (20).

The importance of stable routines for habit formation has been highlighted by both theoretical accounts and research in the field of medication adherence. Wood and colleagues (21) present a model of habit formation in which repetitive behaviours are more likely to lead to habit formation when ‘performed in stable circumstances—meaning in particular locations, at specific times...’. Wagner and Ryan found higher adherence levels to antiretroviral medication in adults whose day to day routines were more stable, concluding that “the extent to which one's daily life is structured and routinised is an important factor in understanding medication adherence” (22).

Traditionally, oral health educators and dental practitioners tend to emphasise the longer-term benefits of toothbrushing such as the prevention of dental disease. In the current study, however, parents were more strongly motivated to brush their children’s teeth by shorter term, cosmetic or hygienic factors. Previous qualitative research has found that both adolescents and younger children tend to focus on cosmetic factors when discussing reasons for brushing their own teeth (23, 24), but this is the first study to suggest that parents have a similar focus when brushing their infant children’s teeth.

The idea that shorter-term benefits may hold more appeal than apparently larger longer-term benefits is consistent with findings in psychology and behavioural economics. It is found that many people inform their decisions through attending to more immediate outcomes and discount the importance of delayed outcomes even when the value of these delayed outcomes are significantly greater (25), a phenomena sometimes referred to as myopia. There is,

however, considerable variation in the extent with which people place importance on immediate and delayed outcomes: some people are more myopic than others. Moreover, the extent to which individuals exhibit such myopia has been linked to the likelihood with which they will engage in certain ‘health protective’ behaviours such as taking regular exercise or voluntary flu vaccinations (26).

Previous research has suggested a possible link between parents’ oral health knowledge or literacy and their child’s oral health behaviour (8). In the current study, the overwhelming majority of parents were aware of – and often mentioned without prompting – the ‘twice a day’ toothbrushing norm, suggesting that this traditional oral health message was well understood among this group.

Parents’ behaviour, however, appeared to be related to their perception of how often other parents *actually* brushed their child’s teeth – what is commonly referred to as a ‘descriptive norm’, rather than the twice-a-day ‘prescriptive norm’. In many instances, parents assumed that their own behaviour (whether they brushed their child’s teeth frequently or infrequently) was similar to that of most other parents.

Recent research has suggested that adolescents tend to over-estimate how often their peers consume alcohol (27) and sweet drinks (28), and that the degree of over-estimation is typically related to their own level of consumption (28). The findings of the current study suggest that parents may exhibit similar biases in their estimation of toothbrushing norms.

Peer group comparisons also appeared to exert some influence on how satisfied parents were with the frequency with which they brushed their child’s teeth: some parents who brushed their child’s teeth infrequently were nonetheless satisfied with their behaviour, due to their belief that most other parents acted similarly. These findings are consistent with research

suggesting that satisfaction with a wide range of outcomes, such as personal income and body image are heavily influenced by social comparisons (29, 30).

The stability of day-to-day home routines, the perceived immediacy of the benefits of toothbrushing and perceptions of how often other parents brush their children's teeth all appear to be important factors for parents from socio-economically deprived backgrounds when thinking about brushing their children's teeth at home. These areas are relatively unexplored in oral health research, but have received more attention in the wider health and psychology literature. Future research should be aimed at further understanding these issues in relation to dental and oral health and exploring the extent to which these insights may inform future oral health education and intervention initiatives.

## **Bullet points**

### *What this paper adds*

- Traditionally, oral health promotion has been based on an assumption that parents who brush their children's teeth infrequently do so because they have poor oral health knowledge, or do not prioritise their child's oral health.
- This paper suggests that other factors may actually be important in parental decision making about home toothbrushing.

### *Why this paper is important for paediatric dentists*

- Paediatric dentists should be aware that many parents are motivated to brush their children's teeth by short-term, cosmetic factors ('clean teeth', 'fresh breath') as much if not more than long-term factors such as reducing the risk of dental decay.
- Paediatric dentists should consider that, in addition to the common 'twice-a-day' message (a prescriptive norm), parents may be influenced by what they believe most other parents actually do (a descriptive norm).
- Paediatric dentists should be aware that many parents from socio-economically deprived areas have very unstable day-to-day routines and so find it difficult to establish a twice-daily toothbrushing habit for their children.

## References

1. Pitts NB, Boyles J, Nugent ZJ, Thomas N, Pine CM. The dental caries experience of 5-year-old children in Great Britain (2005/6). Surveys co-ordinated by the British Association for the Study of Community Dentistry. *Community Dent Hlth*. 2007 Mar;24(1):59-63.
2. Bernabé E, Hobdell MH. Is Income Inequality Related to Childhood Dental Caries in Rich Countries? *The Journal of the American Dental Association*. 2010 February 2010;141(2):143-9.
3. Welsh Oral Health Information Unit. 2010:  
<http://www.cardiff.ac.uk/dentl/research/themes/appliedclinicalresearch/epidemiology/oralhealth/index.html>
4. Walsh T, Worthington HV, Glenny AM, Appelbe P, Marinho VC, Shi X. Fluoride toothpastes of different concentrations for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. [Meta-Analysis Review]. 2010(1):CD007868.
5. Pine CM, McGoldrick PM, Burnside G, Curnow MM, Chesters RK, Nicholson J, et al. An intervention programme to establish regular toothbrushing: understanding parents' beliefs and motivating children. *Int Dent J*. [Clinical Trial Randomized Controlled Trial]. 2000;Suppl Creating A Successful:312-23.
6. Chestnutt IG, Schafer F, Jacobson AP, Stephen KW. The influence of toothbrushing frequency and post-brushing rinsing on caries experience in a caries clinical trial. *Community Dent Oral Epidemiol*. [Clinical Trial]. 1998 Dec;26(6):406-11.

7. Hooley M, Skouteris H, Boganin C, Satur J, Kilpatrick N. Parental influence and the development of dental caries in children aged 0-6 years: A systematic review of the literature. *J Dent*. 2012 Nov;40(11):873-85.
8. Vann WF, Jr., Lee JY, Baker D, Divaris K. Oral health literacy among female caregivers: impact on oral health outcomes in early childhood. *J Dent Res*. [Research Support, N.I.H., Extramural]. 2010 Dec;89(12):1395-400.
9. Buunk-Werkhoven YAB, Dijkstra A, van der Schans CP. Determinants of oral hygiene behavior: a study based on the theory of planned behavior. *Community Dent Oral Epidemiol*. 2011 Jun;39(3):250-9.
10. Pine CM, Adair PM, Petersen PE, Douglass C, Burnside G, Nicoll AD, et al. Developing explanatory models of health inequalities in childhood dental caries. *Community Dent Hlth*. [Multicenter Study Research Support, U.S. Gov't, P.H.S.]. 2004 Mar;21(1 Suppl):86-95.
11. Watt RG. Strategies and approaches in oral disease prevention and health promotion. *B World Health Organ*. 2005 Sep;83(9):711-8.
12. Hennink M, Bailey A, Hutter I. *Qualitative Research Methods*: SAGE Publications; 2010.
13. Glaser BG, Strauss AL. *The Discovery of Grounded Theory: Strategies for Qualitative Research*: Aldine de Gruyter; 1967.
14. Corbin JM, Strauss A. Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*. 1990;13(1):3-21.

15. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006 2006/01/01;3(2):77-101.
16. Silverman D. *Doing Qualitative Research*: SAGE Publications; 2009.
17. Mason J. *Qualitative Researching*: SAGE Publications; 2002.
18. Aunger R. Tooth brushing as routine behaviour. *Int Dent J*. 2007 Oct;57(5):364-76.
19. Verplanken B, Orbell S. Reflections on past behavior: A self-report index of habit strength. *J Appl Soc Psychol*. 2003 Jun;33(6):1313-30.
20. Verplanken B. Beyond frequency: habit as mental construct. *Br J Soc Psychol*. 2006 Sep;45(Pt 3):639-56.
21. Wood W, Neal DT. A new look at habits and the habit-goal interface. *Psychol Rev*. [Research Support, Non-U.S. Gov't Review]. 2007 Oct;114(4):843-63.
22. Wagner GJ, Ryan GW. Relationship between routinization of daily behaviors and medication adherence in HIV-positive drug users. *AIDS Patient Care STDS*. [Research Support, U.S. Gov't, P.H.S.]. 2004 Jul;18(7):385-93.
23. Stokes E, Ashcroft A, Platt MJ. Determining Liverpool adolescents' beliefs and attitudes in relation to oral health. *Health Educ Res*. [Research Support, Non-U.S. Gov't]. 2006 Apr;21(2):192-205.
24. Gill P, Stewart K, Chetcuti D, Chestnutt IG. Children's understanding of and motivations for toothbrushing: a qualitative study. *Int J Dent Hyg*. [Research Support, Non-U.S. Gov't]. 2011 Feb;9(1):79-86.

25. Frederick S, Loewenstein G, O'Donoghue T. Time discounting and time preference: A critical review. *J Econ Lit*. 2002 Jun;40(2):351-401.
26. Bradford WD. The Association Between Individual Time Preferences and Health Maintenance Habits. *Med Decis Making*. 2010 Jan-Feb;30(1):99-112.
27. Perkins HW, Haines MP, Rice R. Misperceiving the college drinking norm and related problems: A nationwide study of exposure to prevention information, perceived norms and student alcohol misuse. *J Stud Alcohol*. 2005 Jul;66(4):470-8.
28. Lally P, Bartle N, Wardle J. Social norms and diet in adolescents. *Appetite*. 2011 Dec;57(3):623-7.
29. Brown GDA, Gardner J, Oswald AJ, Qian J. Does wage rank affect employees' well-being? *Ind Relat*. 2008 Jul;47(3):355-89.
30. Wedell DH, Santoyo EM, Pettibone JC. The thick and the thin of it: Contextual effects in body perception. *Basic Appl Soc Psych*. 2005 Sep;27(3):213-28.

## **Appendix E - Social norms journal article**

The following article has been submitted to the Community Dentistry and Oral Epidemiology journal.

It is based on the findings detailed in the current report, specifically the element of parents' perceived social norms for toothbrushing and the influence on their decisions about how often they brush their own child's teeth.

## **Parents' perceived social norms for toothbrushing in children aged 3-6 years old**

R.J. Trubey

Research Assistant, Applied Clinical Research and Public Health, Cardiff University School of Dentistry

S.C. Moore

Professor, Violence & Society Research Group, Applied Clinical Research and Public Health, Cardiff University School of Dentistry

I.G. Chestnutt

Professor and Hon. Consultant in Dental Public Health, Applied Clinical Research and Public Health, Cardiff University School of Dentistry

### **Corresponding author:**

Rob Trubey

Research Assistant

Applied Clinical Research and Public Health

Cardiff University School of Dentistry

Heath Park

CARDIFF CF14 4XY

Tel: 029 2074 5469

E-mail: [trubeyrj@cardiff.ac.uk](mailto:trubeyrj@cardiff.ac.uk)

## **Abstract**

*Objectives:* This study aimed to assess whether the frequency with which parents brush their young children's teeth at home is affected by their perception of how often other parents do so (their descriptive norm).

*Methods:* Questionnaire surveys were sent to 625 parents of children aged 3-6 years old, resident in socioeconomically deprived areas of South-East Wales. Parents were asked how often they brushed their own child's teeth per week, how often they thought other parents did so, and how satisfied they were with their child's toothbrushing routine. Demographic details were also collected.

*Results:* Parents reported brushing their children's teeth 12.5 times per week, on average, significantly more often than they estimated that the average parent did so (mean = 10.5 times per week). Multiple regression analysis showed that parents' perceived descriptive norm for brushing was significantly associated with how often they brushed their own child's teeth ( $p < 0.001$ ), even when controlling for demographic factors. Finally, parents' satisfaction with their child's brushing routine was predicted by their perception of how it compared with the average child ( $p < 0.01$ ), even controlling for actual brushing frequency.

*Conclusions:* Many parents seem to underestimate how often their peers brush their children's teeth, with those who perceive the norm to be lower tending to brush their own children's teeth less often. Parental satisfaction with their child's brushing routine appears to be relative, rather than absolute, in common with findings with the wider health literature. Interventions which provide some form of feedback based on social normative information ("most parents do this") may be more persuasive to some parents than simple prescriptive advice ("you should do this").

## **Introduction**

The benefits of using fluoridated toothpaste for preventing dental caries are well established (1). Clinical trials have demonstrated improved oral health outcomes for twice-daily brushing compared to brushing just once a day or less (2, 3). However, the factors which influence parents' decisions about how often to brush their children's teeth at home are poorly understood (4).

Recently, there has been an increasing focus on the role of perceived social norms and their influence on people's own behaviour (Fig 1). Within oral health research, a small number of qualitative research studies have suggested that oral hygiene behaviour in adolescence may be influenced by peer groups and perceived social norms (5, 6), while a study by Blinkhorn in 1978 found that mothers of young children sought information about how to look after their child's teeth from close friends, family and dental professionals (7). A more recent study by the present authors found that parents of young children tended to judge their own child's brushing routine in terms of how they thought it compared with other children (8).

**Table 1: Definition of terms used**

<b>Term</b>	<b>Definition and source</b>
<i>Social norm</i>	The (explicit or implicit) generally accepted rules of a group that can guide group members' attitudes, beliefs and behaviour (19)
<i>Injunctive norm</i>	A person's perception of how peers or significant others would expect them to behave (11)
<i>Descriptive norm</i>	A person's perception of how often peers or significant others actually perform an action or behaviour (11)
<i>Social comparison</i>	The process of comparing one's own behaviour with the behaviour of others (34)

Very few quantitative studies have looked at the relationship between perceived social norms and oral health behaviour. A handful of recent studies have measured perceived social norms using the framework of the Theory of Planned Behaviour (9, 10). These studies measure a type of social norm called 'injunctive norms': the extent to which a person believes that their peers would want them to behave in a certain way (11). Buunk-Werkhoven and colleagues (9) for instance, measured perceived social norms for brushing and flossing behaviour by asking participants whether they believed friends, family and colleagues would "expect them to regularly brush or floss their teeth".

The wider health literature suggests that a second type of social norm, "descriptive norms", may be a more important source of social information than perceived social pressure (12, 13). Descriptive norms refer to a person's perception of what their peers actually do themselves

(11) and are typically measured by asking a person to estimate how often a behaviour is carried out by an average or typical person in their peer group.

Researchers investigating descriptive norms have commonly found that people's perceptions of what their peers do are inaccurate. Surveys from both the United States of America and Europe have shown that students tend to considerably over-estimate how often and how much their peers consume alcohol compared to actual reported behaviour among reference groups (14-16). Similar results have been reported for over-estimates of the prevalence of smoking and substance misuse (17). School children in the UK over-estimated the extent to which their classmates consume fizzy drinks, while under-estimating their fruit and vegetable consumption (18). A recent survey by Lally and colleagues (19) found that the vast majority of parents believed that the 'average parent' in their area gave their pre-school children more sweet and savoury snacks than they gave to their own child.

More importantly, these studies find that people's perceptions of what other people do are strongly associated with their own behaviour and their satisfaction with it. Students who overestimate the campus norm for drinking tend to consume more alcohol themselves, for instance, and are less concerned about their own consumption levels (15, 20).

The aim of the current study was to establish the extent to which perceived descriptive norms might influence decisions about oral hygiene: specifically, whether descriptive norms might influence parents' decisions about how often they brushed their children's teeth at home.

The study objectives were:

(1) To compare how often parents brushed their children's teeth at home with how often they thought an 'average' parent did so (their descriptive norm)

(2) To establish whether parents' perception of the descriptive norm was related to how often they brushed their own child's teeth

(3) To establish whether social comparisons influenced parents' satisfaction with their own child's brushing routine.

## **Method**

Ethical approval for the study was granted by the National Health Service, National Research Ethics Committee, East Midlands, code 12/EM/0070 under their proportionate review scheme.

### *Participants*

The sampling frame for the study consisted of all parents whose children were participating in a national supervised toothbrushing scheme via their nursery school or school, in the Abertawe Bro Morgannwg Local Health Board in South-West Wales. The “Designed to Smile” programme (21) is specifically targeted at schools in areas of high socio-economic deprivation, using the Welsh Index of Multiple Deprivation (22). The ‘catchment areas’ for each school mean that parents whose children attend the school are themselves resident in these deprived areas.

Twenty of the 127 participating schools were randomly selected and all 625 parents of children aged between 3-6 years old (nursery, reception and Year 1) were invited to take part in the survey.

Recruitment of parents was aided by classroom teachers, who handed invitation letters, information sheets and consent forms to parents and collected returned consents. UK Data Protection legislation prevented a direct approach to the parents by the researchers.

### *Measures*

A short questionnaire survey was developed, based on themes developed from previous qualitative work (8) and with the help of the Community Dental Service and a consultant in Dental Public Health. The survey was piloted on members of the sample population before

being finalised, using a combination of cognitive interviewing and mailing the survey to a small sample of 30 parents (23). Due to changes made to the survey following piloting, data from the pilot surveys were not included in the final analysis.

The survey measured:

*Child's brushing frequency:* How often parents brushed their child's teeth (or the child brushed their own teeth) during a typical week at home. Assessed by summing the answers from two separate questions: "In a normal week, how often do you brush your child's teeth (or does your child brush their own teeth) at home in the morning?" and "In a normal week, how often do you brush your child's teeth (or does your child brush their own teeth) at home in the evening?"

*Perceived descriptive norm for brushing:* How often parents felt that the 'average' parent in their child's year group brushed their child's teeth at home in a typical week.

*Satisfaction with child's brushing routine:* A single-item five-point Likert scale measure assessing whether parents agreed or disagreed with the statement "I am satisfied with how often my child has their teeth brushed at home in a typical week". The item was scored from 1 to 5, with higher scores indicating higher levels of agreement and therefore satisfaction.

*Demographic details:* Information was collected about various demographic factors which have been shown to be related to oral hygiene behaviour or oral health status in children. These included the child's age and gender, the age at which the parent first started brushing the child's teeth, the number of older and younger siblings in the child's family. Socio-economic status was assigned using quintiles from the Welsh Index of Multiple Deprivation (22).

### *Procedure*

Questionnaire surveys were sent directly in the post to consenting parents between July and September 2012 along with a covering letter. Both envelopes and covering letters were personalised using details from the consent form, consistent with best practice (24). Surveys were self-completed by parents and then returned to the researcher using a pre-addressed and pre-paid envelope.

Non-respondents were contacted by telephone after four weeks and offered a replacement questionnaire survey. After a further two weeks, parents who had still not responded were re-contacted and again offered a replacement survey. At both points, any parents who indicated that they no longer wished to take part in the study were removed from the contact list.

### *Data Analysis*

Data entry and analysis was carried out in SPSS v20 (25).

Parents' estimates of how often the average parent brushed their child's teeth per week were compared to the reported brushing frequency from the study population. Parents were split into three groups: those who slightly overestimated the mean (within one standard deviation), those who slightly underestimated the mean (within one standard deviation) and those who greatly underestimated the mean (more than one standard deviation lower than the mean).

A social comparison score was calculated for each parent, using the difference between how often they reported brushing their own child's teeth each week and how often they thought the average parent brushed their child's teeth each week.

Multivariate analysis was used to explore factors associated with brushing frequency. The outcome variable 'weekly brushing frequency' was not normally distributed, so simple linear regression was not considered appropriate. The variable was transformed to 'missed sessions', by computing how far each parent fell below the 14 times per week optimum. The resulting variable matched a Poisson distribution, but was over-dispersed (the variance exceeded the mean). Therefore, a form of Poisson regression called Negative Binomial regression was used: Poisson regression is considered more appropriate for data with a Poisson distribution (26), and Negative Binomial regression is a specialised form of this regression which makes no assumptions about dispersion (27).

## **Results**

In total, 297 (48%) parents returned a completed and usable questionnaire.

Table 2 shows a summary of the key variables, including weekly brushing frequency, perceived descriptive norms for weekly brushing and various demographic details of the study participants.

**Table 2: Summary of demographic and toothbrushing data**

<b>Demographics</b>					
	<b>N*</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Child's age (months)	290	59.3	13.6	18	82
No. of younger siblings	289	0.5	0.6	0	3
No. of older siblings	291	0.8	0.9	0	6
	<b>N*</b>	<b>%</b>			
Child's gender					
<i>Male</i>	139	47.3			
<i>Female</i>	155	52.7			
Socio-economic status (deprivation quintile,					
<i>Most deprived</i>	102	34.3			
<i>Next most deprived</i>	83	27.9			
<i>Middle deprived</i>	66	22.2			
<i>Next least deprived</i>	25	8.4			
<i>Least deprived</i>	11	3.7			
<i>Unknown</i>	10	3.4			
<b>Toothbrushing data</b>					
	<b>N*</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Reported weekly brushing frequency	297	12.5	2.5	4	14
Perceived descriptive norm	287	10.5	3.2	2	14
Child's age when parent began brushing their	285	11.5	6.8	2	54
	<b>N*</b>	<b>%</b>			
Parents' satisfaction with child's brushing					
<i>Strongly agree</i>	141	48.0			
<i>Agree</i>	80	27.2			
<i>Neither agree/disagree</i>	31	10.5			
<i>Disagree</i>	29	9.9			
<i>Strongly disagree</i>	13	4.4			

\*N varies slightly between variables due to item non-response

Children about whom the parents were questioned were aged between 3 and 6-years old, with a mean age of 59 months, or just under 5 years. The majority of the parents surveyed were resident in areas of high socio-economic deprivation. 145 (51%) of the parents surveyed reported that they had begun to brush their child's teeth before they reached 12 months old.

Most parents provided an estimate of how often their peers brushed their child's teeth at home. Only 10 respondents (3%) did not provide an estimated descriptive norm.

### *Self-reported behaviour and perceived norms*

The average number of times that parents reported brushing their child's teeth at home was 12.5 (SD±2.5) times per week, with 214 parents (72%) reporting that they brushed their child's teeth 14 times per week, or twice per day.

The mean perceived descriptive norm for weekly brushing was 10.5 (SD±3.1), meaning that on average, parents underestimated the reported norm for weekly brushing by 2 times per week.

Just over a third (106, 37%) of parents slightly overestimated the actual weekly norm of 12.5 times a week (within one standard deviation), while 92 parents (32%) slightly underestimated the actual norm (within one standard deviation). The remaining 89 parents (31%) heavily underestimated the actual norm for weekly brushing, perceiving the norm to be 9 times or fewer per week, more than one standard deviation lower than the actual reported norm.

A Wilcoxon signed-rank test confirmed that, across the sample, there was a statistically significant discrepancy between the frequency with which parents reported brushing their own child's teeth and their estimates of how often their peers did ( $Z = -8.078$ ,  $p < 0.001$ ).

### *Effect of perceived norms on own behaviour*

Table 3 shows the result of a multiple regression analysis, predicting missed brushing sessions (the number of times parents fell below the 14 times per week ideal). Perceived descriptive norm was a significant predictor of missed sessions ( $B = -0.19$ ,  $p < 0.001$ ) even when demographic factors such as the child's age, gender, number of siblings and socio-economic status were sequentially added to the analysis. Overall, perceiving the descriptive norm for brushing to be higher was associated with fewer missed sessions. Deprivation quintile was also significantly associated with missed sessions ( $B = 0.36$ ,  $p < 0.05$ ).

**Table 3: Negative binomial regression analysis, exploring factors associated with how often parents missed weekly brushing sessions**

Missed sessions (weekly)	Iteration 1		Iteration 2		Iteration 3	
	$\beta$ (SE)		$\beta$ (SE)		$\beta$ (SE)	
Perceived norm	-0.203 (0.041)	***	-0.203 (0.042)	***	-0.193 (0.043)	***
Child's gender (male)			0.163 (0.240)		0.102 (0.246)	
Child's age			0.011 (0.006)		0.011 (0.007)	
Deprivation quintile (most deprived)			0.546 (0.291)		0.655 (0.289)	*
No. of older siblings					0.107 (0.240)	
No. of younger siblings					-0.385 (0.264)	
Constant	2.349 (0.375)		1.666 (0.744)		1.459 (0.759)	
Inalpha Constant	1.667 (0.157)	***	1.587 (0.159)	***	1.569 (0.161)	***
N	287		284		284	

\*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$

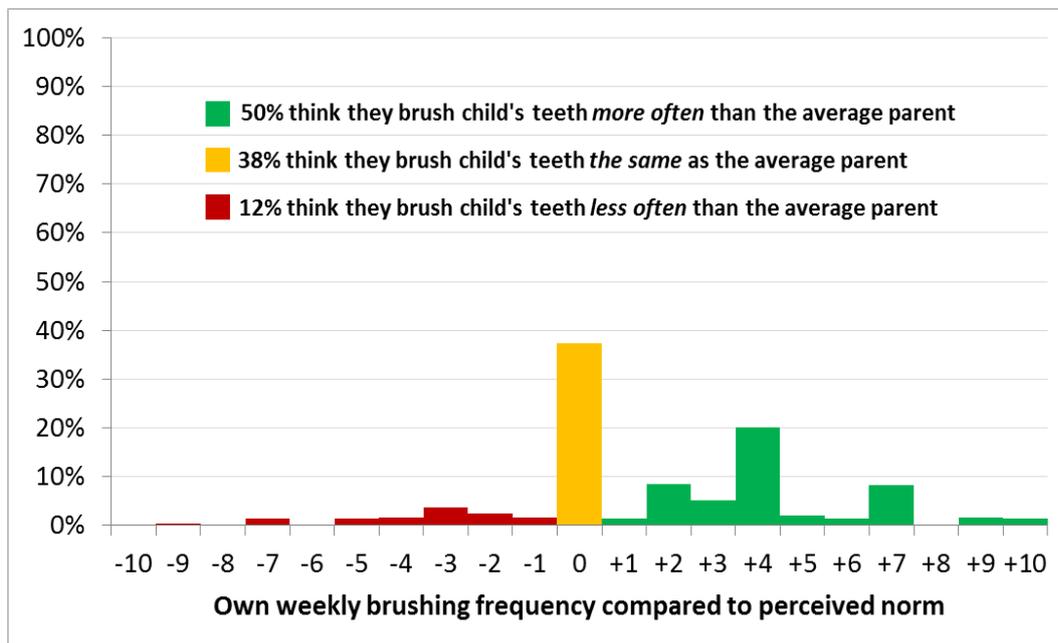
Hutchinson and Holtman provide a formula for interpreting the results of Poisson regression, whereby “the percentage change in the outcome count (Y) expected with each one unit increase in the independent variable (X) equals 100 times the inverse natural log of the coefficient minus one” (28). Using this formula, it was calculated that a one unit increase in perceived descriptive norm was associated with a 17.5% decrease in the number of missed weekly brushing sessions.

Children whose parents greatly underestimated the norm missed an average of 3.1 brushing sessions per week (twice the average number of missed sessions, 1.5), compared to an average of 0.6 times per week for children whose parents slightly overestimated the norm.

### *Social comparison and satisfaction*

The distribution of social comparison scores is shown in Figure 1.

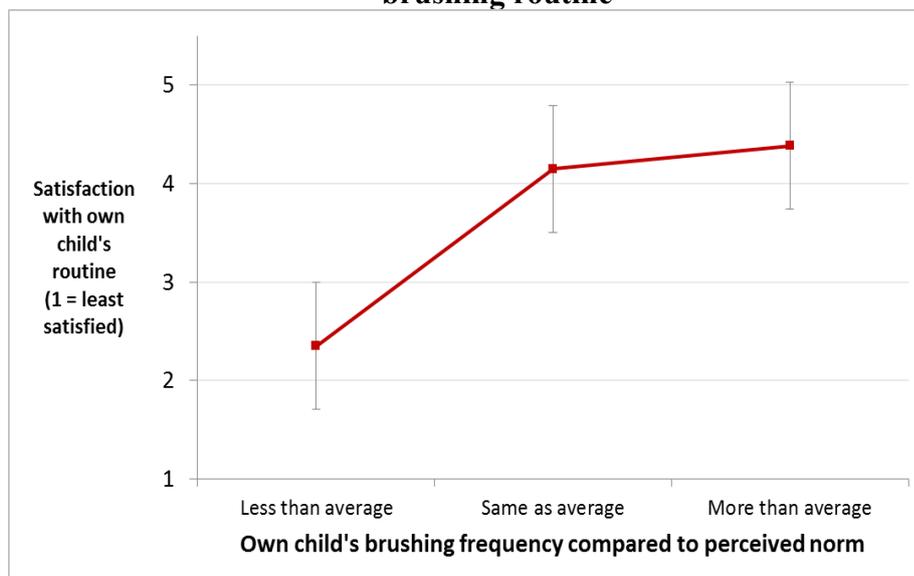
**Figure 1: Distribution of social comparison scores**



Half of the parents surveyed (50%) thought that they brushed their own child's teeth more often than the average parent, while 38% thought their child's brushing routine was equal to the average. Only 12% of parents believed that their child's routine was worse than average.

The effect of this social comparison on parent's satisfaction with their child's brushing routine was explored. Figure 2 illustrates that average satisfaction levels, as measured by a five-point Likert scale, plotted against whether parents thought their child's brushing routine was below, equal to or above average.

**Figure 2: Effect of social comparison on parental satisfaction with child's brushing routine**



Generally, parents who perceived their child's routine to be better than or equal to their perceived average had higher levels of satisfaction than those parents who thought their child's routine was worse than average.

Ordinal logistic regression showed that calculated social comparisons significantly predicted satisfaction levels ( $B=0.22$ ,  $p<0.001$ ), having controlled for brushing frequency alone and other demographic factors.

## **Discussion**

The results reported here suggest that many parents of young children hold misperceptions about how often their peers brush their child's teeth, often considering their own child's oral hygiene routine to be better than average. These findings are consistent with a large body of research showing that people's perception of themselves compared to others often tend to be inaccurate and over-optimistic (Dunning et al., 2004).

Importantly, the results showed that parents' perceived descriptive norms for brushing were significantly associated with how often they brushed their own child's teeth: those who thought the descriptive norm was higher tended to brush their own child's teeth more often. Again, this is consistent with findings from social norms research in the wider health literature, showing that people's perceived descriptive norms are associated with their own behaviour in areas such as alcohol consumption, substance use, exercise frequency and food consumption (14, 18). This is the first study to suggest that perceived descriptive norms may influence decisions about oral hygiene behaviour.

The results also showed that parents' satisfaction with their child's brushing routine was influenced by social comparisons. Satisfaction was greater when parents believed that their child brushed more often than the 'average' child, even when actual brushing frequency was controlled for. This suggests that parents' judgements about what constitutes an appropriate oral hygiene routine are to some extent relative (measured in relation to what they think other people do), rather than absolute (measured only against, for instance, a twice-a-day standard). Parents who brush their own child's teeth less frequently may feel justified if they perceive their behaviour to be 'normal'.

In this sense, the results echo findings from economic studies, where researchers have found that people's satisfaction with their salary depends on how they think it compares with that of their colleagues or peers rather than its absolute value (29). In health, people's perceptions of risk or vulnerability to disease also appear to be influenced by a process of social comparison (30).

Normative perceptions were therefore associated with both parents' own behaviour and their satisfaction with that behaviour. It is unclear why parents from similar socio-economic backgrounds should have such a range of different perceptions of how often other parents

brush their children's teeth, or what informs such perceptions. In other areas of health, people's normative perceptions may be informed by direct observation. Researchers in the field of alcohol, for instance, have argued that overestimations of the drinking norm might result from a form of recall bias, where observing other people drinking alcohol and being drunk is more salient than seeing people drinking non-alcoholic drinks and being sober.

With oral hygiene behaviour, however, direct observation is less likely. The cross-sectional design of the survey means that it is not possible to be certain about the causal relationship between parents' own behaviour and their perceived norms. It is possible that parents simply use their own experience as a benchmark and distort their norms in the direction of their own behaviour: a phenomenon known as the false-consensus effect (31). Future research may seek to explore the factors which influence people's normative perceptions in relation to oral hygiene behaviour, and to explore whether certain more proximal peer groups (such as close friends or family) might exert more influence than others.

### *Limitations*

The current study mirrored the methodology most often used in the social norm literature by using self-report measures of personal behaviour. It is important to acknowledge that the validity of self-report data may be limited: parents may exhibit a social desirability bias and exaggerate their own child's brushing frequency. Future research may seek to use objective oral health measures. Nonetheless, the results show a wide range of perceptions about the social norm for brushing and these perceptions are closely associated with parents' own self-reported behaviour

Finally, despite significant efforts to follow up non-respondents, the response rate to the survey (48%) was marginally lower than the 50% guideline that Perkins and colleagues, for instance, suggest as an adequate response rate in social norms studies (32). UK data protection laws prevent researchers from obtaining class lists directly from schools, hence the requirement of a two-tier approach to recruitment in the current study. The survey was targeted primarily at parents from socio-economically deprived areas, where response rates to surveys are generally lower than average.

### *Implications*

In the wider health literature, 'social normative interventions' have become increasingly prevalent in recent years. Such interventions are based on the idea that providing people with more accurate information about what their peers do will correct misperceptions and so reduce problem behaviour. Recent reviews have found that such interventions have led to improved outcomes with regard to alcohol and smoking in adolescent populations (33)

Current oral health promotion tends to focus on providing parents with simple prescriptive advice ("you should brush your child's teeth twice a day"). The findings reported here suggest that some parents may be more motivated to change their behaviour by normative feedback ("most other parents in your area brush their children's teeth twice a day"). Such an approach should be effective regardless of whether parents' perceptions of what their peers do is informed by or informs their own behaviour. In either case, challenging misperceptions and utilising people's tendency to compare themselves with their peers should result in parents re-appraising their own behaviour.

## References

1. Walsh T, Worthington HV, Glenny AM, Appelbe P, Marinho VCC, Shi X. Fluoride toothpastes of different concentrations for preventing dental caries in children and adolescents. *Cochrane Db Syst Rev* 2010.
2. Pine CM, McGoldrick PM, Burnside G, Curnow MM, Chesters RK, Nicholson J, et al. An intervention programme to establish regular toothbrushing: Understanding parents' beliefs and motivating children. *Int Dent J* 2000;Suppl Creating A Successful: 312-23.
3. Chestnutt IG, Schafer F, Jacobson APM, Stephen KW. The influence of toothbrushing frequency and post-brushing rinsing on caries experience in a caries clinical trial. *Community Dent Oral Epidemiol* 1998;26: 406-11.
4. Hooley M, Skouteris H, Boganin C, Satur J, Kilpatrick N. Parental influence and the development of dental caries in children aged 0-6 years: A systematic review of the literature. *J Dent* 2012;40: 873-85.
5. Stokes E, Ashcroft A, Platt MJ. Determining liverpool adolescents' beliefs and attitudes in relation to oral health. *Health Educ Res* 2006;21: 192-205.
6. Hodge HC, Holloway PJ, Bell CR. Factors associated with toothbrushing behaviour in adolescents. *Dent Health (London)* 1983;22: 7-9.
7. Blinkhorn AS. Influence of social norms on toothbrushing behavior of preschool children. *Community Dent Oral Epidemiol* 1978;6: 222-6.
8. Trubey RJ, Moore SC, Chestnutt IG. Parents' reasons for brushing or not brushing their child's teeth: A qualitative study. *Int J Paediatr Dent* 2013, In Press.

9. Buunk- Werkhoven YAB, Dijkstra A, van der Schans CP. Determinants of oral hygiene behavior: A study based on the theory of planned behavior. *Community Dent Oral Epidemiol* 2011;39: 250-59.
10. Syrjälä A-MH, Niskanen MC, Knuutila MLE. The theory of reasoned action in describing tooth brushing, dental caries and diabetes adherence among diabetic patients. *J Clin Periodontol* 2002;29: 427-32.
11. Cialdini RB, Reno RR, Kallgren CA. A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *J Pers Soc Psychol* 1990;58: 1015.
12. Ravis A, Sheeran P, Armitage CJ. Augmenting the theory of planned behaviour with the prototype/willingness model: Predictive validity of actor versus abstainer prototypes for adolescents' health- protective and health- risk intentions. *Br J Health Psychol* 2006;11: 483-500.
13. Fishbein M, Ajzen I. The influence of attitudes on behavior. *The handbook of attitudes* 2005: 173-222.
14. McAlaney J, McMahon J. Normative beliefs, misperceptions, and heavy episodic drinking in a british student sample. *J Stud Alcohol Drugs* 2007;68: 385.
15. Perkins H, Haines MP, Rice R. Misperceiving the college drinking norm and related problems: A nationwide study of exposure to prevention information, perceived norms and student alcohol misuse. *J Stud Alcohol Drugs* 2005;66: 470.
16. Borsari B, Carey KB. Descriptive and injunctive norms in college drinking: A meta-analytic integration. *J Stud Alcohol* 2003;64: 331.

17. Perkins HW, Craig DW. The imaginary lives of peers: Patterns of substance use and misperceptions of norms among secondary school students. *The Social Norms Approach to Preventing School and College Age Substance Abuse: A Handbook for Educators, Counselors, and Clinicians San Francisco, CA: Jossey-Bass* 2003: 209-23.
18. Lally P, Bartle N, Wardle J. Social norms and diet in adolescents. *Appetite* 2011;57: 623-27.
19. Lally P, Cooke L, McGowan L, Croker H, Bartle N, Wardle J. Parents' misperceptions of social norms for pre-school children's snacking behaviour. *Public Health Nutr* 2012;1: 1-5.
20. Wood AM, Brown GD, Maltby J. Social norm influences on evaluations of the risks associated with alcohol consumption: Applying the rank-based decision by sampling model to health judgments. *Alcohol* 2012;47: 57-62.
21. D2S. Designed to Smile. URL: <http://www.Designedtosmile.Co.Uk/home.Html> (last accessed: 01/10/13). 2012.
22. WIMD. Welsh Index of Multiple Deprivation. URL: <http://wales.Gov.Uk/topics/statistics/headlines/compendia2009/welsh-index-multiple-deprivation-2012-indicator-analysis/?Lang=en> (last accessed 01/10/13). 2012.
23. Campanelli P. Testing survey questions. *International Handbook of Survey Methodology* 2008: 176-200.
24. Dillman DA. *Mail and internet surveys: The tailored design method*: Wiley New York; 2000.

25. SPSS. Ibm corp. Released 2011. IBM SPSS statistics for windows, version 20.0. Armonk, NY: IBM corp. 2011.
26. Cameron AC, Trivedi P. *Regression analysis of count data*: Cambridge University Press; 2013.
27. Cox S, West SG, Aiken LS. The analysis of count data: A gentle introduction to poisson regression and its alternatives. *J Pers Assess* 2009;91: 121-36.
28. Hutchinson MK, Holtman MC. Analysis of count data using poisson regression. *Res Nurs Health* 2005;28: 408-18.
29. Boyce CJ, Brown GD, Moore SC. Money and happiness rank of income, not income, affects life satisfaction. *Psychol Sci* 2010;21: 471-75.
30. Klein WM. Objective standards are not enough: Affective, self-evaluative, and behavioral responses to social comparison information. *J Pers Soc Psychol* 1997;72: 763-74.
31. Ross L, Greene D, House P. The “false consensus effect”: An egocentric bias in social perception and attribution processes. *J Exp Soc Psychol* 1977;13: 279-301.
32. Perkins JM, Perkins H, Craig DW. Misperceptions of peer norms as a risk factor for sugar-sweetened beverage consumption among secondary school students. *J Am Diet Assoc* 2010;110: 1916-21.
33. Moreira MT, Smith LA, Foxcroft D. Social norms interventions to reduce alcohol misuse in university or college students. *Cochrane Database Syst Rev* 2009: CD006748.
34. Mussweiler T. 'Everything is relative': Comparison processes in social judgment the 2002 Jaspars Lecture. *Eur J Soc Psychol* 2003;33: 719-33.