

The association between parents' perceived social norms for toothbrushing and the frequency with which they report brushing their child's teeth

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Objectives: To determine whether parents' judgements on how often other parents brush their children's teeth are associated with the frequency with which they brush their own children's teeth, and their satisfaction with their child's brushing routine. **Methods:** A cross-sectional questionnaire survey completed by 297 parents of children aged 3-6. 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 data were also collected. **Results:** The mean frequency that parents brushed their children's teeth was 12.5 times per week. Multiple regression analysis tested the relationship between parents' perceptions of other parents brushing frequency (mean 10.5 times per week) and how often they brushed their own child's teeth, controlling for socio-demographic factors, and yielded a positive association ($p < 0.001$). There was a positive association between parents' satisfaction with their child's brushing routine and the extent to which they thought it was better than that of the average child ($p < 0.001$). **Conclusions:** Parents' judgements on how frequently other parents brush their children's teeth are associated with their own behaviour and satisfaction. Re-framing oral health messages to include some form of social normative information ("most parents do this") may prove more persuasive than simple prescriptive advice ("you should do this").

Key words: oral health, toothbrushing, oral health promotion, caries, children, social norms

Introduction

Fluoride toothpaste has been shown to be effective in the prevention of caries in children (Marinho *et al.*, 2003). However, its efficacy is highly dependent on a number of behavioural factors, including the frequency of brushing. Clinical trials have demonstrated improved oral health outcomes for twice-daily brushing compared to brushing just once a day or less (Walsh *et al.*, 2010) and brushing children's teeth twice a day is widely recommended. Nevertheless, surveys conducted in the UK suggest that many parents of five-year children do not adhere to these guidelines (White *et al.*, 2006). While parents clearly play a key role in determining children's home toothbrushing habits, the factors which influence parents' decisions about when and how often to brush their children's teeth remain poorly understood (Hooley *et al.*, 2012).

Oral health promotion has typically focused on providing information and advice about best practice (Watt, 2005). However, cross-sectional studies find that parents' oral health knowledge does not always correspond with how often they report brushing their children's teeth (Blinkhorn *et al.*, 2001). Systematic reviews of oral health promotion also find that providing advice and information alone is not sufficient to change behaviour in the long term (Kay and Locker, 1998).

Recently, there has been a growing focus on the wider social and environmental determinants of health-related behaviours. One social factor which has been highlighted as influencing people's decisions about health is 'social norms': a person's perception of the "accepted standards of behaviour in social groups" (Cialdini *et al.*, 1990).

Researchers have distinguished between two types of norm that influence decisions about how to behave: "injunctive norms" and "descriptive norms" (Cialdini *et al.*, 1990). Injunctive norms refer to a person's belief about what significant others would expect them to do, or would approve of them doing. Buunk-Werkhoven and colleagues (2011), for example, 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". In contrast, descriptive norms refer to a person's belief about what their peers *actually* do.

Table 1: Definition of terms used

Term	Definition and source
Social norm	The (explicit or implicit) generally accepted rules of a group that can guide group members' attitudes, beliefs and behaviour (Lally <i>et al.</i> , 2012)
Injunctive norm	A person's perception of how peers or significant others would expect them to behave (Cialdini <i>et al.</i> , 1990)
Descriptive norm	A person's perception of how often peers or significant others actually perform an action or behaviour (Cialdini <i>et al.</i> , 1990)
Social comparison	The process of comparing one's own behaviour with the perceived behaviour of others (Mussweiler, 2003)

There is growing evidence that descriptive norms are an important factor in understanding people's health-related behaviour (Rivis and Sheeran, 2003). Studies of behaviour related to alcohol, smoking, exercise and diet have all shown that people's views of what their peers do are often closely aligned to their own behaviour. McAlaney and McMahon, for instance, demonstrated a significant correlation between UK students' perceptions of how often their peers drank alcohol and their own alcohol consumption: those who thought heavy drinking was more common among peers were more likely to be heavy drinkers themselves (McAlaney and McMahon, 2007). Similar results have been reported in relation to people's smoking, diet and exercise behaviour, for adolescents and adults (Ball *et al.*, 2010; Lally *et al.*, 2011).

Perceptions of what other people do can also affect a person's satisfaction with their own behaviour, through the process of 'social comparison'. Social comparison refers to the tendency to evaluate one's own behaviour or performance in relation to others, rather than against objective standards (Mussweiler, 2003). Students' perceived risk of developing alcohol-related disorders appear to be influenced by how they think their alcohol consumption compares with other students across the country, for instance (Wood *et al.*, 2012).

Unlike alcohol use, smoking and diet, it is unlikely that people will gain information about other people's toothbrushing behaviour through direct observation. Instead, they may assume that their own behaviour is normal and use that as a benchmark for what they imagine others do, a phenomenon referred to as the 'false-consensus effect' (Ross *et al.*, 1977). If parents' perceptions of what others do are related to how often they brush their own child's teeth, there would be important implications for oral health promotion and interventions aimed at parents. To date, the effect of social norms and social comparison has been relatively underexplored in relation to oral health. A recent qualitative study found that parents of young children had a tendency to compare their child's toothbrushing frequency with what they thought other children did (Trubey *et al.*, 2014). However, there have been no quantitative studies in this area.

The current study therefore aimed to assess whether: i, the frequency with which parents reported brushing their children's teeth at home was associated with their estimate of how often an 'average' parent brushed their child's teeth; ii, parents' satisfaction with their child's toothbrushing frequency was modified by comparisons with other parents and children.

Method

A cross-sectional postal survey was conducted in the Swansea and Neath Port Talbot local authorities in South Wales. All participants were volunteers who gave informed consent, and research ethics approval was granted by the National Health Service, National Research Ethics Committee, East Midlands, code 12/EM/0070.

The study population comprised parents or caregivers of children aged between three and six years of age who were attending a nursery or primary school involved in the government funded Designed to Smile tooth-brushing scheme in the Swansea and Neath Port Talbot local au-

thorities (D2S, 2014). This program primarily targeted schools in high-need areas of the country, so the study population was purposely skewed towards parents resident in areas of high socio-economic deprivation.

To determine the expected proportion of parents who reported brushing their child's teeth 14 times a week (twice a day) to within $\pm 5\%$ with a 95% confidence interval (2-sided), it was calculated that a final sample of at least 289 parents was required. The Community Dental Service provided a list of all schools taking part in the scheme in the two local authorities ($n=127$), from which twenty nursery and primary schools were selected at random. Invitations were sent to all parents of children who met the inclusion criteria of having children aged three and six years at the time of the survey ($n=625$), based on an estimated 50% response rate and allowing some margin of error.

A short questionnaire was developed, based on themes developed from a formative qualitative study (Trubey *et al.*, 2014) and with the assistance 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 (Campanelli, 2008). Those who were included at the pilot stage were excluded from the main study.

The questionnaire measured:

Own child's brushing frequency - How often parents reported brushing their own child's teeth (or how often the child brushed their own teeth) during a typical week at home. This was calculated 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 - The parents' estimate of how often an 'average' parent in their child's nursery or primary school class brushed their child's teeth at home in a typical week.

Satisfaction with child's brushing routine - A single-item five-point scale to determine parents level of agreement 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 satisfaction.

Perceived cost of brushing - Parents were asked to indicate how expensive they thought it was to purchase toothbrushes and toothpaste for their children. Five answer options ranged from 'very expensive' to 'very cheap'.

Demographic details - Demographic details included the child's age and gender, the age at which the parent first started brushing the child's teeth and the number of other siblings in the household. Socio-economic status was assigned using quintiles from the Welsh Index of Multiple Deprivation (WIMD, 2012), derived from parents' home post-code.

The questionnaires were sent by 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 (Dillman, 2000). Surveys

were self-completed by parents and then returned to the researcher using a pre-addressed pre-paid envelope. Non-respondents were contacted by telephone after four weeks and offered a replacement questionnaire. After a further two weeks parents who had still not responded were re-contacted and again offered a further replacement. 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 entry and analysis was carried out in SPSS v20. Multivariate analysis was used to explore factors associated with ‘missed weekly brushing sessions’. This was a recoded, count variable indicating how far parents fell below the recommended 14 brushing occasions per week. Thus, a parent who reported brushing their child’s teeth 10 times a week would have a score of 4, while a parent who reported brushing their child’s teeth 14 times a week would be assigned a score of 0. The outcome variable was not normally distributed (Shapiro-Wilk test, $p < 0.05$), so simple linear regression was not considered appropriate. The variable matched a Poisson distribution, but was over-dispersed (the variance exceeded the mean). Therefore negative binomial regression models were used (Cameron and Trivedi, 2013). Incident Rate Ratios (IRR) are reported with 95% confidence intervals.

For the purposes of the multivariate analysis, the cost of toothbrushes and toothpaste variable was dichotomised with ‘fairly expensive’ and ‘very expensive’ combined and compared against all other answer options. Likewise, the descriptive norm variable was dichotomised with parents who thought an average parent brushed their child’s teeth less than 10 times per week coded as having a ‘low descriptive norm’ and compared against parents who thought the norm was higher. Finally, because the sample was skewed towards those from more deprived areas, the socio-economic status variable was dichotomised to compare those from the most or next most deprived quintiles of the Welsh Index of Multiple Deprivation with those from all other quintiles. An intra-cluster correlation coefficient (ICCs) was calculated using a large one-way ANOVA, and indicated that there was no significant clustering of the outcome measure (missed weekly brushing sessions; $ICC \leq 0.00001$, $p = 0.61$) within schools or nurseries.

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. Ordinal logistic regression was used to predict parents’ satisfaction with their child’s brushing routine.

Table 2. Summary of demographic and toothbrushing data

		<i>n</i> *	<i>Mean</i>	<i>sd</i>	<i>Min</i>	<i>Max</i>	<i>%</i>
<i>Demographics:</i>							
	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	
	Child’s gender						
	Male	139					47.3
	Female	155					52.7
Socio-economic status (deprivation quintile, WIMD)							
	WIMD=5 (Most deprived)	102					34.3
	WIMD=4	83					27.9
	WIMD=3	66					22.2
	WIMD=2	25					8.4
	WIMD=1 (Least deprived)	11					3.7
	Unknown	10					3.4
<i>Toothbrushing data:</i>							
	Reported weekly brushing frequency	297	12.5	2.5	4	14	
	Perceived descriptive norm	287	10.5	3.2	2	14	
Parents’ satisfaction with child’s brushing routine:							
“I am satisfied with my child’s weekly brushing routine”							
	Strongly agree	141					48.0
	Agree	80					27.2
	Neither agree/disagree	31					10.5
	Disagree	29					9.9
	Strongly disagree	13					4.4

*n varies slightly between variables due to item non-response

Results

Completed questionnaires were received from 297 parents, representing a 47.5% response rate. Post-code data were available for an additional 190 non-respondents who completed consent forms but did not return a survey. There was no significant difference ($\chi^2=6.42$, $p=0.17$) between respondents and non-respondents in terms of socio-economic status measured by Welsh Index of Multiple Deprivation quintile.

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

Ten respondents (3%) did not provide an estimated descriptive norm, so were not included in the final analysis.

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 each day. The mean estimate of how often an 'average' parent brushed their child's teeth was 10.5 (sd 3.1, range 2-14) times per week.

Relationship between perceived norms and self-reported behaviour

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

Variable	Incident rate ratio	95% CI
Perceived descriptive norm <10 times per week	3.63**	1.94,6.79
Socio-economic status WIMD=4 or 5 †	2.39*	1.22,4.71
Perceived cost of toothbrushes/ paste as fairly/very expensive	1.02	0.54,1.91
Child's gender being male	1.48	0.82,2.64
Child's age (per month increase)	1.01	1.00,1.03
Child's age when parent started brushing their teeth (per month increase)	1.02	0.99,1.03
Number of siblings in family (per unit increase)	0.90	0.66,1.20

* $p<0.05$, ** $p<0.001$, † more deprived

Multiple regression analysis (Table 3) showed that parents who perceived the descriptive norm for brushing to be relatively low (0-9 times per week) missed significantly more weekly brushing sessions with their own child (IRR=3.63, $p<0.0001$) compared to those who thought the norm was higher. Parents from more socio-economically deprived areas (WIMD=4 or 5) also missed significantly more brushing sessions than those from less deprived areas (WIMD=1-3) (IRR=2.39, $p<0.05$). A parent's perception of the cost of toothpaste and toothbrushes and demographic factors such as the child's age, gender and number of siblings were not independently associated with the number of missed weekly brushing sessions.

Social comparison and satisfaction

The distribution of parents' social comparison scores is shown in Figure 1. Half of the parents surveyed thought that they brushed their own child's teeth more often than the average parent, while only 12% of parents believed that their child's routine was worse than average.

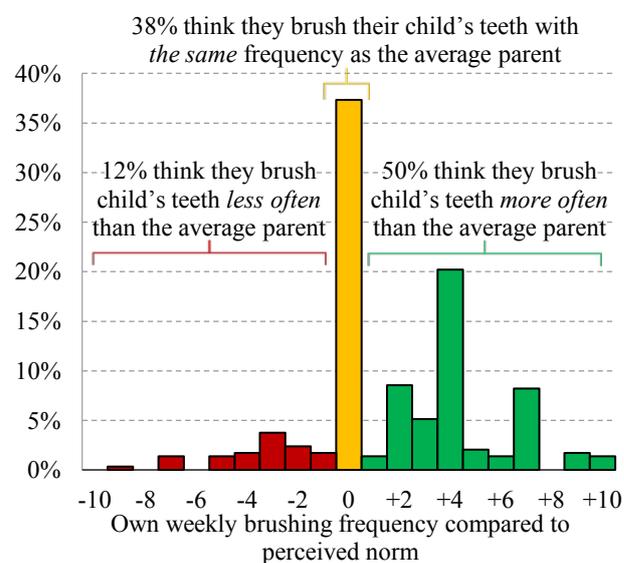


Figure 1. Distribution of social comparison scores

Ordinal logistic regression showed that a parent's social comparison score significantly predicted how satisfied they were with their child's brushing routine ($B=0.22$, $p<0.001$), independently of brushing frequency and other socio-demographic factors. Figure 2 illustrates average satisfaction levels, as measured by a five-point Likert scale, according to whether parents thought their child's brushing routine was better, equal or worse than that of their peers.

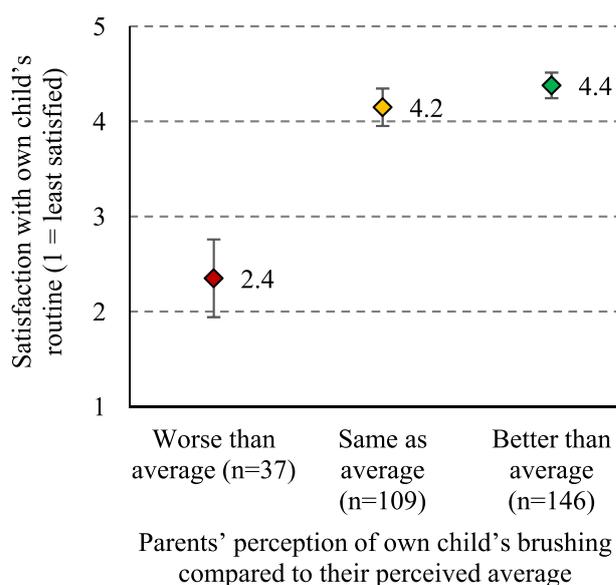


Figure 2. Effect of social comparison on parental satisfaction with child's brushing routine (with 95% confidence intervals)

Discussion

The results reported here show that parents' perceived descriptive norms for brushing were significantly associated with how often they brushed their own child's teeth. Parents who thought that other parents brushed their children's teeth regularly tended to brush their own child's teeth more often. This is consistent with findings from research in the wider health literature that suggests perceived descriptive norms are associated with behaviour in areas such as alcohol consumption, substance misuse, exercise frequency and food consumption (Lally *et al.*, 2011, McAlaney and McMahan, 2007). However, this is the first study to suggest that descriptive norms may influence parents' decisions about oral hygiene behaviour.

The results also showed that parents' satisfaction with their child's brushing routine was predicted by the difference between their own behaviour with what they believed other parents do. Satisfaction was greater when parents believed that their child brushed more often than a perceived 'average' child, even when actual brushing frequency was controlled for. This suggests that parents' judgements about what constitutes an appropriate oral hygiene routine are relative (determined by social comparison), rather than absolute (measured against objective standards). Parents who brush their own child's teeth less frequently than recommended may feel justified in their decisions if they perceive their behaviour to be 'normal', and so lack motivation to change.

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 (Boyce *et al.*, 2010). In health, people's perceptions of risk or vulnerability to disease also appear to be moderated by comparing themselves with others (Klein, 1997).

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. 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 (Ross *et al.*, 1977). 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.

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.

Despite significant efforts to follow up non-respondents, the response rate to the survey means that there is likely to be some degree of non-respondent bias. Although there was no significant difference in socio-economic status between respondents and those who provided consent forms but did not respond, it is not possible to account for the parents who did not return a consent form at all. It might be expected, for instance, that these parents would brush their children's teeth less often than those who did respond. The sample was also drawn from a relatively small geographic area and was fairly homogenous in terms of socio-economic status, limiting the generalisability of the results. Further research is needed to see if the concepts explored here may be relevant to other populations. Finally, as the study was not specifically powered for the multiple regression analysis, there is some risk of type-II errors, where some of the non-significant findings may have reached significance with a larger sample of parents.

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 change perceived norms and therefore behaviour. A recent systematic review found that such interventions have led to improved outcomes with regard to alcohol and smoking in adolescent populations (Moreira *et al.*, 2009).

Current oral health promotion tends to focus on providing people 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 messages which convey some element of social information ("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 others do informs their behaviour, or vice versa. 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.

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