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Optimizing oral health: Towards a tailored, effective and cost-effective dental care

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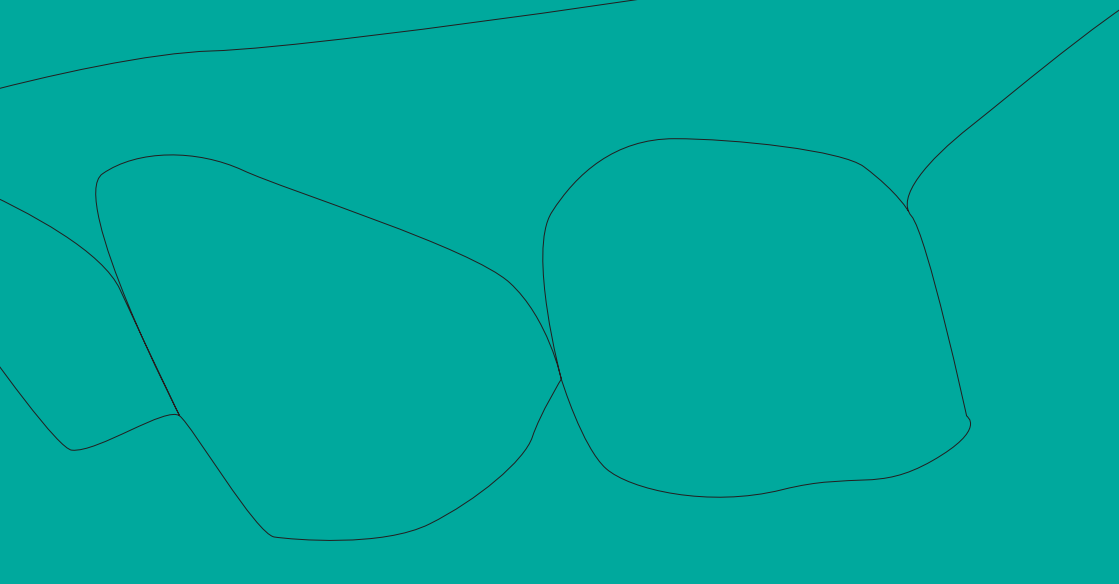
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Chapter

6

Attitudes towards oral health among parents of six-year-old children at risk of developing caries



Attitudes towards oral health among parents of six-year-old children at risk of developing caries

Introduction

Attitudes are widely considered a relevant construct for dental health behaviour and education research because of their effect on health perceptions and behaviour (Mohebbi et al., 2008; Poutanen et al., 2007; Skei et al., 2006; Kaye et al., 2005; Jerkovic et al., 2009). From the health care point of view, it is desirable to alter attitudes that obstruct effective behaviour. Successful smoking-cessation and oral health modification strategies in adults have already shown that different attitudes require different communication strategies (Doran et al., 2004; Stewart et al., 1996), but before attitudes can be changed, they need to be determined.

Common to most definitions of “attitude” is that they are subjective, that is, influenced by cognitive, emotional, and physical tendencies (Cross, 2005; Oppenheim, 1992). Questionnaires have traditionally been used to describe attitudes (Glanz et al., 2002) in a variety of areas, including dentistry (Kaye et al., 2005; Gussy et al., 2008; Poutanen et al., 2006; Tickle et al., 2003). The scoring of psychological constructs like attitudes is usually performed using Likert-type scales or semantic differential-based questionnaires. A drawback of these types of response formats is the possible introduction of an acquiescence bias, that is, a tendency to agree or indicate a positive connotation with the questions. Furthermore, attitudes usually grouped into one mean composite score. Parents, for example, will have either high, moderate, or low attitudes towards oral health (Peterson et al., 2000). Others have used VAS-scales for measuring cognitive, affective, and behavioural aspects of attitudes, also resulting in an overall score (Stenberg et al., 2000). This type of information can be useful for dental professionals, as it tells them what “type of parent” is rearing their paediatric patient. But it does not inform them of the antecedents of a parent’s attitude and therefore provides little support for developing individualised oral health education that will help parents alter their obstructive attitudes and adopt an effective preventive regime. This is especially relevant in the case of children at risk of developing caries.

The aim of this study is to explore the range and diversity of parents’ attitudes toward oral health in depth using Q-methodology, a research method that combines qualitative and quantitative methods and provides a scientific foundation for the systematic study

of subjectivity (Cross, 2005; Watts et al., 2005). Q-methodology originated in the 1930s (Stephenson, 1935)¹ and many of its studies have been published in the fields of social and political science. In health services and medicine it is still relatively novel, but has been increasingly used in the past decade (Kreuger et al., 2008; Tielen et al., 2008; van Exel et al., 2007; van Exel et al., 2006; Baker, 2006; Bryant et al., 2006; Ryan and Zerwic, 2004). In orthodontic research the method has recently been applied to the evaluation of smile aesthetics. Compared to the use of visual analogue scales, Q-methodology appeared to be a more reliable method (Schnabel et al., 2009).

Because the method is still rather unfamiliar in the dental research field, the procedure is presented in detail.

Material & Methods

In a Q-methodological study, purposively-selected respondents are presented with a sample of opinion statements representative of the subject of study. Respondents are asked to rank-order the statements from their individual point of view and according to instruction. By sorting the statements respondents give subjective meaning to the statement set and so reveal their subjective viewpoint (Smith, 2001). The individual Q-sorts are then correlated and subjected to by-person factor analysis to reveal similarities in viewpoint. If individuals were to have a different viewpoint, their Q-sorts would not correlate. If, however, significant clusters of correlations exist, they can be identified and described as common viewpoints and individuals can be measured to them. Q-methodology can thus be used to reveal and describe a population of *viewpoints* rather than a *population* of people (as in conventional factor analysis). Because the purpose is to identify the range and diversity of attitudes in a population and not the proportion of population that holds them, a small purposive sample of respondents is sufficient for a Q-study (Smith, 2001; Brown, 1980). In common survey analysis, a representative sample of the population is presented with a theoretical selection of measurement instruments, which are expected to provide answers that can be generalised to the larger population. In Q-methodology, a representative set of opinion statements about the subject of study is evaluated by a theoretical selection of respondents, who are expected to reveal the range of attitudes that can be generalised to the subject (and thus not the population sample).

¹ William Stephenson, the inventor of Q-methodology, served as the last assistant to Charles Spearman, the inventor of conventional factor analysis.

Our current Q-methodological study was conducted in four steps (described below): development of the statement set, selection of respondents, interviews, and analysis.

Development of the statement set

Relevant topics within parents' opinions regarding oral health habits and behaviour toward their children were identified on the basis of a literature search and interviews with three experts on health behaviour and oral health. Opinion statements on these topics were collected in the first half of 2007 using both popular and scientific literature and websites concerning parenting issues. To ensure coverage of all the relevant topics, an adapted version of the Health Belief Model (HBM) (Glanz et al., 2002; Rosenstock et al., 1988) was used. The HBM was chosen because it is well known as a general and comprehensive model. Although some have called for the development of a model specific to dental research because of the HBM's limitations (Ashford and Blinkhorn, 1999), it is here suitable for our purpose.

The collected opinion statements ($n = 78$) were categorised to the seven dimensions incorporated in the HBM: susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy, and perceived threats. Next, the sample of statements was reduced to a manageable, representative set. This process involved multiple sessions with members of the research team and consultation with a panel of 25 parents. The final 37 statements were text edited, randomly assigned a number, and printed on separate cards. Table I presents the full list of statements and their relation to the dimension of the HBM.

Subjects

The study was conducted among parents of 6-year-old children because at this age the eruption of the permanent dentition starts, the children are still dependent on parents' help for achieving adequate oral hygiene, and the children are at risk for caries development. Respondents were purposively selected according to socioeconomic status (low, middle, and high level of education) and oral health situation (good and otherwise), defining six target groups. In addition, a fair representation of indigenous and non-indigenous ethnic backgrounds was targeted in each of the six groups. This sampling structure was chosen because the factors are known to be the most relevant for prediction of caries distribution in the Netherlands. The resulting sample was therefore anticipated to represent the entire range and diversity of attitudes toward oral health.

From June to November 2007, parents visiting one of two dental clinics in a medium-sized and a large city in the Netherlands with their child for the regular semi-annual check-up were asked to participate in the study. Parents were approached consecutively until at least six respondents were recruited in each of the defined target groups. A total of 39 parents consented to participate. Eleven (28%) had a high level of education, sixteen (41%) medium, and twelve (31%) low. Oral hygiene levels were equally distributed among education levels. Twenty-five (64%) were female, fourteen (36%) male. Twenty-seven (69%) were indigenous to the Netherlands, six (15%) Moroccan, three (8%) Turkish, and three (8%) Surinamese/Netherlands Antilleans.

The study was judged and approved by the Medical Ethical Committee of the VU University Amsterdam, the Netherlands. Protocol number: 2006/156.

Procedure

74 Parents who agreed to participate did so while at the clinic. They were asked to read carefully through all 37 statements and divide them into three piles: a) statements with which they generally agreed, b) those with which they generally disagreed, and c) those about which they felt neutral or ambiguous. They were then instructed to read through the “agree” statements again, select the two they agreed with most, and place them in the two outermost spots at the right side of the score sheet (Figure I, column 9). Then they were asked to go through the remaining “agree” statements, select the three they agreed with most, and place them in the next column on the score sheet (column 8), and so forth, until all cards in the “agree” pile were placed on the score sheet. The procedure was repeated for the cards in the “disagree” pile, starting in column 1 of the score sheet and continuing from left to right. Last, the statements from the “neutral” pile were evaluated and placed in the remaining middle spots. In a follow-up interview (10-15 minutes) participants were asked to explain their Q-sorts. The interviews were recorded and transcribed literally to augment interpretation and description of the findings.

Statistical analysis

All 39 Q-sorts were entered and analysed in PQMethod 2.11 (Schmolk, 2002), dedicated software for Q-analysis. The aim of the analysis, which is entirely based on conventional correlation and factor analysis techniques, is to identify a limited number of coherent patterns in the rank-ordering of the statements. After determining the correlation

matrix between Q-sorts, it is factor-analysed to identify clusters of coherent Q-sorts (Brown, 1980; Rosenstock et al., 1988). For each resulting factor, a composite sort of the statements was computed based on the Q-sorts defining it ($p < .05$), using their factor loadings as relative weights. This idealised Q-sort represents how a person loading 100% on that factor would have sorted the statement set (Table II). Finally, each factor was interpreted and described as an attitude toward oral health using the composite sort, with emphasis on (1) the statements that distinguished the factor statistically significantly from others, and (2) relevant interview statements made by respondents defining the factor to explain their Q-sorts.

Results

By-person factor analysis (centroid factor extraction with varimax rotation) showed that the data supported a 5-factor solution (factors with Eigenvalue > 1 were retained). Adjacent factor solutions were also inspected, but the 5-factor solution provided the most clear and intelligible portrayal of attitudes of parents with six-year-olds toward oral health. These factors were defined by three to eight variables (i.e., Q-sorts), with a cumulative explained variance of 62%.

The five attitudes described below are illustrated by parents' interview statements (italicised). Relevant statement numbers are referred to in parentheses.

Attitude 1. Conscious and responsible

Parents emphasise the positive effects of their behaviour and minimise the effort it takes to maintain healthy teeth.

Compared to all other types of parents, these consider caries development in the primary and permanent dentition of children to be the biggest problem (Table 1, statements 1, 28): *"A cavity in your tooth means you'll have a weak spot in your mouth for the rest of your life and it will cause you lifelong trouble."* Healthy and fresh teeth are important, providing a good appearance and confidence (4, 27, 34, 37): *"I think it's a shame when you see some children hiding their mouths with their hands when they're laughing."* Parental responsibility for maintaining proper oral hygiene in their children is acknowledged (12): *"Let my son brush his teeth himself? I won't rely on that";* and (20): *"Maybe hereditary elements are involved in some way, but brushing my child's teeth myself prevents him from developing cavities."* The effort it takes to maintain oral health is not considered to be too great (7, 25, 31) and parents are familiar with the effect of

diet on caries development (22). They demonstrate an intention to closely monitor their child's dental health (5) and are convinced that parents can make a difference in their child's caries prevention (2, 20).

In sum, this type of parent is aware of the importance of proper oral hygiene and of their own responsibility in helping to achieve this in their children. They were thus categorised as 'conscious and responsible'.

Attitude 2: Trivialising and fatalistic

Parents prefer not to go to dentists themselves, consider their child's cavity a minor problem (if any), and state with conviction that caries are principally a genetic problem and therefore beyond control.

These parents point out with great certainty that developing caries is mainly a matter of bad luck (21), that there is not much they can do about it (20), and that it is determined genetically (24): *"The fact that my child has so many cavities is no surprise to me: both my grandmother and grandfather had all their teeth extracted and replaced by a prosthesis before they were 25 years old, my mother has no teeth left either and I've lost quite a few already."* The influence parents can have in preventing the development of caries in their children by brushing their teeth is estimated to be low (2, 19): *"So many people in my neighbourhood brush their own and their children's teeth quite a lot and they still get cavities. My sister never brushes my nephews' teeth and they don't have any holes in them."* Having dental decay is not considered a serious problem for either permanent or deciduous dentition (1, 28). Furthermore, their value of healthy teeth is remarkably lower than all other types of parents (4, 27). These parents prefer not to go to the dentist themselves, and take their children only when there are problems with their teeth (15). A yearly visit is considered sufficient (8). When they do go to the dentist, they dislike the criticism of the dental professional who finds fault with their brushing (35). *"I always have to listen to his speech about brushing better – like I don't have the ability to remember that from the last time!"* Finally, this type of parent is less critical about the brushing abilities of their child (12) and they wholly disagree with the statement that proper brushing is difficult (7). This attitude was thus called 'trivialising and fatalistic'.

Attitude 3: Appearance-driven and open-minded

Parents are mainly focused on the benefits healthy teeth have on looks and they are remarkably amenable to professional dental information.

These parents seem to endorse the importance of having good looking, clean, healthy teeth. They are convinced that this can provide their children with self-confidence and will save money in the long term. They also indicate the importance of brushing their children's teeth to obtain or retain a nice smile (27): "...good looks are very important nowadays and having nice-looking teeth can help achieve this goal"; and "Having ugly teeth can influence daily life enormously." A dental appointment is not at all inconvenient (6, 33); on the contrary, it can help them learn more about taking good care of their teeth (18): "Some things in life just need to be done and I think going to the dentist is one of those things. And you always get something useful out of it." A cavity is a matter of parental responsibility, not bad luck: "Parents are to be held responsible for taking good care of their children and taking good care of their teeth is a part of it." They do, however, strongly disagree with the statement that parents should be ashamed if their child develops caries (3). Finally, this type of parent claims to keep a close eye on their children's oral health (5): "Children are not capable of taking good care of themselves. It's the parent's duty to do so until they can." This attitude was thus called 'appearance driven and open minded'.

Attitude 4: Knowledgeable but defensive

Parents know what the ideal balance is to maintain adequate oral health but point out the barriers they encounter while trying to achieve it. The major one seems to be lack of time.

These parents are well aware of all the possible benefits of healthy oral habits (17, 19, 36) and all the disadvantages that may result from not conforming to them (2, 9, 26). They consider decay in a deciduous (or any) tooth very serious (1) but also consider the effort it takes to brush the child's teeth seriously difficult. Brushing is therefore not done as often as they know it should be (7, 25): "...it's just that she won't open her mouth when I try to brush her teeth at night. Most of the time I just leave it like that; I don't want to spoil the atmosphere"; and "We both work full-time and we don't want to fill the time we have with the children with a daily struggle. Besides that, it isn't everyday they don't want to." On the other hand this type of parent attends to dental check-ups frequently and eagerly (8, 15): "...if you have check-ups regularly, the dentist is able to find problems at an early stage and he can prevent them getting worse." It may be that this type of parent adheres to the idea of 'shared responsibility' with the dentist with respect to the oral health of the child, or that they assuage their own guilt by shifting the burden to the dentist whenever possible. This attitude was therefore called 'knowledgeable but defensive'.

Attitude 5: Conscious and concerned

Parents know what action should be taken for their children's best oral health but are concerned that their efforts in the end may have little effect.

These parents assign great value to all general aspects of healthy (oral) behaviour (15, 19, 28), including oral hygiene (25, 31, 32). They are the only group to emphasise the effect diet has on teeth (11, 22, 26, 29, 30). *"I know what all those fizzy drinks can do to your teeth; when I do the shopping those are not likely to end up in my cart."* The undertone of uncertainty is quite present (2, 9, 24): *"...even though I'm trying really hard there's always a risk of my child getting a cavity; you know, neither my husband nor I have strong teeth."* This type of parent also underlines the importance of getting the advice of a dental professional (16, 23, 32), is aware of the importance of keeping the permanent dentition in good health (28), but is surprisingly relaxed when it comes to decay in primary dentition (1): *"... milk teeth are temporary anyway; they'll be replaced in a few years. But when it comes to permanent teeth, it would be a shame if they were affected by caries."* Having healthy, permanent, teeth is, on its own, considered very important. Suggested benefits of having healthy teeth are less important (17, 27, 34, 36, 37). This attitude was called 'conscious and concerned'.

Discussion and recommendations

In this explorative study we found five distinct attitudes toward oral health among parents of six-year-old children: 1) conscious and responsible, 2) trivialising and fatalistic, 3) appearance driven and open minded, 4) knowledgeable but defensive and 5) conscious and concerned. That attitudes concerning oral health differ across parents perhaps does not come as a surprise, but how these differences were identified and characterised in this study is novel and insightful. Of course, claiming that this is the definitive range and variety of attitudes in the population investigated on the basis of one explorative study would be premature, especially for populations in countries with different dental health insurance policies. Replications would have to confirm this and are encouraged. But for the Netherlands, we consider these attitudes to be representative of the range and variety of attitudes operant among parents of six-year-olds, and they provide valuable information for dental professionals to develop and adapt their oral health education to specific groups of patients. For implementation of these results in daily practice, a self-report quick-scan measure is under consideration.

A few remarks should be made regarding this study. Because Q-studies use a relatively small sample of respondents, a frequent question is whether a different sample would have resulted in similar attitudes toward oral health. As explained previously, Q-methodology relies on a theoretical selection of respondents to explore a range and variety of attitudes. A different sample recruited on the basis of the same theoretical structure is therefore expected to reveal similar attitudes. Past studies have shown that the test-retest reliability of Q-studies generally is around .80 (Brown, 1993). A previous Q-study, investigating parental attitudes, reported a test-retest value of .72 (Pease et al., 1989). The current study, however, needs to be replicated before we can say more about the reliability of the results. The results will also depend in some part on the model used to develop and structure a representative statement set. Here we used a modified version of the Health Belief Model because it is widely considered to be generally applicative as well as comprehensive and therefore well-suited to our purpose. A number of alternative models could have been used, including a range of alternative beliefs potentially influencing oral health behaviour (Michie et al., 2005), and one might wonder whether the results would have been different in that case. Because the HBM was chosen for structuring the research instrument and no direct reference is made to its belief categories in the interpretation and description of the results, we believe the role of the belief categories as specified by the HBM is limited. Therefore, if a different model had been chosen, equally general but distinguishing other belief categories, a somewhat different statement set could have emerged, but the resulting attitudes would likely be very similar. It is of course difficult to be conclusive, making it an interesting hypothesis for a validation study. Furthermore, based on the current study, nothing can be said about the proportion of the population that holds these attitudes, or about associations of the attitudes with characteristics of parents, the family context, or other variables of interest. Q-methodology is not fit for this purpose (Brown, 1995). A traditional survey in which the five attitudes are presented to a representative sample of parents of six-year-olds could provide this type of information.

When comparing the results found in this study with those from other Q-studies of health attitudes (Tielen et al., 2008; van Exel, et al., 2007) some similarities appear. Despite the aspect of health studied, the revealed attitudes all distinguish degrees of involvement, control, concern, self-confidence, pliability, and motivation. These are important factors in understanding health behaviours, which are often studied more in-depth independently, but as shown in these Q-studies, are related and interact.

Comparing our results to those from a recent survey among African-Americans (Sohn et al., 2008), it can be said that while the fatalistic type of parent was found in both samples, the distinction between fatalistic and non-fatalistic can be further refined.

In this study, Q-methodology proved to be a feasible way to analyse parents' attitudes toward the oral health of their children. Respondents found it interesting to participate and were confident in ranking the statements according to the instructions and with the score sheet provided. Despite the fact that the ranking of the statements and the follow-up interview took a total of about 45 minutes, participants remained involved and talkative, resulting in much helpful information for interpreting and describing the statistical results. Taken together, we believe Q-methodology is a useful and welcome addition to the toolbox for future social and behavioural dental research.

To conclude, the results of this study can contribute to a better understanding among dentists of parents' attitudes toward their children's oral health. It is not intended as a means to label parents as 'good' or 'bad' in how they attend to their children's oral health. Revealing the parent's thinking on this topic can help to individualise the preventive strategy by, for example, applying individual education techniques like motivational interviewing or individually-assigned professional fluoride applications. Whether attitude-dependent prevention will result in more effective preventive strategies and oral health education is a matter for future research.

Psychological Model	Author	Sample size	Study design	Outcome measure	Results
Health belief model (HBM) Rosenstock 1966, 1974	Vanagas et al.* 2009 *similar to HLoC and TPB	397	Cross sectional	Understanding of importance of preventing tooth decay, importance of controlling (sugary) snacking and perceived seriousness of tooth decay	- Parental attitudes were significantly associated with oral health behaviour they apply to their children
	Pine et al. 2000	421	Randomized controlled trial	Caries increment / twice daily brushing	- Caries reduction 16% in intervention group - Parental belief influence the likelihood of brushing twice a day
	Durward et al. 1989	238	Cross sectional	Perceived value of preventive dental visits	- HBM provides little explanatory power in predicting preventive behaviors
Protection motivation theory Rogers 1975, 1983	Kegeles et al. 1984	> 1500	Before and after study	Behaviour changes in relation to beliefs	- No evidence that HBM can be helpful in either predicting or helping to explain behavior of adolescents
	Mohebbi et al. 2009	242	Randomized controlled trial	Increment of carious surfaces	- Oral health education, using given to mothers by general health staff is a valuable tool to prevent caries in infants and toddlers
	No studies found for cariology				

Psychological Model	Author	Sample size	Study design	Outcome measure	Results
Health locus of control (HLLoC) Wallston 1982	Vanagas et al. * 2009 * similar to HBM and TPB	397	Cross sectional	Understanding of importance of preventing tooth decay, importance of controlling (sugary) snacking and perceived seriousness of tooth decay	<ul style="list-style-type: none"> - Parental attitudes were significantly associated with oral health behaviour they apply to their children
	Brandão et al. 2006	110	Cross sectional	Prevalence of early childhood caries	<ul style="list-style-type: none"> - No statistically significant differences between the means for each health locus of control sub-scale and early childhood caries was found
	Chase et al. 2004	79	Cross sectional (cohort study)	Influence of all different loci of control on healthcare outcomes	<ul style="list-style-type: none"> - No meaningful difference existed between the Relapse versus Non-relapse groups with respect to each health locus of control parameter
	Lencová et al. 2008	285	Cross sectional	Level of untreated caries	<ul style="list-style-type: none"> - Parents who returned for follow-up care appeared to have an internal health locus of control while those who did not return had an external locus
	Syrjälä et al. 2004	149	Cross sectional	Proportions of variance explained by the linear regression model	<ul style="list-style-type: none"> - Higher internal parental LoC is associated with better control of both untreated caries and caries experience in their preschool children - A more internal LoC within the family is advantageous in the prevention of dental caries

Psychological Model	Author	Sample size	Study design	Outcome measure	Results
	Knecht et al. 1999	149	Cross sectional	Frequencies of tooth brushing and dental visiting, oral indexes, diabetes adherence, and HbA1c level	<ul style="list-style-type: none"> - Self-efficacy is the best overall determinant of various health behavior practices - The ability of psychological characteristics to explain oral health was limited. Improvement of self-efficacy therefore may have a positive effect on various aspects of health behaviors. - Locus of control beliefs are health behavior specific
Social cognitive theory (Social Learning Theory) Bandura 1986	Reisine et al. 1994	184	Longitudinal (1 year follow-up)	Increment of carious surfaces	<ul style="list-style-type: none"> - Children with higher dmfs, higher S. mutans, and whose parents reported more frequent brushing had more decay in the second year. - None of the other behavioral, cognitive, or demographic factors was significant
Theory of planned behavior (TPB) Azjen 1988	Vanagas et al. * 2009 * similar to HBM and HLoC	397	Cross sectional	Understanding of importance of preventing tooth decay, importance of controlling (sugary) snacking and perceived seriousness of tooth decay Changes in self-perceived sugar consumption	<ul style="list-style-type: none"> - Parental attitudes were significantly associated with oral health behaviour they apply to their children
	Astrøm et al. 2004	372	Cross sectional	Sugar intake of their children reported by parents	<ul style="list-style-type: none"> - TPB is a valid theory to predict intended and self-perceived sugar consumption prospectively
	Astrøm et al. 2006	589	Cross sectional		<ul style="list-style-type: none"> - TPB provided a significant prediction of intention with attitude

Psychological Model	Author	Sample size	Study design	Outcome measure	Results
Theory of reasoned action (TRA) Fishbein 1975, Azjen & Fishbein 1980	Freeman et al 1997	187	Randomized controlled trial	Preferences of sugar consumption	- Immediate pleasurable taste of sugar outweighed and deferred the recognition of dangers associated with its consumption. - Past dental health experiences, behaviours and education together with the role of parental figures acted as important influences
Implementation intentions Gollwitzer 1993	No studies found for cariology				
Trans theoretical model (Stages of Change) Prochaska 1984	Amin et al 2007	26	Qualitative research	Receptiveness to advice and willingness to change undesired behaviour	- Readiness to change is an important predictor of whether parents adopted and maintained preventive behaviors to improve their child's oral health
	Tillis et al. 2003	521	Cross sectional	Regular interdental cleaning	- Stages of change was shown to be a valid and reliable method to analyze the pros and cons involved in behavioural change-decision-making
Theory of interpersonal behaviour Triandis 1977, Godin & Sheppard 1990	No studies found for cariology				
Problem behaviour theory Jessor 1984	No studies found for cariology				
Model of personal investment Tappe 1992	No studies found for cariology				

Statements †		Factor				
		1	2	3	4	5
1	A cavity in a deciduous (baby) tooth isn't all that serious	-4*	3**	-1	-3	0**
2	If you brush well, you won't develop cavities	2	-4*	-2	1	-2
3	When your child develops a cavity, it is something that a parent should be ashamed of	-1	-3	-4	-1	-1
4	Healthy teeth are worth the world	4	0**	4	4	4
5	I keep a close eye on my child's oral health	3	-2**	3	2	2
6	I'd rather not go to the dentist for myself	0	3**	-3**	0	0
7	Brushing well is hard to achieve	-2	-4**	0	3**	0
8	Going to the dentist once a year is enough for me	-1	2	1	-4**	0
9	A restored tooth is as strong as a sound tooth	0	1*	-1	-2	-3
10	When your child has caries, parents are to be held responsible	1	-1	-1	0	1
11	Children shouldn't spend their pocket money on sweets	0	-1	-1	0	2
12	My child is quite capable of brushing his/her own teeth; there's no need for me to interfere	-3	1	-2	-3	0
13	In my social environment everyone takes their children to the dentist regularly	2	0	1	1	1
14	I know enough about oral hygiene to maintain proper oral health	1	1	1	1	1
15	I take my child to the dentist only when he/she is in pain	-2	2**	-4	-4	-4
16	I welcome every effort the dental professional makes in teaching me oral hygiene	1	0	3	1	3
17	Taking good care of your teeth saves a lot of money in the future	0	-2	3	3	0
18	I think a dental appointment is a lot of fuss	-1	2**	-2	-1	-1
19	Brushing my child's teeth myself can help prevent cavities	4	-3**	2	2	4
20	It's not the parent's fault if the child develops a cavity	-2**	4**	0	-1	-1
21	Getting cavities is a matter of bad luck	-1	3**	-2	-1	-1
22	When you don't watch your diet, you're just asking for cavities to develop	2	-2	-3	-1	2
23	If I want to know something about things inside my mouth, I'll ask or look it up	0	-1	2	2	2
24	Some families just happen to have bad teeth	-1	4**	1	0	1
25	It's hard to keep up with brushing my child's teeth twice a day	-3	0	0	4**	-2
26	It doesn't matter what you eat or drink as long as you just brush well afterwards	1	-1	1	-2	-2
27	Having healthy teeth gives my child confidence	3	-3	4	0	1
28	A cavity in a permanent tooth isn't all that serious	-4	1**	-3	-2	-4
29	When you eat and drink, you should be aware of its effect on your teeth	1	0	0	1	3*

Statements †		Factor				
		1	2	3	4	5
30	It's clear to me what's good for my teeth and what's not	-1	-1	0	0	3**
31	Brushing my child's teeth takes a lot of effort	-3	0	-1	0	-2
32	I usually forget the advice my dentist gives me	-2	0	0	-2	-3
33	Brushing your teeth is something you learn from the dentist	0	-2	2*	-3	-1
34	I brush my child's teeth for fresh breath	2	1	1	-1	-3**
35	I hate it when my dentist tells me I'm not brushing well	1	2	0	1	1
36	Brushing well now saves a lot of trouble when you're older	0	-1	-1	3**	-1
37	I brush my child's teeth so he/she will have a nice smile	3	1	2	2	0

Notes:

(*) significant at < .05;

(**) significant at < .01.

† The statements were related to the dimensions of the Health Belief Model as follows: 1, 9, 26 and 28 represent "perceived severity"; 2, 5, 14, 22, 27 and 29 "self-efficacy"; 3, 10, 15, 20, 21 and 24 "perceived susceptibility"; 4, 16, 17, 19, 36 and 37 "perceived benefits"; 6, 7, 8, 18 and 35 "perceived barriers"; 11, 25, 31 and 32 "perceived threats"; and 12, 13, 23, 30, 33 "cues to action".

Figure 1: Score sheet

Disagree most	1	2	3	4	5	6	7	8	Agree most	9
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Factor 1 – Conscious and Responsible

Disagree most	-4	-3	-2	-1	0	+1	+2	+3	Agree most
A cavity in a deciduous (baby) tooth isn't all that serious	My child is quite capable of brushing his/her own teeth; there's no need for me to interfere	Brushing well is hard to achieve	When your child develops a cavity, it is something that a parent should be ashamed of	I'd rather not go to the dentist for myself	When your child has caries, parents are to be held responsible	If you brush well, you won't develop cavities	I keep a close eye on my child's oral health	Healthy teeth are worth the world	
A cavity in a permanent tooth isn't all that serious	It's hard to keep up with brushing my child's teeth twice a day	I take my child to the dentist only when he/she is in pain	Going to the dentist once a year is enough for me	A restored tooth is as strong as a sound tooth	I know enough about oral hygiene to maintain proper oral health	In my social environment everyone takes their children to the dentist regularly	Having healthy teeth gives my child confidence	Brushing my child's teeth myself can help prevent cavities	
	Brushing my child's teeth takes a lot of effort	It's not the parent's fault if the child develops a cavity	I think a dental appointment is a lot of fuss	Children shouldn't spend their pocket money on sweets	I welcome every effort the dental professional makes in teaching me oral hygiene	When you don't watch your diet, you're just asking for cavities to develop	I brush my child's teeth so he/she will have a nice smile		
	I usually forget the advice my dentist gives me	Getting cavities is a matter of bad luck	Some families just happen to have bad teeth	Taking good care of your teeth saves a lot of money in the future	It doesn't matter what you eat or drink as long as you just brush well afterwards	I brush my child's teeth for fresh breath			
			It's clear to me what's good for my teeth and what's not	Brushing your teeth is something you learn from the dentist	I hate it when my dentist tells me I'm not brushing well				
				Brushing well now saves a lot of trouble when you're older					

Note: distinguishing statements (see Table 1) shown in bold.

Factor 2 – Trivialising and Fatalistic

Disagree most		Agree most						
-4	-3	-2	-1	0	+1	+2	+3	+4
Brushing well is hard to achieve	When your child develops a cavity, it is something that a parent should be ashamed of	Taking good care of your teeth saves a lot of money in the future	It's clear to me what's good for my teeth and what's not	It's hard to keep up with brushing my child's teeth twice a day	A cavity in a permanent tooth isn't all that serious	I take my child to the dentist only when he/she is in pain	A cavity in a deciduous (baby) tooth isn't all that serious	It's not the parent's fault if the child develops a cavity
If you brush well, you won't develop cavities	Having healthy teeth gives my child confidence	Brushing your teeth is something you learn from the dentist	Children shouldn't spend their pocket money on sweets	Brushing my child's teeth takes a lot of effort	My child is quite capable of brushing his/her own teeth; there's no need for me to interfere	Going to the dentist once a year is enough for me	Getting cavities is a matter of bad luck	Some families just happen to have bad teeth
Brushing my child's teeth myself can help prevent cavities	When you don't watch your diet, you're just asking for cavities to develop	When you don't keep a close eye on my child's oral health	If I want to know something about things inside my mouth, I'll ask or look it up	I usually forget the advice my dentist gives me	A restored tooth is as strong as a sound tooth	I think a dental appointment is a lot of fuss	I'd rather not go to the dentist for myself	
			Brushing well now saves a lot of trouble when you're older	I welcome every effort the dental professional makes in teaching me oral hygiene	I know enough about oral hygiene to maintain proper oral health	I hate it when my dentist tells me I'm not brushing well		
			When your child has caries, parents are to be held responsible	When you eat and drink, you should be aware of its effect on your teeth	I brush my child's teeth for fresh breath			
			It doesn't matter what you eat or drink as long as you just brush well afterwards	In my social environment everyone takes their children to the dentist regularly	Brush my child's teeth so he/she will have a nice smile			
			Healthy teeth are worth the world					

Note: distinguishing statements (see Table 1) shown in bold.

Factor 3 – Appearance Driven and Open Minded

Disagree
most

-4	-3	-2	-1	0	+1	+2	+3	+4	Agree most
When your child develops a cavity, it is something that a parent should be ashamed of	When you don't watch your diet, you're just asking for cavities to develop	If you brush well, you won't develop cavities	Children shouldn't spend their pocket money on sweets	Brushing well is hard to achieve	It doesn't matter what you eat or drink as long as you just brush well afterwards	Brushing my child's teeth myself can help prevent cavities	Taking good care of your teeth saves a lot of money in the future	Having healthy teeth gives my child confidence	
I take my child to the dentist only when he/she is in pain	A cavity in a permanent tooth isn't all that serious	My child is quite capable of brushing his/her own teeth; there's no need for me to interfere	Brushing well now saves a lot of trouble when you're older	It's clear to me what's good for my teeth and what's not	In my social environment everyone takes their children to the dentist regularly	Brushing your teeth is something you learn from the dentist	I keep a close eye on my child's oral health	Healthy teeth are worth the world	
	I'd rather not go to the dentist for myself	I think a dental appointment is a lot of fuss	When your child has caries, parents are to be held responsible	It's hard to keep up with brushing my child's teeth twice a day	I know enough about oral hygiene to maintain proper oral health	If I want to know something about things inside my mouth, I'll ask or look it up	I welcome every effort the dental professional makes in teaching me oral hygiene		
		Getting cavities is a matter of bad luck	Brushing my child's teeth takes a lot of effort	I usually forget the advice my dentist gives me	I brush my child's teeth for fresh breath	I brush my child's teeth so he/she will have a nice smile			
		A restored tooth is as strong as a sound tooth		When you eat and drink, you should be aware of its effect on your teeth	Going to the dentist once a year is enough for me				
		A cavity in a deciduous (baby) tooth isn't all that serious		I hate it when my dentist tells me I'm not brushing well	Some families just happen to have bad teeth				
				It's not the parent's fault if the child develops a cavity					

Note: distinguishing statements (see Table 1) shown in bold.

Factor 4 – Knowledgeable but Defensive

Disagree most

-4

I take my child to the dentist only when he/she is in pain

-3

My child is quite capable of brushing his/her own teeth; there's no need for me to interfere

-2

A cavity in a permanent tooth isn't all that serious

-1

When your child develops a cavity, it is something that a parent should be ashamed of

0

I'd rather not go to the dentist for myself

+1

If you brush well, you won't develop cavities

+2

Brushing my child's teeth myself can help prevent cavities

+3

Brushing well now saves a lot of trouble when you're older

+4

It's hard to keep up with brushing my child's teeth twice a day

Agree most

Going to the dentist once a year is enough for me

A cavity in a deciduous (baby) tooth isn't all that serious

A restored tooth is as strong as a sound tooth

When you don't watch your diet, you're just asking for cavities to develop

Children shouldn't spend their pocket money on sweets

When you eat and drink, you should be aware of its effect on your teeth

If I want to know something about things inside my mouth, I'll ask or look it up

Brushing well is hard to achieve

Healthy teeth are worth the world

Brushing your teeth is something you learn from the dentist

I usually forget the advice my dentist gives me

I think a dental appointment is a lot of fuss

When your child has caries, parents are to be held responsible

I hate it when my dentist tells me I'm not brushing well

I brush my child's teeth so he/she will have a nice smile in the future

Taking good care of your teeth saves a lot of money in the future

It doesn't matter what you eat or drink as long as you just brush well afterwards

Getting cavities is a matter of bad luck

Brushing my child's teeth takes a lot of effort

In my social environment everyone takes their children to the dentist regularly

I keep a close eye on my child's oral health

It's not the parent's fault if the child develops a cavity

It's clear to me what's good for my teeth and what's not

I know enough about oral hygiene to maintain proper oral health

I brush my child's teeth for fresh breath

Some families just happen to have bad teeth

Welcome every effort the dental professional makes in teaching me oral hygiene

Having healthy teeth gives my child confidence

Note: distinguishing statements (see Table 1) shown in bold.

Factor 5 – Conscious and Concerned

Disagree most	-4	-3	-2	-1	0	+1	+2	+3	Agree most
I take my child to the dentist only when he/she is in pain	A restored tooth is as strong as a sound tooth	It doesn't matter what you eat or drink as long as you just brush well afterwards	Brushing your teeth is something you learn from the dentist	Going to the dentist once a year is enough for me	My child is quite capable of brushing his/her own teeth; there's no need for me to interfere	When your child has caries, parents are to be held responsible	When you don't watch your diet, you're just asking for cavities to develop	It's clear to me what's good for my teeth and what's not	Brushing my child's teeth myself can help prevent cavities
A cavity in a permanent tooth isn't all that serious	I usually forget the advice my dentist gives me	Brushing my child's teeth takes a lot of effort	When your child develops a cavity, it is something that a parent should be ashamed of	A cavity in a deciduous (baby) tooth isn't all that serious	Some families just happen to have bad teeth	Children shouldn't spend their pocket money on sweets	When you eat and drink, you should be aware of its effect on your teeth	Healthy teeth are worth the world	
I brush my child's teeth for fresh breath	If you brush well, you won't develop cavities	Getting cavities is a matter of bad luck	I think a dental appointment is a lot of fuss	I'd rather not go to the dentist for myself	Having healthy teeth gives my child confidence	If I want to know something about things inside my mouth, I'll ask or look it up	I welcome every effort the dental professional makes in teaching me oral hygiene		
	It's hard to keep up with brushing my child's teeth twice a day	It's not the parent's fault if the child develops a cavity	Brushing well now saves a lot of trouble when you're older	Brushing my child's teeth so he/she will have a nice smile	I hate it when my dentist tells me I'm not brushing well	I keep a close eye on my child's oral health			
				Brushing well is hard to achieve	In my social environment everyone takes their dentist regularly	I know enough about oral hygiene to maintain proper oral health			
				Taking good care of your teeth saves a lot of money in the future					

Note: distinguishing statements (see Table 1) shown in bold.