Community Dental Health (2013) **30,** 45–51
Received 29 May 2012; Accepted 9 July 2012

doi:10.1922/CDH_3044Trubey07

Attitudes towards establishing a daily supervised school-based toothbrushing programme - determined by Q-sort methodology

R.J. Trubey and I.G. Chestnutt

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

Objectives: This study used Q-sort methodology to determine the views of staff involved in a national school-based daily toothbrushing programme. ***Methods*:** Q-methodology is a mixed-method approach in which participants are asked to sort a collection of statements according to degree of agreement with them. Factor analysis identified subgroups of like-minded participants and revealed areas of consensus and disagreement. 24 Community Dental Service staff managing or delivering the toothbrushing programme were asked to rank 49 statements derived from previous qualitative interviews. ***Results:*** Varimax rotation produced a three-factor solution with five/six participants loading significantly into each group. Groups divided largely according to staff role: Factor 1, mainly Support Workers (assistants with no oral-health background); Factor 2, managers; and Factor 3, Oral Health Educators (dental nurses with teaching qualifications). As staff new to the area of oral-health, the views of Support Workers were of particular interest. Unlike others, this group saw Designed to Smile as a unique health promotion scheme and wanted to involve as many children as possible, regardless of oral-disease risk. Managers' perceptions of issues affecting the establishment of the programme differed from those staff in day-to-day contact with the 515 schools in which the toothbrushing took place. ***Conclusions*:** This study used a long established but little used technique to ascertain the commonality of views of staff. These data may be of value not only in managing the current programme, but for anyone who may be considering developing such a toothbrushing scheme.

Key words: *oral health; health promotion; toothbrushing; school dentistry; q-sort; workforce*

Introduction

Schools in the UK have previously directed much energy towards educating children, parents and teachers about the importance of keeping teeth healthy (Davies and Bridgeman, 2011). Such lessons were supported by workbooks, games, songs, puppet shows and the use of anatomical models. While these activities may result in improved knowledge, there is little evidence that they translate to improved oral health (Kay and Locker, 1996; Sprod *et al*., 1996), particularly in disadvantaged communities. Inappropriately applied attempts to try to change lifestyle behaviours may widen health inequalities (Smith *et al*., 2009), as parents from more advantaged communities are more likely to act on advice given.

Oral health education initiatives that do not incorporate the use of fluoride generally have limited sustained impact on caries incidence. The benefits of fluoridated toothpaste in preventing dental caries are beyond doubt (Walsh *et al*., 2010) and it has proved effective in a supervised toothbrushing programme in schools (Curnow *et al*., 2002) and four years after the end of a randomised controlled trial in this setting (Pine *et al*., 2007).

In recognition of the above issues, the governments in Scotland and Wales have devoted considerable resources to the establishment of national school-based daily supervised toothbrushing programmes (Macpherson *et al*., 2010; Turner *et al*., 2010; Welsh Assembly Government, 2009). "Childsmile" (2012) in Scotland and "Designed to Smile" (2012) in Wales are multi-component programmes targeted at children in the most deprived areas.

This study concerns the establishment of a school-based daily supervised toothbrushing programme in Wales, operated by the Community Dental Service (CDS). Schools were recruited from the 150 most deprived areas in North and South Wales. After 12 months, 515 schools and 30,442 children aged 3-5 years were participating in daily in-school toothbrushing. A significant challenge in setting up this programme was to encourage the schools to take part, to train the teachers and classroom assistants who would supervise the on-going toothbrushing and to agree the specific details of how to operationalise the programme.

Traditionally school-based oral health education programmes in the UK are delivered by Oral Health Educators who have a background in dental nursing or dental hygiene and have further qualifications in oral health education or a post-qualification diploma in education. In setting up the Designed to Smile programme it was decided to recruit a new cadre of workers termed "Support Workers" who had no formal qualifications in, or past experience of oral health education, but often having worked with children in a school or other setting. Figure 1 illustrates the structure of the staff setting up and delivering the toothbrushing programme.

In managing the implementation and roll-out of the programme it was thought important to gauge the attitudes and views of the staff delivering the school based toothbrushing programme, namely the Oral Health Educators, the Support Workers and the Managers.

Correspondence to: Rob Trubey, Applied Clinical Research and Public Health, Cardiff University School of Dentistry, Heath Park, Cardiff CF14 4XY, UK. Email: trubeyrj@cardiff.ac.uk

Q-sort methodology has been widely used to determine attitudes across a wide range of disciplines (Cross, 2005), but its use in dental research has been limited (Schnabel *et al*., 2009). Vermaire and colleagues (2010) provided a detailed description of the technique in a study which examined attitudes towards oral health among parents. In another health discipline, Gidman and colleagues (2009) considered Q-methodology a technique which would provide additional insight beyond that gleaned from a conventional qualitative interview survey among female pharmacists.

The objectives of this study were to:

- Examine attitudes of CDS staff towards how a daily supervised school-based toothbrushing programme should be delivered
- Investigate if the differences in views of staff were related to their job status or the geographic area in which they work
- Determine the implications of any differences observed and their value to commissioners and others interested in setting up a school-based toothbrushing programme.

Method

Q methodology is a research technique used to systematically investigate people's subjective beliefs, attitudes or preferences (Watts and Stenner, 2005) and dates from the 1930s (Stephenson, 1935). It combines qualitative and quantitative methods and provides a scientific foundation for the systematic study of subjectivity (Cross, 2005; Watts and Stenner, 2005). It typically involves presenting a small number of purposively selected participants with a list of statements representative of the subject under study (Q-statements) and asking them to rank them using a fixed layout (the Q-sort). By sorting the statements the respondents give subjective meaning to the statement set and so reveal their subjective viewpoint.

The individual Q-sorts are then subjected to factor analysis to identify groups of participants with similar viewpoints, in order to identify a small number of unique 'viewpoints' on the topic under investigation. If each individual were to have a different view point, their Q-sorts would not correlate. If, however, significant clusters of correlations exist, they can be identified and described as common view points and individuals can be measured against 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) (Vermaire *et al*., 2010). 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 (Brown, 1993).

A structured sample of 24 CDS staff were chosen to take part in the study, ensuring a balance of job roles and geographical location (Table 1). Each participant was sent a consent form explaining the nature of the study and then contacted to arrange a face-to-face semi-structured interview.

The Q-statements used for the study were derived from interviews previously carried out with 15 CDS staff members. An initial list of quotes was filtered to remove duplicate statements or statements too specific to individuals, and to ensure a balance of viewpoints for each theme.

To ensure that the statements were understandable a pilot exercise was undertaken with three CDS staff. As a result several statements were removed. The final Q-set contained 49 statements (Table 2) which were randomly numbered, printed on to 3x5 inch cards and laminated. Each participant was presented with the 49 cards, asked to read each one then place it in to one of three piles: statements they broadly agreed with, those

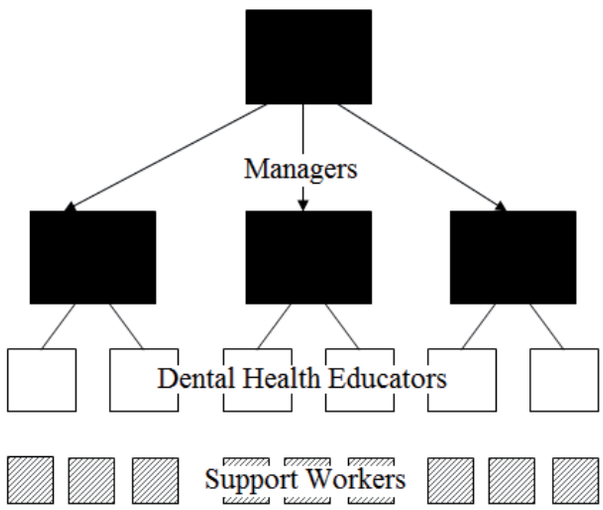

Figure 1. *Representation of staff grades and structure employed in the delivery of the Designed to Smile Programme in each of North and South Wales*

Table 1. Characteristics of participants and factor loadings

Demographics		*Factor loadings*		
Job role and location North/South Wales		*1*	*2*	*3*
Manager	N	0.48	0.64	0.39
Manager	N	-0.03	0.79	0.13
Manager	N	0.18	0.63	0.29
Support Worker	N	0.71	0.11	0.04
Dental Health Educator	N	0.10	0.35	0.61
Support Worker	N	0.31	0.60	0.23
Support Worker	S	0.42	0.11	0.55
Support Worker	S	0.71	-0.02	0.50
Admin	S	0.49	0.04	0.47
Support Worker	S	0.36	0.32	0.53
Support Worker	S	0.50	0.15	0.49
Dental Health Educator	N	0.06	-0.03	0.67
Support Worker	N	0.73	-0.03	0.23
Support Worker	N	0.57	0.20	0.27
Dental Health Educator	N	0.07	0.14	0.73
Support Worker	S	0.37	0.48	0.21
Dental Health Educator	S	0.13	0.17	0.67
Dental Health Educator	S	0.09	0.09	0.49
Support Worker	S	0.19	0.43	0.41
Support Worker	S	0.35	0.37	0.38
Dental Health Educator	S	0.55	0.21	0.40
Support Worker	S	0.71	0.05	-0.19
Manager	S	0.14	0.68	-0.04
Manager	S	0.01	0.52	0.34

they broadly disagreed with, and those they felt neutral or undecided about.

Next they were presented with the Q-sort grid (Figure 2). Using the cards in the 'agree' pile, participants were asked to identify the one statement which they agreed with the most, and place it in the +6 column. They were then asked to look at the remaining statements and choose the two which they agreed with the most, placing those in the +5 column. The process continued until all cards in the agree pile had been placed, and was then repeated for the 'disagree' cards with respondents placing the statement they disagreed with the most in the -6 column and so on. Then, the neutral cards were placed in the remaining slots on the grid, from left to right in order of how much participants agreed with each one. The exact shape of the q-sort grid is arbitrary, but is typically arranged in a quasi-normal distribution to reduce the burden on the participant (compared to, for instance, asking them to rank the statements one by one) and to reflect the fact that neutral responses to statements are more common than extreme agreement or disagreement.

Participants were given the opportunity to re-arrange any cards that they wished to before the card arrangement was recorded on a separate sheet, along with some basic demographic details about the participant.

The data were analysed using the software package PQMethod (2012). The goal of Q-methodology is to identify a small number of shared viewpoints on a subject by grouping together people with similar Q-sorts. The three PQMethod steps in analysis are:

- firstly, it assesses the degree of similarity between each individual's card arrangement by producing a correlation matrix of each Q-sort;
- it then subjects this correlation matrix to factor analysis, identifying several groups of participants (factors) with similar Q-sorts to one another;
- and finally, this set of factors is subjected to varimax rotation to arrive at a solution which can be more clearly interpreted, typically involving a smaller number of factors which represent unique viewpoints.

For each factor, a representative Q-sort is calculated, effectively a weighted average of the Q-sorts of the participants that make up the factor. Each of the 49 statements is therefore assigned a score from +6 to -6, depending on how strongly participants in that factor tended to agree with them.

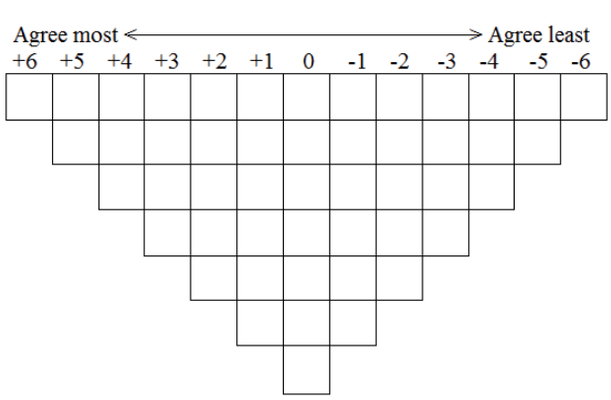

Figure 2. *Q-sort grid on which study participants laid statement cards in order of agreement*

Results

Principle components factor analysis lead to a three factor solution emerging, i.e. there were three groups holding similar views. Each factor had an Eigenvalue exceeding 1.0 (i.e. the total variance explained by the factor was greater than that of any individual Q-sort) and together the three factors accounted for over 50% of the variance.

Factor loadings (participants' degree of similarity with each factor) are shown in Table 1 along with each participant's demographic details. Q-sorts loading at over 0.5 are significant at the $p<0.01$ level and are referred to as 'factor exemplars'. In total, six participants loaded significantly on to Factor 1, six on to Factor 2 and five participants on to Factor 3. The remainder either failed to load significantly on to any of the factors ('null sorts') or were correlated with multiple factors ('confounded sorts') and so were excluded from the analysis. Table 2 shows the composite Q-sorts for each of the final three factors, and Tables 3-5 show the distinguishing statements for Factors 1, 2 and 3 respectively.

Factor 1 is represented by six significantly loading Q-sorts. All but one of the participants who loaded to this Factor was a Support Worker, 3 from each of South and North Wales.

The group is largely defined by their preference for the scheme to involve as many children as possible, regardless of age and socio-economic background. They felt the scheme should be extended to involve children aged 11 and over, should include schools in affluent areas, and be continued for children aged 6 and 7 in participating schools. This viewpoint distinguishes them from the other two groups, who tended to favour a more targeted or pragmatic approach to selecting which schools should be involved.

The group was also relatively sceptical about the benefits of promoting the toothbrushing scheme to schools through the Designed to Smile web-site, promotional DVDs or letters sent to the head-teachers before telephoning them. Despite recognising the importance of a professional image for the scheme, the participants in Factor 1 felt valuable time had been wasted on the producing 'glossy' paperwork. While the other groups felt strongly that more day-to-day support should be offered to participating schools, participants in this group were neutral about the idea.

Factor 2 is also represented by 6 significantly loading Q-sorts. Again, all but one of these participants had the same job role – in this case, area and team managers of the scheme: 4 from North Wales (three managers) and 2 from South Wales.

The group exhibited a strong desire to focus resources on developing a more complete package of support for high-need schools, rather than trying to involve as many schools as possible. The group also felt quite strongly that working with the youngest age cohorts (0-3 year olds) should be a priority for the scheme, a view that both other groups disagreed with.

They also considered it important to work closely with other health promotion schemes operating in schools, in contrast to other groups who tended to see Designed to Smile as more of a standalone, 'unique' health promotion programme.

Table 2. Q statements and factor scores

	Statements	*Factors*		
		1	*2*	*3*
1	*I think it's important to involve the older age groups (6-11 year-olds) in the schools that we're already covering* [a]	*+2*	*+3*	*+1*
2	I think it's best to concentrate on the younger (3-5 year old) age groups for now	-2	-3	+3
3	I think the toothbrushing scheme should be extended to involve children older than 11 years-old as well	+2	-5	-4
4	I think it's best to focus time and money on offering as much support as possible for the really high-need schools, rather than spending too much time on schools in affluent areas	-3	+6	+2
5	I think it makes sense to continue the brushing scheme for Year 2, Year 3 and beyond once it's already been set up in a school[b]	+5	+5	1
6	I think all schools, even those in affluent areas, should have the opportunity to be involved in the toothbrushing programme	+4	-2	+1
7	I think it's important that we work on convincing any schools who've said no to take part in the scheme	-2	+1	-4
8	If a school doesn't want to take part, that's fine - we should focus our time and resources on the schools that do want to take part	0	+2	+5
9	I think it would be good to include more nutrition and diet advice as part of the programme	+3	-1	+1
10	I don't think it's our role to talk about diet and nutrition - we should just focus on the toothbrushing scheme	0	0	+4
11	I think we should increase the number of home packs we give to the children each year	-4	-4	-6
12	I think that targeting the 0-3 age group should be a priority for the future	-4	+4	-4
13	I think we should try and offer more day-to-day support to the schools already involved in the scheme	0	+4	+4
14	The 0-3 age group is too difficult to reach, so we'd be better of focusing on those children in nursery, reception and infant school	-3	-4	+2
15	*I think it's important to develop close links with local dentists*	*-6*	*-5*	*-5*
16	I think it's important that we work more closely with other health promotion schemes aimed at schools	-1	+5	0
17	I think Designed to Smile is unique, and should be kept separate from other health schemes	+4	-1	+2
18	I think one of the main priorities of the scheme should be helping children find their own local dentist	-1	-1	-5
19	*I think it's important to identify those children who need to see a dentist through screening, but it's up their parents or guardians to decide if they want to go*	*-1*	*0*	*-1*
20	I think we need to promote the scheme through the Designed to Smile web-site	-2	-1	+5
21	I think we need to improve communication between teams within our own local area	+2	-4	0
22	I think we need to improve communication between South and North Wales	0	-1	-2
23	I think there's a danger that having too many meetings could take away time we could spend supporting the schools	+1	+2	-2
24	I think something like a promotional DVD would help convince new schools to take part in the scheme	-3	0	-1
25	I think it's important to develop closer links with local health workers, such as GPs and pharmacists	+4	+1	+1
26	*I think the scheme needs to be promoted more at a national level*	*+1*	*+1*	*0*
27	I think the scheme needs to be promoted more at a local level	+1	0	0
28	I don't think we should promote the scheme too widely, or we may end up having to say no to some schools who want to take part	+1	-3	+2
29	*I think it's important to improve the speed with which we get materials translated to Welsh*	*-5*	*-2*	*-3*
30	I think there's too much paperwork, which takes up a lot of time	0	+3	-2
31	I think it's important to collect as much information as we can about each school and the children taking part	+1	0	-2
32	I think it's important that we get constant feedback from the schools involved in the programme	-2	+1	0
33	I think we spend more of the money on sending mobile dental clinics to send around to schools	-1	+4	+3
34	If a school wants to take part in the scheme, even if it's based in an affluent area, we should at least offer them advice and guidance	+3	-2	-3
35	I think we'd be better offering more support to the high-need schools than spending time and money on including schools from more affluent areas	0	+2	+3
36	I think it would be helpful if we could send a letter about the scheme to the head-teachers before we phoned them, so we wouldn't be calling out of the blue	-5	+3	0
37	I think it's best to try and meet the head-teachers before we send them too much paperwork, in case it puts them off the scheme	-2	-3	-1
38	*I think it would be helpful if we could get the schools to include the Designed to Smile consent form as part of their 'starter packs' for new children*	*+1*	*+3*	*+2*
39	I think it's important that we make sure that all the Designed to Smile literature look professional and glossy, to make the scheme look credible	+6	+2	+6
40	*I think it's important that we keep the Designed to Smile literature fresh and up-to-date, each year*	*0*	*-1*	*+1*
41	I think valuable time has been wasted producing glossy literature	+3	-2	-2
42	*I think it's important that teams from different areas have freedom to try out new approaches, to find out what does and doesn't work*	*-3*	*-3*	*-3*
43	*I think it's important that we're all following the same guidelines and carrying out the programme in exactly the same way, in each area*	*+5*	*+2*	*+4*
44	I think it's important to improve the accuracy with which we get materials translated to Welsh	+2	-2	0
45	*I'm happy with the quality of the brushes and buses that we supply to the schools* [c]	*-1*	*0*	*-1*
46	I think we could improve the quality of the brushes and buses and other materials that we supply to the schools	+3	+1	+3
47	I think we make enough visits to each school to pick up on any problems with their toothbrushing programme	-4	-6	-3
48	I think we should visit some schools more often than we do, just to make sure that we're not missing any problems with the toothbrushing programme	-1	+1	-1
49	*I think it would be good to include more general oral health advice as part of the programme*	*+2*	*0*	*+1*

[a] Italics represent consensus items

[b] Year 2 and Year 3 children are aged 6 and 7 years respectively

[c] buses = racks used to store toothbrushes in schools (www.thebrushbus.com)

Table 3. Distinguishing statements for Factor 1

	Statements	*Factors*		
		1	2	3
35	I think we'd be better offering more support to the high-need schools than spending time and money on including schools from more affluent areas	+5	+2	+3
25	I think it's important to develop closer links with local health workers, such as GPs and pharmacists	+4	+1	+1
44	I think it's important to improve the accuracy with which we get materials translated to Welsh	+4	-2	0
34	If a school wants to take part in the scheme, even if it's based in an affluent area, we should at least offer them advice and guidance	+3	-2	-3
41	I think valuable time has been wasted producing glossy literature	+3	-2	-2
3	I think the toothbrushing scheme should be extended to involve children older than 11 years-old as well	+2	-5	-4
21	I think we need to improve communication between teams within our own local area	+2	-4	0
28	I don't think we should promote the scheme too widely, or we may end up having to say no to some schools who want to take part	+1	-3	+2
13	I think we should try and offer more day-to-day support to the schools already involved in the scheme	0	+4	+4
35	I think we'd be better offering more support to the high-need schools than spending time and money on including schools from more affluent areas	0	+2	+3
33	I think we should spend more of the money on sending mobile dental clinics around to schools	-1	+4	+3
7	I think it's important that we work on convincing any schools who've said no to take part in the scheme	-2	+1	-4
20	I think we need to promote the scheme through the Designed to Smile web-site	-2	-1	+5
32	I think it's important that we get constant feedback from the schools involved in the programme	-2	+1	0
4	I think it's best to focus time and money on offering as much support as possible for the really high-need schools, rather than spending too much time on schools in affluent areas	-3	+6	+2
24	I think something like a promotional DVD would help convince new schools to take part in the scheme	-3	0	-1
36	I think it would be helpful if we could send a letter about the scheme to the head-teachers before we phoned them, so we wouldn't be calling out of the blue	-5	+3	0

Table 4. Distinguishing statements for Factor 2

	Statements	*Factors*		
		1	*2*	*3*
4	I think it's best to focus time and money on offering as much support as possible for the really high-need schools, rather than spending too much time on schools in affluent areas	-3	+6	+2
16	I think it's important that we work more closely with other health promotion schemes aimed at schools	-1	+5	0
12	I think that targeting the 0-3 age group should be a priority for the future	-4	+4	-4
36	I think it would be helpful if we could send a letter about the scheme to the head-teachers before we phoned them, so we wouldn't be calling out of the blue	-5	+3	0
30	I think there's too much paperwork, which takes up a lot of time	0	+3	-2
39	I think it's important that we make sure that all the Designed to Smile literature look professional and glossy, to make the scheme look credible	+6	+2	+6
7	I think it's important that we work on convincing any schools who've said no to take part in the scheme	-2	+1	-4
46	I think we could improve the quality of the brushes and buses and other materials that we supply to the schools	+3	+1	+3
17	I think Designed to Smile is unique, and should be kept separate from other health schemes	+4	-1	+2
6	I think all schools, even those in affluent areas, should have the opportunity to be involved in the toothbrushing programme	+4	-2	+1
44	I think it's important to improve the accuracy with which we get materials translated to Welsh	+4	-2	0
28	I don't think we should promote the scheme too widely, or we may end up having to say no to some schools who want to take part	+1	-3	+2
21	I think we need to improve communication between teams within our own local area	+2	-4	0

Finally, this group, consisting of managers, perceived that paperwork was more of a problem than groups consisting largely of Support Workers and Health Educators who typically deal with the forms day-to-day. However, they felt that communication between local teams was far less of a problem than the other groups.

Factor 3 is represented by 5 significant Q-sort loadings, all of whom were Health Educators: 3 from North Wales, 2 from South Wales.

Factor 3 exemplars seemed to adopt a largely pragmatic, conservative approach in terms of the coverage of the scheme. They felt that the youngest age groups (0-3 year olds) were too difficult to target, that the scheme didn't need to target children aged over 11 and that the main focus should remain on the 3-5 year olds rather than including slightly older year groups. Furthermore, they advocated simply focusing on those schools that were willing to take part, rather than attempting to convince any of the more reluctant schools of the scheme's benefits.

Interestingly, they felt that it was not their role to talk about diet and nutrition, and that they should just focus on the toothbrushing scheme. This is perhaps surprising given the job role of the group members. Indeed, it seems inconsistent with the interviews conducted with Health Educators, who were clearly aware of the importance of diet in dental health. Instead, it may come back to prag-

Table 5. Distinguishing statements for Factor 3

	Statements	*Factors*		
		1	*2*	*3*
20	I think we need to promote the scheme through the Designed to Smile web-site	-2	-1	+5
8	If a school doesn't want to take part, that's fine - we should focus our time and resources on the schools that do want to take part	0	+2	+5
10	I don't think it's our role to talk about diet and nutrition - we should just focus on the toothbrushing scheme	0	0	+4
2	I think it's best to concentrate on the younger (3-5 year olds) age groups for now	-2	-3	+3
14	The 0-3 age group are too difficult to reach, so we'd be better of focusing on those children in nursery, reception and infant school	-3	-4	+2
4	I think it's best to focus time and money on offering as much support as possible for the really high-need schools, rather than spending too much time on schools in affluent areas	-3	+6	+2
16	I think it's important that we work more closely with other health promotion schemes aimed at schools	-1	+5	0
36	I think it would be helpful if we could send a letter about the scheme to the head-teachers before we phoned them, so we wouldn't be calling out of the blue	-5	+3	0
21	I think we need to improve communication between teams within our own local area	+2	-4	0
5	I think it makes sense to continue the brushing scheme for Year 2, Year 3 and beyond once it's already been set up in a school	+5	+5	-1
23	I think there's a danger that having too many meetings could take away time we could spend supporting the schools	+1	+2	-2
7	I think it's important that we work on convincing any schools who've said no to take part in the scheme	-2	+1	-4
18	I think one of the main priorities of the scheme should be helping children find their own local dentist	-1	-1	-5
11	I think we should increase the number of home packs we give to the children each year	-4	-4	-6

matism: the feeling that the scheme should simply 'focus on the toothbrushing' is possibly more a reflection of what they believe the schools will realistically take on board.

The group were very enthusiastic about promoting the scheme through the Designed to Smile web-site, considerably more so than either of the other two groups.

The Q-sort identified three groups based on commonality of view points within groups. There were however a number of areas where consensus between the groups was also apparent (shown in italics in Table 2). The lack of need to develop closer links with local dentists was one such area.

There was general agreement that teams from different geographical localities should have freedom, within this national scheme, to try out new approaches to see what does and does not work. The group containing the managers felt more strongly that the same guidelines for the programme should be followed throughout, whereas those working in the schools, health educators and support workers, want more flexibility in how the in-school brushing programme could be operated.

Discussion

School-based toothbrushing programmes currently feature prominently in UK based oral health promotion strategies. The basic premise of this approach is that daily contact of teeth with fluoride is essential in preventing dental decay in high disease-risk children. These schemes are expensive to organise and deliver. In setting up the programme in Wales, the decision was taken to employ "lay-workers" as support staff to work alongside conventionally trained members of the clinical dental team, to assist with the administration, set-up and roll-out of the toothbrushing scheme. Thus an understanding of the attitudes and viewpoints of the staff involved are important to ensure the programme is managed in an effective and efficient manner.

Commonly in 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 this not the population sample).

The *a priori* objective of this study was not to examine the attitudes of the three categories of staff separately. It was unknown if attitudes would correlate with job role, geographic location of work or some other factor. However, a key, if perhaps unsurprising finding of the Q sort, is that analysis revealed three significant factors (groupings of common viewpoints), and that the individuals loading to these factors could be separated into distinctive staff groupings. In interpreting the factors, we cannot claim to represent the subjective viewpoints of all staff, as the Q sorts of seven staff members either failed to load significantly on to any of the factors, or correlated strongly with more than one factor. Nevertheless, the factor analysis and rotation resulted in a reduction to three key viewpoints which accounted for the large majority of participants.

Although the newly recruited support workers had extensive training prior to starting fieldwork, it appears they did not appreciate the need to focus efforts on high-risk schools and in the interview stage of data synthesis they displayed some resentment to the resources being devoted to this section of society. It may be advantageous for those providing future such training to take more time to explain the rational for targeting oral health promotion programmes. In general it appears is that when "lay-workers" are employed to assist in community oral health programmes they may retain lay concepts and ideas which training should address.

This exercise has also been of value in demonstrating differences in attitudes and views of managers and field staff. Communication up and down the "command structure" is crucial in rolling out such a national programme. Clearly there are differences in opinion between different staff groups, for example over the amount of "paperwork" involved. This exercise conducted by an academic dental public health unit as part of the formal evaluation of the toothbrushing programme has been of value to the programme managers and commissioners in identifying areas of potential conflict. Awareness of these issues is of value in managing the programme and may be helpful to others considering establishing such a programme.

Considering those statements on which there is evidence of consensus across groups, all staff categories disagreed that there was a need for closer links with local general dental practitioners. This is an important finding for programme commissioners (the Welsh Assembly Government) as closer integration of different branches of NHS dental services is a policy objective. In addition to improving oral health via toothbrushing it would be hoped that the Designed to Smile Programme would play a role in facilitating dental attendance. Work is therefore required to understand further why Designed to Smile staff do not perceive a need to make links with colleagues in general dentistry.

In conclusion, this study has ascertained the commonality of views of staff involved in the set-up and roll-out of a national school-based toothbrushing programme. It has identified how views expressed in initial qualitative interviews differ across and between different staff groupings. These data will be of value not only in managing the current programme, but for anyone who may be considering developing such a scheme.

Acknowledgements

The study was funded by a grant from the Welsh Assembly Government (Grant No C-110/2008/09). The authors are grateful to the Community Dental Service staff who generously gave of their time to participate in the interviews and complete the Q-sort exercise.

References

Brown, S.R. (1993): A primer on Q methodology. *Operant Subjectivity* **16**, 91-138.

Childsmile (2012): www.child-smile.org.uk

Cross, R.M. (2005): Exploring attitudes: the case for Q-methodology. *Health Education Research* **20**, 206-213.

Curnow, M.M.T, Pine, C.M., Burnside, G., Nicholson, J.A., Chesters, R.K. and Huntington, E. (2002): A randomised controlled trial of the efficacy of supervised toothbrushing in high-caries-risk children. *Caries Research* **36**, 294-300.

Davies, G. and Bridgman, C. (2011): Improving oral health among schoolchildren – which approach is best? *British Dental Journal* **210**, 59-61.

Designed to Smile (2012): www.designedtosmile.co.uk/home.html

Kay EJ, Locker D. (1996): Is dental health education effective? A systematic review of current evidence. *Community Dentistry and Oral Epidemiology* **24**, 231-235.

Gidman, W., Day, J., Hassell, K. and Payne, K. (2009): Delivering health care through community pharmacies: are working conditions deterring female pharmacists' participation? *Journal of Health Services Research and Policy* **14**, 141-149.

Macpherson, L.M.D., Ball, G.E., Brewster, L., Duane, B., Hodges, C., Wright, W., Gnich, W., Rodgers, J., McCall, D.R., Turner, S. and Conway D.I. (2010): Childsmile: the national child oral health improvement programme in Scotland. Part 1: establishment and development. *British Dental Journal* **209**, 73-78.

Pine, C.M., Curnow, M.M.T., Burnside, G., Nicholson, J.A. and Roberts, A.J. (2007): Caries prevalence four years after the end of a randomised controlled trial. *Caries Research* **41**, 431-436.

PQ Method 2.11 for Windows. www.lrz.de/~schmolck/qmethod/downpqx.htm

Schnabel, B.J., McNamara, J.A. Jr, Franchi, L. and Bacetti, T. (2009): Q-sort assessment vs visual analog scale in the evaluation of smile esthetics. *American Journal of Orthodontics and Dentofacial Orthopaedics* **135**, S61-S71

Smith, K.E., Hunter, D.J., Blackman, T., Elliot, E., Green, A., Harrington, B.E., Marks, L., McKee, L. and Williams, G.H. (2009): Divergence or Convergence? Health inequalities and policy in a devolved Britain. *Critical Social Policy* **29**, 216-242.

Sprod, A.J., Anderson, R. and Treasure, E.T. (1996): *Effective oral health promotion: literature review.* Cardiff: Health Promotion Wales. Technical Report 20.

Stephenson, W. (1935): Correlating persons instead of tests. *Character and Personality* **4**, 17-24.

Turner, S., Brewster, L., Kidd, J., Gnich, W., Ball, G.E., Milbirn, K., Pitts, N.B., Goold, S., Conway, D.I. and Macpherson, L.M. (2010): Childsmile: the national oral health improvement programme in Scotland. Part 2: monitoring and delivery. *British Dental Journal* **209**, 79-83.

Vermaire, J.H., Hoogstraten, J., van Loveren, C., Poorterman, J.H.G. and van Exel, N.J.A. (2010): Attitudes towards oral health among parents of 6-year-old children at risk of developing caries. *Community Dentistry and Oral Epidemiology* **38**, 507-520.

Walsh, T., Worthington, H.V., Glenny, A-M., Appelbe, P., Marinho, V.C. and Shi, X. (2010): Fluoride toothpastes of different concentrations for preventing dental caries in children and adolescents. *Cochrane Database Systematic Reviews* 1:CD007868.

Watts, S. and Stenner, P. (2005): Doing Q-methodology: theory, method and interpretation. *Qualitative Research in Psychology* **2**, 67-91.

Welsh Assembly Government (2009): Ministerial Letter. *Expansion of designed to smile – a national oral health improvement programme*. www.wales.gov.uk/docs/dhss/publications/091023letter03209en.pdf