

LEEDS METROPOLITAN UNIVERSITY

**INSTITUTE FOR HEALTH
AND WELLBEING**



An Evaluation of Calderdale's Toothbrushing in Schools scheme

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1. Context

The dental health of children in the Yorkshire and Humber region compares poorly to other parts of England. The mean number of decayed, missing or filled teeth (dmft) in five year old children in Yorkshire and the Humber is 1.51 which compares unfavourably to the South East Coast of England (0.72) and the average across England as a whole (1.11) (Robertson et al., 2011). It is acknowledged that the dental health of individuals from the lower end of the socioeconomic scale is markedly worse than that of individuals from the upper end (Locker, 2000). Indeed, the picture is reflected more locally where five year old children from the most deprived areas in Calderdale have higher dmft scores than those from less deprived (Dyer et al., 2012). However, within the Yorkshire and the Humber region the dmft of five year olds in Calderdale is higher than other parts, such as East Riding, Wakefield, Leeds and Sheffield. Only Doncaster, Hull, Kirklees and Bradford & Airedale show higher mean dmft scores (Robertson et al., 2011).

The determinants of poor oral health are both complex and multifactorial. They include deprivation, age, gender, ethnicity, environment, poverty and lifestyle (Richards and Filippini, 2011). Whilst multi-agency and intersectoral interventions to tackle oral health inequalities are espoused, many commentators have advocated for schools to be considered as a key setting for tackling inequalities in oral health (Kwan et al., 2005). Their rationale is premised on several factors, including:

- Schools offer the opportunity to reach a large proportion of the school aged population and can be instrumental in shaping children's health related beliefs, attitudes, values and behaviours (Hublely et al., 2013).
- Given that evidence suggests that good health in childhood can subsequently track into adulthood, schools can potentially play a crucial role in establishing the foundations for healthy patterns of behaviour (Tones and Tilford, 2001, Licence, 2004). This is supported by studies that show that supervised brushing in school offers significant benefits to dental health (Curnow et al., 2002, Jackson et al., 2005).
- Evidence suggests that the transfer of knowledge, skills and values can occur from health promotion in school to the home and wider community (Hublely et al., 2013).

Calderdale's toothbrushing in schools scheme

The Calderdale toothbrushing in schools scheme is an evidence-based intervention across 18 schools. The intervention aims to introduce a life skill & improve the oral health of young children. The intervention involves children aged between 3-5 years brushing their teeth during the school day, as research demonstrates that the application of fluoride toothpaste in a supervised school-based intervention can have a significant effect on children with high caries risk (Curnow et al., 2002). The actual time of brushing is not prescribed to the schools to ensure that it fits best with the regime; however, it is advised that this is not at the start of the school day.

Resources (e.g. brushes, toothpaste and the 'brush bus' – a storage facility for brushes (see Figure 1)) are provided to schools and replenished regularly. Training is also given to school staff to ensure that hygiene standards are maintained and cross-contamination of brushes are avoided. Appropriate informed consent arrangements are in place for participating children

Figure 1. The brush bus



Aims and objectives

The South West Yorkshire Partnership NHS Foundation Trust commissioned the Institute for Health and Wellbeing at Leeds Metropolitan University to conduct an independent evaluation of Calderdale's toothbrushing in schools scheme.

The overarching aim of the evaluation is:

To undertake a review of the Calderdale toothbrushing in schools scheme with reference to its ownership, delivery and effectiveness in school settings.

Specifically, the evaluation will seek to address the following research objectives:

1. To identify what school characteristics are important for achieving effective implementation of the intervention.
2. To ascertain stakeholder views in relation to how the intervention contributes to key school-based indicators, such as OFSTED measures.
3. To explore whether children are engaged (or not) in the intervention and identify areas of good practice.
4. To identify whether the Toothbrushing in Schools scheme influences behaviour change in relation to toothbrushing within the home.
5. To identify appropriate measures for the Toothbrushing in Schools scheme to enable ongoing monitoring and evaluation to demonstrate effectiveness to commissioners.

Organisation of the report

A brief overview of the methodological approach to the evaluation follows; this outlines the process by which evidence was gathered and how the data was analysed. The findings from the evaluation are then presented. Next, the key findings are synthesised and discussed and finally the conclusions and recommendations are outlined.

2. Methodology

The use of triangulation has been proposed as a means of achieving validity in evaluation (Green and Tones, 1999) and is particularly relevant to the toothbrushing in schools scheme. This approach relies on collecting evidence of impact from a variety of different sources and making conclusions based on the overall data collected. By triangulating various data sources it allows us to make robust conclusions and recommendations.

Our approach to the evaluation draws particularly on qualitative approaches to gain the richness and depth required to understand the mechanism and context in which the intervention is set. It is generally agreed that, through qualitative research methodology, it is possible to explore a wide array of dimensions, including people's understandings and experiences and the way that social processes, institutions and relationships work (Mason, 2002). To complement this, quantitative data will also be ascertained in order to provide a broader overview of the scheme. Table 1 provides an overview of the data collection approaches. All aspects of the data collection were approved by the Faculty of Health and Social Science's Research Ethics Committee.

Table 1. **An overview of data collection activities**

Data collection activity	Details
School case studies	Case studies were conducted in three schools. In total data was gathered from: <ul style="list-style-type: none"> • 21 children participating in a 'draw and write' activity. • 18 parents contributing to a focus group discussion. • 4 members of school staff directly involved with the programme.
Programme/strategic level interviews	Three interviews with oral health programme leads.
On-line survey	A small scale questionnaire based survey which was sent to the 18 schools participating in the intervention. The questionnaire was administered online and a total of 13 questionnaires were returned.

School case studies

Case studies allowed in-depth examination of the toothbrushing in schools scheme and enabled the evaluation team to develop understanding of the effect of local context within schools and the inevitable adaptation that occurs in the implementation of the programme. Three "information rich" case study schools were sampled in negotiation with the oral health team. Participation in the evaluation was voluntary and some schools did reject the offer of being involved.

Within the schools a total of 18 parents were involved in focus group discussions. Unfortunately at one school, no parents responded to requests to participate in a focus group. As simplistic definition proposed by Tonkiss (2004) is that a focus group is a small group discussion facilitated by a researcher on a particular topic. The focus groups within the schools comprised of 16 females and 2 males. These individuals had been selected as they expressed an interest to participate with the school. The focus groups were facilitated by two researchers and the sessions were audio recorded after consent had been obtained. A high street shopping voucher was provided to participants as a thank you for their time. The general purpose of the focus groups was to explore the following:

- Parents' knowledge of the scheme;
- Their views on the scheme and how it operates;
- Whether participation in the toothbrushing scheme at school has influenced their child's toothbrushing behaviour at home;
- What further support, if any, parents need to enable their children to brush their teeth regularly.

Within each of the three schools, semi-structured interviews with key staff involved with the toothbrushing scheme were undertaken. The semi-structured interview created increased opportunity to probe and guide questioning, but also allowed the interview to be completed within an agreed time frame (Willig, 2001). The aim of these interviews was to broadly capture the operational realities of the scheme and to understand the characteristics necessary for achieving effective implementation of the toothbrushing scheme.

Finally in each of the case study schools, the draw and write technique was conducted with 21 children aged 3-5 years old. Given the central importance of children within the toothbrushing intervention, it was essential that their views were sought. Parental consent in a written format was obtained before the child took part in the draw and write session (not all parents provided consent and despite children's interest in supporting the evaluation they were unable to participate). In addition agreement was verbally sought from each pupil before the session commenced. Draw and write is a fairly recent development in health research and is regarded as a participatory method in which children of all ages can take part (Backett-Milburn and McKie, 1999). The draw and write approach is essentially a qualitative method for understanding how children construct ideas and concepts (Carter and Ford, 2013). It has been used effectively in a range of areas, including understanding children's views on road safety (Green et al., 2007). The premise of the method is relatively straightforward in that children are invited to draw a picture and to write what is happening in the picture. Where children are unable to write for themselves, adults can act as scribes (Carter and Ford, 2013). In this evaluation, children were asked by the researchers to draw a picture of them brushing their teeth. As the children were drawing, the researchers asked questions to clarify the drawings and, with permission, made notes on the children's work.

Programme/strategic level interviews

Three interviews with oral health programme leads took place to supplement the case study data. These interviews were semi-structured in nature and were conducted over the telephone and in person. The interviews were audio recorded after consent had been gained. These interviews explored several dimensions of the scheme, including: relationships with schools; operational realities and challenges; ingredients for success; recommendations for future development.

On-line survey

Quantitative data was gathered through a small scale questionnaire based survey which was sent to the 18 schools participating in the intervention. The survey asked an appropriate member of school staff to complete the questionnaire and was designed to provide a broad overview of the scheme across participating schools and complement qualitative data collected through the other methods. The questionnaire was administered online using SNAP and a total of 13 questionnaires were returned. This was after several prompts to remind schools to complete the questionnaire. This resulted in a satisfactory response rate of 72%.

Data analysis

All focus group and interview recordings were transcribed verbatim and the data was coded and themes identified. The individually identified themes were then discussed between the

authors and any discrepancies were considered and resolved. Themes were then organised into larger categories based on the evaluation's primary objectives. Quantitative data derived from the on-line survey were analysed in Excel and descriptive statistics were performed as appropriate.

3. Findings

This section presents the findings of the evaluation. The findings have been organised in relation to the cross-cutting themes that emerged across the data gathering approaches. Where quotations have been used to illuminate an issue, these have been anonymised to protect the participants involved.

Teachers as pseudo-parents

Although outside the remit of this evaluation, the debate as to whether school staff should be delivering the toothbrushing programme or whether it was a role for parents, was frequently raised and worthy of note. There were some tensions from both the school staff interviewed and parents on this debate.

The toothbrushing scheme was placed by some school staff within the wider context of teachers having increasing responsibility for supporting children in rudimentary activities like using the toilet. One teacher suggested that this may be a reflection on the community in which the school was based and the social deprivation that several families faced. It was inferred that teachers felt that their role as educators was increasingly being replaced as pseudo-parents:

“I have been teaching for long time and more and more things the parents used to do I think it’s put on to our heads....learning to use knife and folks, learning to get dressed, learning to go to the toilet all those things children used to come and be able to do.” (School staff)

Conversely, some parents questioned the reason why schools were replacing their duty as parents and several parents had initial scepticism of the scheme, especially concerning the storage of brushes and hygiene practices. However, it seemed that these initial worries had been allayed:

“I was concerned about whose brush they were going to use, but later my daughter told me that they are divided into groups and they probably recognised what brush is theirs so that made me less concerned and I am fully ok with it right now.” (Parent)

Where the programme seemed to be most successful was when the school philosophy embraced, rather than rejected the notion of improving children’s health and social skills alongside educational attainment. Several teachers suggested that it was difficult to be passive when they were aware of the poor dmft scores of children in their area and the fact that they had seen the poor state of the children’s teeth in their class:

“There are so many with black teeth, yellowy brown teeth, fallen out teeth.” (School staff)

“If this is the only time some of them [the children] brush their teeth, then we can’t say no.” (School staff)

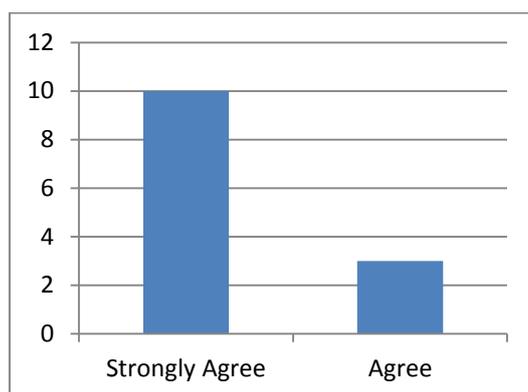
Children’s engagement and increased knowledge

Across the data collection activities, one recurring and clear theme was that children enjoyed participating in the toothbrushing scheme. Parents reported how their children enjoyed brushing their teeth and that the toothbrushing in school scheme had raised their interests:

“Yes my son enjoys it and has started asking me, ‘Mummy can I get a new tooth brush’...he seems to enjoy brushing his teeth for lot longer, rather than it being taxing.” (Parent)

The survey data supported these assertions as responding schools either ‘strongly agreed’ or ‘agreed’ that children were engaged in the toothbrushing scheme (see Figure 2).

Figure 2. Children in this school are generally engaged in the toothbrushing scheme



Key staff within schools suggested how the activity of brushing had become habitualised and seen by the children as an integral and enjoyable part of the school day. This was noted by one of the open comments provided via the on-line survey and comments made by school staff in the interviews:

“The children love the routine of brushing their teeth”

“It’s such an integral part of the day.”

While for school staff the songs and rhymes used to encourage a two-minute brushing routine could be repetitive, they seemed to be valued by the children themselves:

“We try to make it as much fun as you can make tooth brushing fun. Here we play the song or we make them say the rhymes” (School staff)

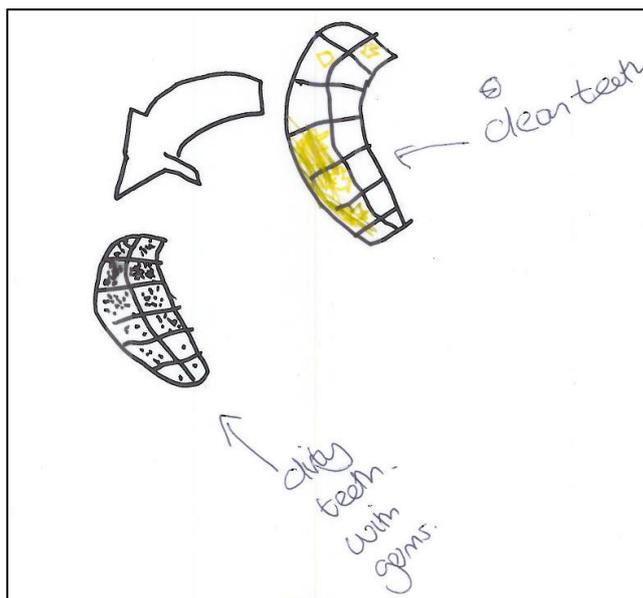
These general findings were reiterated during observations of toothbrushing within one of the schools selected for the evaluation. Moreover, data from the draw and write activities seem to consistently show children smiling and enjoying toothbrushing (see Figure 3).

Figure 3. Smiling while brushing



Parents suggested that as a result of the scheme their children had generally become more knowledgeable about toothbrushing and the consequences of not regularly cleaning their teeth. Some children in the school seemed extremely knowledgeable about toothbrushing. This was shown by one child who in their drawing demonstrated the consequences of not brushing regularly (Figure 4). However, in one of the schools the children seemed to be a lot less knowledgeable about teeth cleaning.

Figure 4. The consequence of not brushing regularly
(Researchers' comments on drawing after talking with the child)



The importance of committed school staff

The toothbrushing scheme was reported, primarily by the oral health co-ordinators, to be contingent on key staff within the schools. The head teacher was seen as being fundamental to enabling the scheme to be implemented; however, a stable and consistent day-to-day contact person within the schools was also regarded as being critical to success, with their commitment, motivation and personality often being key for the scheme to flourish.

The oral health co-ordinators were clear that teachers were not always their contact point and indeed some suggested how teaching support-workers were often in a better position to facilitate the intervention as one continual theme emerging from the evaluation was how busy teaching staff were and how pressurised their role had become:

“When we do the training we ask for someone who will be the lead and that’s not necessarily the teacher, they may have appointed a TA [Teaching Assistant]...some people find that it is an important role they have been given, some people see it as a chore.” (Oral health co-ordinator)

Potential issues in the toothbrushing scheme occurred when there were changes in staffing within the schools – this could often create instability and jeopardise the sustainability of the scheme. This was described by one of the oral health co-ordinators:

“One or two schools have had quite a big change of staff...one school was running really well, but then they had a change in staff, a change in Head, and it became a bit chaotic and we thought we were going to lose the school....after the change in leadership we nearly lost it.” (Oral health co-ordinator)

Data from the oral health co-ordinators indicated that when schools do have a change in personnel, this becomes a potential ‘weak point’ in the intervention delivery. While a change of staff can create new opportunities, it frequently means that the toothbrushing scheme can be dismissed as a ‘non-essential’ part of the school regime. Moreover, where staff in schools feel isolated and unsupported by other teaching staff, this again creates potential for the scheme to be in jeopardy:

“In schools staff change all of the time and quite often that becomes a weak point.” (Oral health co-ordinator)

“For other schools there isn’t really that team approach and they are working as individuals. Some of the teaching assistants are doing it on their own and if they are struggling they feel quite isolated.” (Oral health co-ordinator)

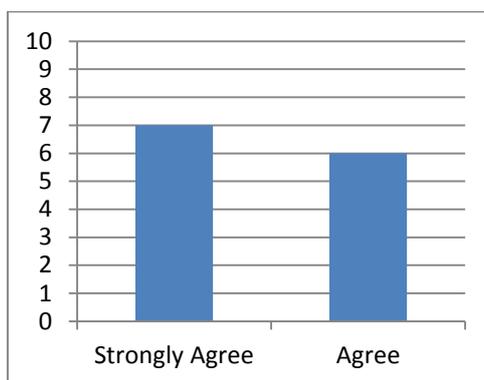
Fulfilling learning objectives and the OFSTED agenda

The survey data shows that the toothbrushing scheme is perceived to contribute to children’s wider education and learning (see Figure 5). Moreover, the school staff that were interviewed claimed that linking the toothbrushing scheme with the broader curriculum was essential if the intervention was to be embedded in the school culture. Those schools that did this effectively, and saw the links between the curriculum and brushing were often reported to be more successful at carrying out the scheme than those schools that did not see the interconnections. The opportunity to link toothbrushing with colour and shape identification, counting etc. was deemed important by school staff, especially in those schools where the intervention had been considered a success. This was reiterated in several of the children’s drawings whereby the colour of the brush was discussed (see Figure 6 as an illustrative example) and by one of the oral health co-ordinators:

“The successful schools integrate the brushing as part of daily activities and link it to colours, counting” (Oral health co-ordinator)

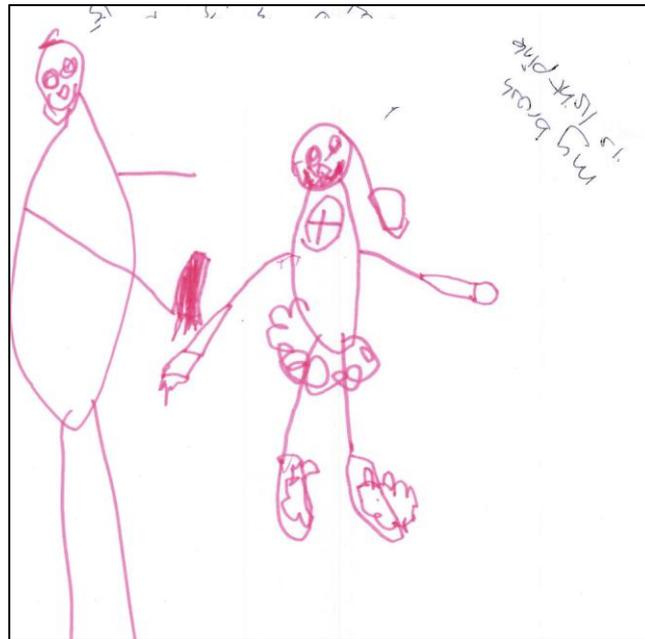
Moreover, school staff suggested that the scheme may encourage independence which was deemed an important developmental stage in the early year child-development. One member of teaching staff also commented that the intervention may influence speech and language development.

Figure 5. The toothbrushing in school scheme contributes to children’s wider education and learning



The opportunity to link the formal school curriculum and the toothbrushing intervention was used as a ‘selling point’ for the oral health co-ordinators in engaging schools in the process. Having explicit recognition by OFSTED for the intervention would significantly help this process, although to date this had not been acquired.

Figure 6. “My brush is light pink”



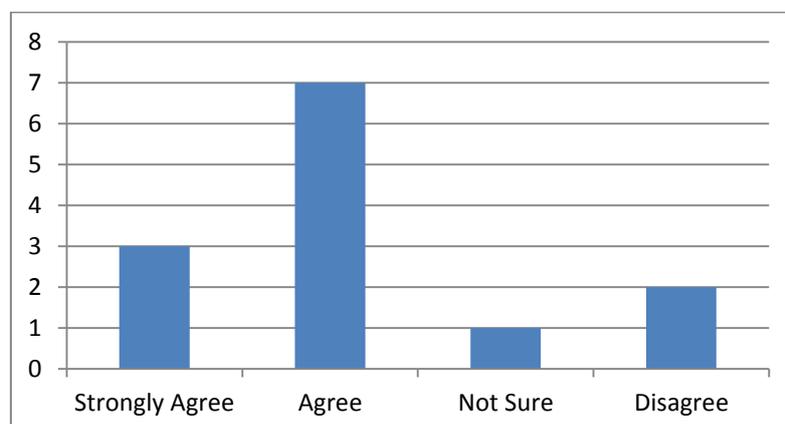
Influencing brushing in the home

Some of the data collected as part of the evaluation points to the positive transfer of toothbrushing in schools to toothbrushing in the home. According to many parents, brushing at home has become easier as a result of the scheme because children are heightened to the importance of regular brushing:

“They don’t make a fuss about brushing at home in the morning. Maybe brushing at school has given them the knowledge about why we brush and maybe everything is linked right from school actually. The morning time fuss or the night time fuss is not there anymore, they know the importance of brushing.” (Parent)

Several of the schools that responded to the survey were less convinced that the toothbrushing scheme was making a difference to behaviour in the home (Figure 7) as three schools either ‘disagreed’ that it made any difference or were ‘not sure’. Arguably, however, school staff are not in the best place to comment on differences to behaviours in the home.

Figure 7. The toothbrushing scheme has the potential to influence children’s brushing in the home



While it was difficult to determine this quantitatively, the qualitative data suggests that there is also a 'ripple effect' whereby children pass on the information gained in school to their siblings and parents. For example, Figure 8 was a drawing by one child who, when explaining it to the researcher, noted how her Father did not brush his teeth properly. This suggests that children are taking the information gained from the school back home. Indeed this kind of scenario was discussed within the one parent focus group:

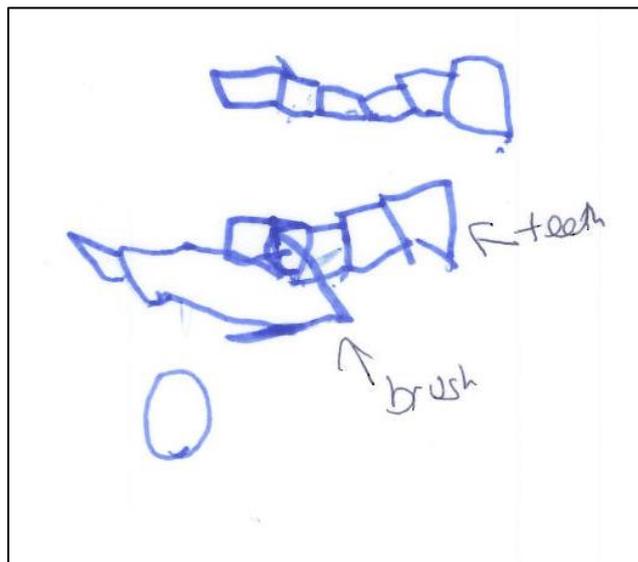
"Actually my son teaches me how to brush , he says no Mum you should not brush like that, you have to brush round and round and you have to brush up and down like that." (Parent)

The oral health co-ordinators also subscribed to the viewpoint that knowledge transfer occurs from the toothbrushing in schools scheme. Two co-ordinators noted:

"The child goes home and sees brushing as a much more important thing, as it's not just Mum or Dad telling them they have to do it. The child quite often goes home and gets their other siblings in the bathroom and says 'right we've got to brush our teeth'."

"We have had reports from parents that there are less problems of brushing at homethey are more willing to do it themselves."

Figure 8. "My daddy brushes wrong"



Links with parents

Parents were fairly unanimous in suggesting that the toothbrushing programme should be continued beyond the 3-5 year age bracket. Some parents clearly wanted to be more involved in the scheme and have more information and several parents suggested that they would appreciate feedback on how well their children were brushing their teeth and regular (weekly) updates on their child's engagement with toothbrushing. According to school staff and the oral health co-ordinators, parents sessions had been previously established within schools, but these had often been poorly attended. Indeed, in some of the schools it was mentioned that engaging with parents could be difficult, not only in relation to toothbrushing but other health and educational matters.

Parents in the focus group discussions suggested how, at times, it was useful that their children were brushing their teeth in the school as there had been occasions where brushing was not done at home prior to arriving at the school. This, however, seems to contradict the

aim of the programme which is to encourage brushing in school *in addition to* (not instead of) brushing at home:

“There was some mornings when my daughter wouldn’t brush her teeth at home ‘cos she was crying, so it’s good to know that she brushes them here [at school]” (Parent)

“It’s alright for the morning rush, I’ll say ‘you haven’t brushed your teeth, you can do it at school.’”

From the open comments on the on-line survey, several schools noted that more oral health information should be provided to parents so that toothbrushing in the school was consolidated at home. Those school staff interviewed also made recommendations about improving parent links. This included inviting parents to stay with their children at the start of the school day while their children were brushing their teeth.

Logistics and delivery

The schools in which case studies had been conducted, noted how supportive the oral health team were at addressing concerns and how efficient they were at providing new supplies. Comments were unanimously positive as illustrated by one member of teaching staff:

“They [the oral health team] are extremely supportive. I mean we have got their emails, we have got their phone numbers, got their mobile phone numbers and we ring up or email them when we need new supplies...they are really doing a really great job.” (School staff)

It seemed that regardless of how well schools were performing in the toothbrushing scheme, the schools were positive about both the communication processes between the school and the oral health co-ordinator (Figure 9) and the training and support provided to schools to deliver the toothbrushing scheme (Figure 10).

Figure 9. I am satisfied with the communication processes between the school and the oral health co-ordinator

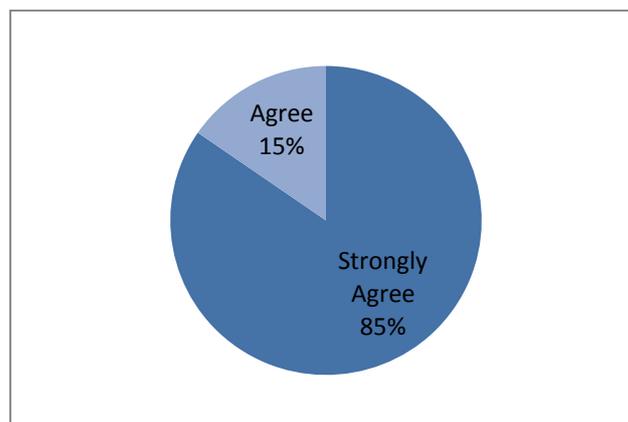
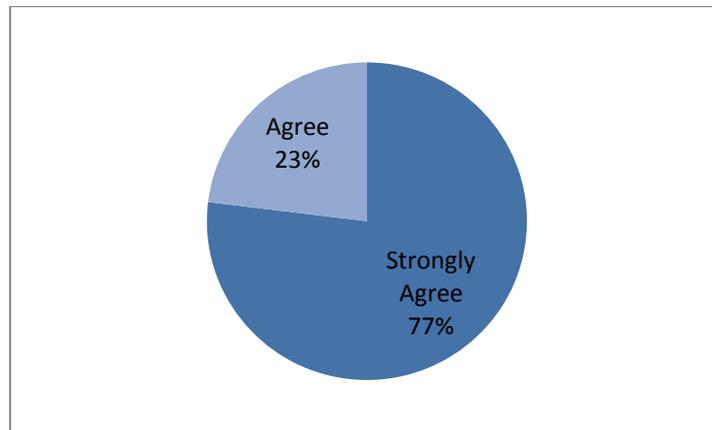


Figure 10. The training and support provided to schools to deliver the toothbrushing scheme is appropriate



Summary of findings

- The toothbrushing programme was most successful when the school philosophy embraced, rather than rejected the notion of improving children's health and social skills alongside educational attainment.
- Children enjoyed participating in the toothbrushing scheme and parents reported how their children enjoyed brushing their teeth and that the toothbrushing in school scheme had raised their children's interests in relation to oral health.
- The head teacher was seen as being fundamental to enabling the scheme to be implemented. However, a stable and consistent day-to-day contact person within the schools was also regarded as being critical to success, with their commitment, motivation and personality often being key for the scheme to flourish.
- The survey data shows that the toothbrushing scheme is perceived to contribute to children's wider education and learning. This was supported by the qualitative data also.
- Some of the data collected as part of the evaluation points to the positive transfer of toothbrushing in schools to toothbrushing in the home. Children also pass on the information gained in school to their siblings and parents.
- The links with parents was variable, but several parents did want to know more about the programme and be provided with regular updates on their child's toothbrushing.
- Across all schools, there was praise for the oral health co-ordinators and the work they do.

4. Discussion

The toothbrushing in schools programme is an intervention designed to respond to the poor dmft scores of children in the Calderdale region (Robertson et al., 2011). It is well-known that encouraging positive toothbrushing patterns in childhood is vital for optimum oral health as these behaviours, once established, can continue into adulthood (Aunger, 2007). Toothbrushing interventions delivered in the school setting remain relatively rare and therefore this evaluation provides learning and recommendations not only for the development of the programme in Calderdale, but also for other oral health programmes delivered nationally.

This programme provides children with supervised brushing and potentially allows skill development that may not be routinely taught or fostered in the home. There was, of course, variance in how well schools were delivering the programme as some schools were able to comfortably manage the practical and logistical issues and others less so. Although the schools can be seen as an artificial setting with which to encourage toothbrushing (Cooper et al., 2011), there was clear evidence of positive health and educational outcomes as a result of the programme. The following discussion intends to highlight learning from the programme and suggest where improvements may be considered.

Organisational components for success

While there is widespread discussion and debate about the role of schools in society (Hubley et al., 2013), the data from this evaluation suggests that one of the critical elements for successful implementation of the toothbrushing in schools programme is when stakeholders (i.e. teachers head teachers and parents) are in agreement that the school's mission concerns more than educational attainment as its primary remit. Where schools, particularly head teachers, recognised the important role they played in developing children's life skills, the toothbrushing intervention seemed to be delivered more enthusiastically and consistently by the school. Where the toothbrushing scheme was less successful, the programme was often dismissed as being a non-essential element of the school curricula and a possible distraction from other activities. In this case, toothbrushing in school either occurred less frequently or not at all.

The importance of school staff in the day-to-day management of the toothbrushing intervention was another critical ingredient in the success (or not) of the programme and should not be understated. Green and Tones (2010) have suggested previously that the commitment of staff is a facilitating factor in the implementation of healthy school initiatives. However, the data collected as part of this evaluation would stress this further as evidence suggests that the individual commitment of staff was *essential* if the toothbrushing scheme was to be delivered as intended. As an example, when committed staff left the school this became a potential 'weak point' in the intervention delivery.

It was apparent from the data that toothbrushing in school relied almost solely on a single individual. We would suggest that wider school engagement is necessary; this includes having more than one member of staff being able to practically deliver the intervention. Without this, the intervention becomes too fragile and the sustainability of the scheme in schools becomes jeopardised. Furthermore, the qualitative data suggests that teachers may not always be the most effective individuals to drive the toothbrushing scheme forward; indeed, it may be that teaching assistants and other support staff may be able to commit more time and resources to the intervention delivery and management. School staff also seemed to work in isolation and were not connected to staff in other schools. Connecting these staff together and forming a peer network may be worthwhile and could allow problems to be shared amongst staff and solutions to be identified. The advice provided by

the network may also be more 'credible' as network members would be able to understand the context and pressures under which schools are asked to operate within.

One clear theme to emerge from the data was the work and dedication of the oral health co-ordinators who were unanimously praised for their commitment and ability to deal with problems that schools faced. Any future roll-out of the programme must ensure that oral health co-ordinators are given the time and space to develop relationships with schools as this seems to be one of the critical ingredients for success.

Children's engagement

Children across the participating schools were engaged in the scheme and enjoyed brushing their teeth within the school environment. Whether brushing occurred daily in schools, or less frequently did not seem to dampen the children's enjoyment. Unlike the findings of previous studies (Gill et al., 2011), several children that participated in the evaluation acknowledged how toothbrushing cleared debris and germs and improved personal appearance. The children were also able to link the consequences of poor oral health to decayed and filled teeth. While this was not universally observed in the children that participated in the evaluation, this confirms evidence that there can be improvements in children's oral health knowledge and awareness as a result of school based interventions (Watt et al., 2001).

In terms of sustaining children's interest in brushing and oral health, some school staff did suggest that the toothbrushing rhyme and resources to encourage brushing could be regularly updated so repetition and monotony for both the children and staff was avoided.

Contribution to OFSTED markers

The evidence firmly suggests that the toothbrushing scheme does contribute to children's education and learning. Survey data suggests that schools 'agree' or 'strongly agree' that the scheme contributes to children's wider education and learning. Those schools that were delivering the scheme effectively embraced the opportunity to link together the practice of toothbrushing with developing children's counting skills, colour and shape identification. In developing the scheme further, it may be prudent to monitor not only health outcomes in children but also educational outcomes. While this may be potentially complex and could include quasi-experimental designs, demonstrating impact on this level may potentially show how the toothbrushing in schools scheme benefits 'core business objectives' of the setting. By doing this, it would encourage greater institutional 'buy-in' and commitment of schools.

Influencing toothbrushing in the home

There is a growing evidence base that suggests that oral health interventions delivered in schools increase children's knowledge, but that it may not have any long-term impact on behavioural change (Watt et al., 2001). Cooper et al. (2011), for example, note that in spite of the increased number of school-based oral health programmes in recent years, the majority have not produced sustained behavioural change. Moreover, brushing teeth at school can result in a significant increase in frequency of toothbrushing, but these effects are not maintained at one-year follow-up (Wind et al., 2005).

This evaluation was unable to provide any longitudinal follow-up on toothbrushing in the home; however, data does suggest that children's toothbrushing behaviour in the home is positively influenced by toothbrushing in school. There was also evidence to suggest that children act as 'change agents' as it was reported that they frequently passed on the information gained in school to their siblings and parents. Indeed, the evaluation supports the work of Christensen (2004) who has advanced the notion of the child as a health-promoting actor in the family context.

An integral part of the health-promoting school approach is the development of sound links and partnerships with parents (Denman, 1998). One issue which may require further attention in the toothbrushing programme is the importance of forging partnerships with parents so that oral health messages that are provided in the school setting are reinforced in the home. It was apparent that links had been formed with some parents in some of the schools, but this was not consistently the case across the participating schools in Calderdale. In some instances, parents had clearly wanted to be more involved in the toothbrushing scheme, but often did not know how to go about this. Reinforcing toothbrushing practices in the school, the home and other settings in which children engage with is essential to tackle the inequalities in oral health. Indeed, by focussing on school settings in isolation from the wider context of health inequalities, there is a potential danger that the approach fosters “*insularity and fragmentation*” (Dooris, 2006, p.5). A practical recommendation to begin this dialogue may be to develop parental self-efficacy around supporting children to brush their teeth (Cooper et al., 2011).

Monitoring, evaluation and performance indicators to demonstrate effectiveness

This evaluation, coupled with other internal evaluation already conducted, has attempted to capture good practice and suggest issues for further consideration to develop the service. This information provides an evidence base that can inform future implementation and feasibility of rolling out the programme.

Further evaluation is required to validate the findings presented in this report. Based on the data collected as part of this evaluation, the following gaps in knowledge still remain:

- Research should explore the longer-term effects of the toothbrushing in schools scheme in Calderdale to ascertain changes in toothbrushing practices. The wider evidence base on oral health promotion schemes in schools suggests that behavioural outcomes may not be sustained after the intervention.
- Closer examination of the impact on the toothbrushing programme on educational outcomes is required.
- An experimental study should be designed to measure the effects of toothbrushing in school and the effects on dmft. This study would need to carefully control external variables so that any changes in oral health status can be attributable to the toothbrushing programme.
- There remains a research gap in relation to the health and social cost-benefits of the programme. In order to address this, a cost-effectiveness study of the toothbrushing in schools scheme in Calderdale is required.

Despite these research gaps, annual performance indicators could be routinely monitored as these may act as proxy indicators of the effectiveness and success of the intervention.

Based on the data collected here, possible performance indicators include:

- Measuring the attrition rates of schools engaged in the toothbrushing programme;
- Assessing changes in dental health service utilisation within the region;
- Measuring school satisfaction with the programme (including initial training);
- Ascertaining levels of parental engagement with the toothbrushing scheme (assessed, for example, through a survey);
- Monitoring the amount of resources provided to schools (toothpaste, brushes etc.)

5. Conclusions and recommendations

The toothbrushing in schools scheme in Calderdale reinforces and supports the development of a key health skill that may not be routinely taught in the home. Although the school could be perceived as an 'artificial' setting for toothbrushing, the evidence from this evaluation suggests that children are fully engaged in the programme, have an awareness of oral health issues and that this influences their own and others' behaviour in the home. These outcomes, however, do seem to vary from school-to-school based on the school's commitment to the programme and the availability of committed staff to drive the intervention forward.

While it is difficult from this evaluation design to suggest the longer-term impact on oral health inequalities in the region, evidence from Scotland shows that the introduction and uptake of a similar toothbrushing program contributed positively to the dental health of children and reduced dental health inequalities (Macpherson et al., 2013).

The evaluation evidence suggests that the service is making a difference to the oral health of children in the Calderdale region, but needs to be considered as part of a wider work programme aimed at tackling inequalities in health.

In developing the programme further, the following issues should be considered:

- Parents need to be much more involved in the delivery and 'mechanics' of the toothbrushing programme. This could include regular information being sent to parents or by providing training in supporting children to brush their teeth. This will ensure that learning and practices developed in school around oral health care are supported and replicated at home.
- The feasibility of using successful schools as 'champions' to encourage other schools to participate in toothbrushing scheme should be considered. Sharing the school philosophy and the logistical realities of the programme may be convincing in recruiting further schools or in maintaining schools that are struggling to implement.
- Providing local data on children's dmft scores was a powerful catalyst for some schools to take action. Where available, this data should be shared regularly with head teachers and parents to encourage regular brushing routines.
- A network (physical or virtual) should be developed whereby issues and problems about the toothbrushing scheme can be shared amongst school staff and solutions identified. This should not replace the support provided by the oral health co-ordinators. However, the advice provided by the network may be more 'credible' as network members would be able to understand the context and pressures under which schools are asked to operate within.
- Consideration should be given to extending the scheme in participating schools beyond the current 3-5 year old age bracket.
- Resources to encourage brushing in school (i.e. rhymes and songs) should be updated to avoid boredom for the teachers and children.
- There should be more than one member of staff in each school that is able to manage and deliver the toothbrushing programme. This will provide some 'insurance' for the programme, especially if key staff leave the school.

- The toothbrushing team should continue to make links and partnerships with other agencies to strengthen the combined effort to tackle health inequalities. As an example, the oral health team should be regularly liaising with nutrition and dietary leads for Calderdale.
- Further research is required to establish the longer-term impacts of the toothbrushing in schools scheme and to determine the impact on other indicators, like educational attainment and speech and language development.

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