Measuring dental anxiety in children with complex and additional support needs using the Modified Child Dental Anxiety Scale (faces) (MCDASf)

S Turner[1], S A Chambers[2] and R Freeman[3]

[1]Senior Research Fellow; [2]Research Fellow; [3]Professor of Dental Public Health Research: Dental Health Services and Research Unit, University of Dundee

Abstract

Aim and objectives: A Dental Playbox has been developed to reduce dental anxiety among children with complex and additional support needs. The aim of this paper was to examine the level of agreement between parents and children in relation to dental anxiety using the Modified Child Dental Anxiety Scale (faces) (MCDASf) and a parental proxy (CFSS-DS), and to assess whether agreement levels were influenced by exposure to the Dental Playbox materials.

Methodology: Children were selected as part of a post-intervention evaluation study. Teachers identified children similar in age and ability level, who had and had not taken part in the intervention. Questionnaires were sent to parents (n=220), and with their consent, questionnaires were also administered to their children as a classroom exercise (n=47). In total, 47 parent-child dyads were available for analysis. The questionnaires included measures of child dental anxiety, experience of invasive and non-invasive dental procedures, anxiety level at the child's last dental visit, and child's age.

Results: Mean scores on parent and child measures of child dental anxiety were not significantly different. This also applied to those exposed to the intervention and those who were not, with the exception of items relating to non-invasive procedures. Correlations between child and parent scores were approximately r=0.3, with agreement stronger among families of intervention children.

Conclusions: Reliable measurement of dental anxiety can be obtained from children with complex and additional support needs, using appropriate scales, particularly when families have been involved in programmes to reduce anxiety. The potential to use these scales in clinical settings must now be investigated.

Key words: *Complex and additional support needs, dental anxiety, intervention, measurement, children*

Refereed paper
Received - 22 August 2011. Accepted - 12 January 2012.
DOI: 10.4483/JDOH_001Turner08

Introduction

Epidemiological and research evidence suggests that children with complex and additional support needs have poorer oral health than other children (Desai *et al*., 2001). They experience less preventive care and restorative treatment but more extractions than children in the general population (Gizani *et al*., 1997; Desai *et al*. 2001; Mitsea *et al.*, 2001; Bradley and McAlister, 2004; de Jongh *et al*., 2008). This higher rate of extractions implies greater risk from the administration of general anaesthetic, as well as causing distress and dental anxiety (Carson and Freeman, 2003). Reasons put forward for this different pattern of oral care include:

- Children being unable to take care of their teeth
- Children refusing to cooperate with carers with tasks such as tooth brushing
- Children experiencing communication difficulties
- Lack of experience amongst dentists in treating children with complex and additional support needs
- Many children with complex and additional support needs experiencing dental anxiety which makes dental care difficult to carry out. (Nunn *et al*., 1993; Russell and Kinirons, 1993; Gordon *et al*., 1998; Connick and Barsley, 1999; de Jongh *et al*., 2008).

While it is known that preparedness for dental treatment will reduce dental anxiety (Carson and Freeman, 1998;

Dailey *et al*., 2002; Humphris and Hull, 2007), little work has been conducted to examine the extent of the dental fear experienced by children with additional support needs. Devising a means by which dental anxiety can be assessed might be a first step in developing behavioural management protocols to reduce fear and increase acceptance for dental care. Previous writers have criticised researchers for failing to actively involve both children (Beresford, 1997; Marshman *et al*., 2007), and those with learning disabilities (Whelan *et al*., 2010), in oral health research. Lack of involvement in research studies is particularly acute for children with complex and additional support needs. Nevertheless, communication and literacy problems may make it difficult to obtain evidence of dental anxiety directly from children (Rabiee *et al*., 2005).

A measure of dental anxiety for individuals with complex and additional support needs is needed to investigate the potential of including children within research. When children are unable to complete paper or interview based measures themselves, a reliable parental proxy is the next best thing. This paper reports on the parallel use of a child-completed measure and a parental proxy amongst children with additional educational support needs. The children in the study were asked to complete the Modified Child Dental Anxiety Scale (faces) (MCDASf), which has been shown to be a reliable and valid indicator of child dental anxiety among children with no additional support needs (Howard and Freeman, 2007). A parent (usually the mother) was asked to complete the Child Fear Survey Schedule - Dental Subscale (CFSS-DS) (Klingberg, 1994) which has been reported to be a reliable and valid parental proxy for child dental anxiety (Klingberg, 1994). Comparisons were made of anxiety measures between children and parents who did and did not take part in an intervention to reduce child dental anxiety.

The Special Smiles Dental Project

The data on dental anxiety were collected from schoolchildren and parents as part of a wider evaluation of a school-based intervention conducted by Action for Sick Children (Scotland) (ASC(S)), a voluntary organisation working for improvements in the standard of paediatric healthcare provided in hospital and community settings. One popular and well-established ASC(S) initiative is the Hospital Playbox, an awareness-raising and play-based preparation tool for use in school, community and home settings with young children about to go into hospital. Building on this experience, ASC(S) then developed the Dental Playbox, which contains dressing-up clothes (e.g. dentist and dental nurse uniforms), dental equipment (e.g. mouth mirrors, dental bibs), DVDs and story books to inform the child and parent about going to the dentist, puppets with teeth to practise tooth brushing and oil of cloves to recreate the environment of the dental surgery.

The Dental Playbox Programme had three distinct aims, to:

1. Reduce anxiety about dental treatment
2. Promote oral health
3. Encourage children to go to the dentist.

Both the Hospital Playbox and the Dental Playbox were developed for children in mainstream schooling. In 2006, ASC(S) began to investigate the oral health needs of children requiring additional support, and to develop a dedicated dental resource. As a result of this work, the need for both an adapted Dental Playbox for school use and a portable Dental Playpack for home use was identified. ASC(S) secured funding for *The Special Smiles Dental Project*, which introduced the Dental Playbox and Playpack into 29 schools for children with complex and additional support needs in East Scotland. Training in the use of the materials was provided for teachers and parents. In August 2009, ASC(S) commissioned the Dental Health Services & Research Unit, University of Dundee to evaluate *The Special Smiles Dental Project* in terms of improved oral health understanding, oral health practices and lower dental anxiety in children and young people with complex and additional support needs (Chambers *et al*., 2010).

The aim of this paper is to examine the level of agreement between parents and children in the measures of dental anxiety used in the study, and to assess whether exposure to *The Special Smiles Dental Project* influenced the level of agreement. This information will inform the development of a valid and reliable means of assessing dental anxiety for children and young people with complex and additional support needs.

Material and method

The study adopted a child-centred approach, and as far as possible attempted to collect data from children in participating schools. Given the wide age and ability range of the children in the Project schools, the evaluation administered questionnaires to both children and young people, and to their parents, in order to obtain measures of dental anxiety, oral health practice and knowledge.

Sample

ASC(S) identified those schools which had used the dental play resources in the classroom setting. Following agreement of the relevant Education Departments, the research team approached nine of these 29 schools, selected to represent a range of children of different ages and educational support needs. The schools sampled included specialist primary and secondary schools, sensory services as well as specialist provision for children with complex and additional support needs in mainstream schools. This range of school participation ensured that children with varying degrees of intellectual impairment were invited to take part with their parents. Participating schools were asked

to identify parents of children who had used the dental play resources and children of comparable age and ability who had not. This second group acted as a control group.

Measures

The child's questionnaire included the Modified Child Dental Anxiety Scale (faces) (MCDASf) (Howard and Freeman, 2007). Using simple language, the scale covers eight items ranging from attendance at the dentist to extractions and general anaesthetic. For full question wording and formatting for the original MCDASf see Howard and Freeman (2007). Teachers in the participating schools felt that many of the children would have difficulties with the original MCDASf five-faces scale (not worried=1; very slightly worried=2; fairly worried=3; worried a lot=4; very worried=5). A three-faces scale was used, with equivalent scoring (not worried=1; fairly worried=3; very worried=5) (see *Table 1*). Thus the range of scores was 8 to 40. The three-faces scale was also used to measure reported anxiety at the most recent dental visit. In addition, the questionnaire included a measure of oral health knowledge and practice (not included in this paper).

The parent's questionnaire included the Child Fear Survey Schedule - Dental Subscale (CFSS-DS) (Klingberg, 1994), which covers similar items to the MCDASf but with slightly different wording. Parents were also asked to rate child anxiety at the last visit to the dentist. Child oral health practice, oral health understanding, and experience of dental treatment were also covered. Other questions referred to parental knowledge, parental dental anxiety and awareness of school activities to promote good child oral health.

Administration of questionnaires

Participating schools distributed an information letter, consent form and parent's questionnaire to parents of children in the relevant classes. Once parental questionnaires had been returned, teachers administered the children's questionnaire as a class exercise at school. School staff felt children would be more relaxed and cooperative if the questionnaire was introduced by a familiar figure. The questionnaire was administered and distributed to all children in the classroom setting by their school teachers and classroom assistants. The teachers and assistants provided support with reading and/or understanding of the questions but did not influence the children's answers. The child's questionnaire included an explanation of the study and its voluntary nature, and asked for child consent to be indicated. The study was approved by the University of Dundee Ethics Committee (ref: 9061).

Statistical analysis

For both parent and child dental anxiety measures, the mean of all completed ratings were used to compute the overall dental anxiety scores. Reliability analysis was conducted on each scale. Agreement between parent and child scores was investigated in terms of the strength of correlation (Pearson r); and of significant differences between these two scores, measured by t-tests. In view of the aim of the ASC(S) initiative to involve parents, as well as children and teachers, we also examined whether the two dental anxiety scores were in closer agreement (ie stronger correlation and closer scores) for children who had been exposed to the dental play resources (the intervention group).

Finally, we investigated whether the level of parent-child agreement in anxiety scores might be predicted by certain variables. A multiple regression analysis, using difference in anxiety scores (squared to remove negative scores) as the dependent variable, tested the following variables as potential predictors: child's age, child's reported level of dental anxiety, experience of invasive dental treatment, and intervention (scored 1) or control (scored 0) group membership. Variables were entered stepwise.

Results

The nine participating schools distributed questionnaires to 220 parents. A total of 88 parents (40%), and 47 (53%) of their children completed the questionnaires at school, giving 47 parent-child dyads. No systematic analysis of response bias was possible, although response tended to be lower in urban schools in socially deprived areas. The 47 children included 33 boys and 14 girls attending six schools; five primary schools and one combined primary and secondary school. Their mean age was 9.65 years with a range of 5 to 17 years.

Table 1 shows the distribution of scores on the MCDASf items for the 47 children. The original order of the questions has been changed to rank the items by increasing anxiety. Those shown in bold have an equivalent in the parents' questionnaire. As expected, anxiety scores for non-invasive situations tended to be lower than those involving anaesthesia or surgery. Reliability analysis of the eight scale items indicated reliability was good (α=0.85, n=36). Careful examination of the individual dental anxiety items showed that there was close absolute agreement between the children's mean scores and the normative values (*Table1*).

Table 2 shows CFSS-DS scores obtained from parents. The distribution of scores has been collapsed into three categories to facilitate comparison with child scores (*Table 2*). As with the children, there is a clear difference in parental mean scores between non-invasive situations (the first 5), and those involving anaesthesia or surgery (the second 5). Reliability analysis gave an alpha of 0.94 (n=43).

Comparison of child and parent scores

Figure 1 shows the distribution of scores across the three

Table 1. Child dental anxiety: child report (MCDASf) (mean scores, frequencies and percentages)

How do you feel about ..	Mean (s.d.)	Normative means (s.d.)[1]	Not worried (score: 1) 	Fairly worried (score: 3) 	Very worried (score: 5) 
having your teeth looked at? (n:44)	1.73 (1.30)	1.66 (0.77)	32 72.7%	8 18.2%	4 9.1%
going to the dentists generally? (n:45)	1.80 (1.24)	1.68 (0.93)	30 66.7%	12 26.7%	3 6.7%
having your teeth scraped and polished? (n:41)	2.32 (1.65)	2.44 (1.15)	23 56.1%	9 22.0%	9 22.0%
having a mixture of 'gas and air' which will help you feel comfortable for treatment but cannot put you to sleep? (n:37)	2.57 (1.77)	2.39 (1.48)	19 51.4%	7 18.9%	11 29.7%
having a filling? (n: 43)	2.44 (1.65)	2.41 (1.32)	22 51.2%	11 25.6%	10 23.3%
being put to sleep to have treatment? (n: 38)	2.63 (1.67)	2.64 (1.54)	17 44.2%	11 28.9%	10 26.3%
having a tooth taken out? (n:39)	3.15 (1.74)	3.37 (1.48)	13 33.3%	10 25.6%	16 41.0%
having an injection in the gum? (n:41)	3.24 (1.80)	3.42 (1.43)	14 34.1%	8 19.5%	19 46.3%

[1] From Howard & Freeman 2007

response categories for the six items common to both child and parental proxy scales.

No significant differences were shown between parental proxy (CFSS-DS) mean scores and the child dental anxiety (MCDASf) mean scores for overall dental anxiety scores, non-invasive items, for invasive items, or for dental anxiety at child's last dental visit (*Table 3*).

Significant correlations between parental and child dental anxiety scores were shown for the overall dental anxiety score ($rp=0.29$, $p<0.05$), non-invasive dental treatments ($rp=0.33$, $p=0.03$) and dental anxiety at last dental visit ($rp=0.34$, $p<0.02$). No significant differences in mean scores were found (*Table 3*).

Table 4 shows the same analyses separately for parental-child dyads who had taken part in the Dental Playbox Programme (intervention) and those who had not (control). There was a significant difference in mean scores relating to non-invasive items in the intervention group ($t=2.10$, $p=0.05$), with children tending to report higher anxiety than parents. In the intervention group, parent-child score correlations for all dental items were highly significant and positive. Parent-child correlations amongst control group families, while not significant, tended to be negative.

Multiple regression analysis was conducted, with difference in anxiety scores (squared to remove negative scores) as the dependent variable, and child age, child dental anxiety score, experience of invasive dental treatment and intervention or control group membership as co-variates. The only co-variate to enter the equation was intervention group membership: parent-child agreement was higher (i.e. difference scores were lower) in the intervention group ($F(1,43)=25.17$, $p=0.001$). Adjusted $R2=0.36$, indicating intervention group membership accounted for 36% of the variance in dental anxiety difference scores. No other variables were close to significance.

Table 2. Child dental anxiety: parental proxy measure (CFSS-DS) (mean scores, frequencies and percentages)

How afraid is your child of:	Mean (s.d.)	Not/A little afraid	A fair amount	Pretty much/Very afraid
having to open their mouth? (n: 37)	1.81 (1.10)	27 73.0%	7 18.9%	3 8.1%
having their teeth cleaned? (n: 47)	1.84 (1.38)	35 74.5%	5 10.6%	7 14.9%
dentists? (n: 47)	1.89 (1.11)	36 76.6%	5 10.6%	6 12.8%
having somebody examine their mouth? (n: 47)	1.91 (1.11)	35 74.5%	7 14.9%	5 10.6%
people in white uniforms? (n: 36)	1.97 (1.23)	25 68.4%	5 13.9%	7 19.4%
choking? (n: 31)	3.03 (1.56)	12 38.7%	6 19.4%	13 31.9%
the dentist drilling? (n: 35)	3.31 (1.61)	13 37.1%	4 11.4%	18 51.4%
going to sleep at the dentists? (n: 34)	3.38 (1.34)	11 32.4%	4 11.8%	19 55.9%
injections? (n: 41)	3.41 (1.55)	13 31.7%	7 11.8%	21 51.2%
having teeth out? (n: 36)	3.67 (1.67)	11 30.6%	3 19.4%	22 61.1%

Figure 1. Child and parental proxy dental anxiety scores

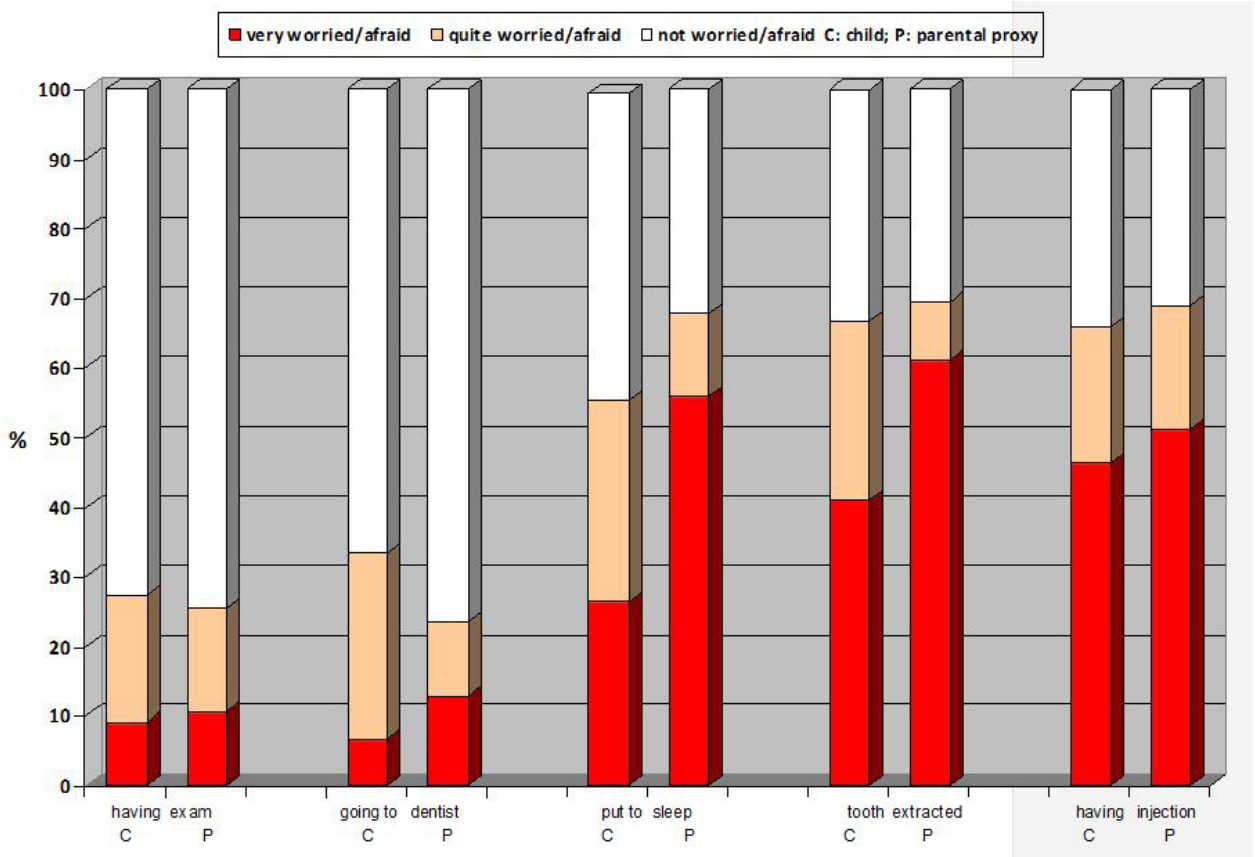

Table 3. Child dental anxiety scores: child and parent proxy scores (independent t tests and Pearson correlations).

	Mean (s.d.)	*t*	r_p
1. overall dental anxiety score (n=45)			
Child (MCDASf)	2.51 (1.20)	0.97	0.29*
Parental proxy (CFSS-DS)	2.31 (1.09)		
2. non-invasive items (n=45)			
Child (MCDASf)	2.02 (1.19)	1.68	0.33*
Parental proxy (CFSS-DS)	1.71 (0.86)		
3. invasive/anaesthetic items (n=39)			
Child (MCDASf)	2.73 (1.43)	-1.08	0.22
Parental proxy (CFSS-DS)	3.03 (1.34)		
4. dental anxiety at last dental visit (n=46)			
Child (MCDASf)	2.17 (1.55)	0.71	0.34*
Parental proxy (CFSS-DS)	2.00 (1.33)		

*$p<0.05$

Discussion

This paper examined the level of agreement between parents of children with additional educational support needs and those children using two measures of dental anxiety. There are increased calls to involve participants more fully in oral health research, in particular, those with complex and additional support needs, and children (Marshman *et al.*, 2007; Whelan *et al.*, 2010).

The results showed that there was no evidence in this sample that mean scores on the two measures were significantly different depending on whether parents or children were the respondents. This applies to those exposed to the intervention and those who were not, with the exception of items relating to non-invasive procedures. For these items children in the intervention group reported significantly higher levels of dental anxiety than did their parents. While correlations between child and parent scores were modest at approximately r=0.3 across the 47 families, agreement was much stronger among families where the child had used the dental play resources. This strong association, which held across all ages for the children exposed to the intervention, may be an indication that the project was successful in raising awareness of oral health and anxiety among parents. Although there was no sign that it had resulted in lower dental anxiety compared to the control children, it did appear to have raised agreement. Such conclusions are weakened, however, by the lack of baseline measures in the study, a result of the post-hoc commissioning of the project evaluation.

This study was small scale, and in attempting to collect data from children with significant educational support needs, necessarily relied on the cooperation of teachers and other school staff in distributing and administering questionnaires. Due to classroom constraints, no research staff were present when children completed the questionnaires in class. This restricted the control of its quality and uniformity of completion. There was also a tendency for scale items relating to treatments and situations that had not been experienced (e.g. extractions, general anaesthetic, choking) to be left blank by parents, but not by children. Some parents of more severely disabled children reported that their child did not display anxiety due to a lack of understanding and/or communication skills, which prevented them from anticipating planned treatment. These issues may have implications for the validity of the measures.

Table 4. Child anxiety scores and parent proxy scores by intervention group (independent t tests and Pearson correlations).

		Mean (s.d.)	*t*	r_p
1. overall dental anxiety score				
Intervention group (n=31)	Child (MCDASf)	2.55 (1.15)		
	Parental proxy (CFSS-DS)	2.37 (1.06)	1.03	0.63**
Control group (n=14)	Child (MCDASf)	2.40 (1.05)		
	Parental proxy (CFSS-DS)	2.38 (1.05)	0.45	-0.32 (*0.26*)
2. non-invasive items only				
Intervention group (n=31)	Child (MCDASf)	2.11 (1.23)		
	Parental proxy (CFSS-DS)	1.74 (1.87)	2.10*	0.63**
Control group (n=14)	Child	2.03 (1.09)		
	Parental proxy (CFSS-DS)	1.71 (0.77)	0.40	-0.46 (*0.10*)
3. invasive/anaesthetic items only				
Intervention group (n=31)	Child (MCDASf)	2.74 (1.25)		
	Parental proxy (CFSS-DS)	3.05 (1.28)	-1.30	0.54**
Control group (n=14)	Child (MCDASf)	2.62 (1.28)	-0.39	-0.21
	Parental proxy (CFSS-DS)	3.28 (1.31)		
4. dental anxiety at last dental visit				
Intervention group (n=31)	Child (MCDASf)	2.31 (1.65)		
	Parental proxy (CFSS-DS)	2.06 (1.43)	0.91	0.51**
Control group (n=14)	Child (MCDASf)	1.74 (1.20)		
	Parental proxy (CFSS-DS)	1.68 (0.82)	0.00	-0.34

*p<0.05

**0.001>p<0.01

It is acknowledged therefore that the measure may not be suitable for children with severe learning disabilities and further work should be conducted to examine the usefulness of the MCDASf for children with severe learning disabilities.

Conclusion

The study suggests that many children with complex and additional support needs can communicate their dental anxiety using a simplified questionnaire format administered in a familiar classroom setting. The correspondence of children's reported anxiety and the parental proxy is confirmed for families where oral health has been highlighted by school activities. More work is needed to determine whether these measures can be incorporated into the clinical setting to ensure that children with complex and additional support needs receive necessary treatment in a sensitive and appropriate way.

Acknowledgements
We would like to acknowledge the funding from Action for Sick Children (Scotland) for the evaluation of the *Special Smiles Dental Project*. In addition, we acknowledge the cooperation of school staff, teachers, parents and their children, without whom this work would not have been possible.

References

Beresford, B. *Personal Accounts: Involving Disabled Children in Research.* London: The Stationary Office, 1997.
Bradley C, McAlister T. The oral health of children with Down syndrome in Ireland. *Special Care Dentistry* 2004; **24:** 55-60.
Carson P, Freeman R. Tell-show-do: reducing anticipatory anxiety in emergency paediatric dental patients. *Int J Health Promotion Educ* 1998; **36:** 87-90.
Carson P, Freeman R. Assessing dental anxiety: the validity of clinical observations. *Int J Paed Dent* 2003 **7:** 171-176.
Chambers SA, Turner S, Freeman R. Special Smiles Dental Project Evaluation Report. University of Dundee, 2010.
Connick CM, Barsley RE. Dental neglect: Definition and prevention in the Louisiana developmental centers for patients with MRDD. *Special Care Dent* 1999; **19:** 123-127.
Dailey YM, Humphris GM, Lennon MA. Reducing patients' state anxiety in general dental practice: a randomized controlled trial. *J Dent Res* 2002; **81:** 319-322.
de Jongh A, van Houtem C, van der Schoof M, Resida G, Broers D. Oral health status, treatment needs, and obstacles to dental care among noninstitutionalized children with severe mental disabilities in The Netherlands. *Special Care Dent* 2008; **28:** 111-115.
Desai M, Messer LB, Calache H. A study of the dental treatment needs of children with disabilities in Melbourne, Australia. *Australian Dent J* 2001; **46:** 41-50.
Gordon SM, Dionne RA, Snyder J. Dental fear and anxiety as a barrier to accessing oral health care among patients with special health care needs. *Special Care Dent* 1998 **18:** 88-92.
Gizani S, Declerck D, Vinckier F, Martens L, Marks L, Coffin G. Oral health condition of 12 year-old handicapped children in Flanders (Belgium). *Community Dent Oral Epidemiol* 1997; **25:** 352-357.
Howard KE, Freeman R. Reliability and validity of a faces version of the Modified Child Dental Anxiety Scale. *Int J Paediatric Dent* 2007; **17:** 281-288.
Humphris GM, Hull P. Do dental anxiety questionnaires raise anxiety in dentally anxious adult patients? A two-wave panel study. *Primary Dent Care* 2007 **14:** 7-11.
Klingberg G. Reliability and validity of the Swedish version of the Dental Subscale of the Children's Fear Survey Schedule, CFSS-DS. *Acta Odont Scand* 1994; **52:** 255-256.
Marshman Z, Gibson BJ, Owens J, Rodd HD, Mazey H, Baker SR, Benson PE, Robinson PG. Seen but not heard. A systematic review of the place of the child in 21st century dental research. *Int J Paediatric Dent* 2007; **17:** 320-327.
Mitsea AG, Karidis AG, Donta-Bakoyianni C, Spyropoulos ND. Oral health status in Greek children and teenagers, with disabilities. *J Clin Pediatric Dent* 2001; **26:** 111-118.
Nunn JH, Gordon PH, Carmichael CL. Dental disease and current treatment needs in a group of physically handicapped children. *Community Dent Health* 1993; **10:** 389-396.
Rabiee P, Sloper P, Beresford B. Doing research with children and young people who do not use speech for communication. *Children & Society* 2005; **19:** 385-396.
Russell G, Kinirons MJ. Barriers to dental care in cerebral palsy patients. *Community Dent Health* 1993; **10:** 57-64.
Whelan J, Newton JT, Dunne, S, Gilbert D. Dental health research (1997-2007) concerning people with learning disabilities: a systematic review addressing the extent to which they are involved in research. *J Disabil Oral Health* 2010; **11:** 91-96.

Address for correspondence:
S A Chambers
The Mackenzie Building
Kirsty Semple Way, Dundee, DD2 4BF
Email: s.a.chambers@dundee.ac.uk