

Oral health status of non-phobic and dentally phobic individuals; a secondary analysis of the 2009 Adult Dental Health Survey

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IN BRIEF

- Highlights that dentate people with dental phobia have higher levels of active caries, higher PUFA scores and report poorer oral health-related quality of life in comparison to non-phobic adults.
- Reports that there were no differences in the number of sound and missing teeth and sugar intake.

Introduction The aim of this study was to conduct an exploration of differences in oral health behaviour and outcome between dentally phobic and non-phobic participants in the UK Adult Dental Health Survey (ADHS, 2009). The null hypotheses for this study were that there are no differences in oral health status of non-phobic and dental phobic individuals. **Methods** The ADHS survey covered the adult population in England, Wales and Northern Ireland and was commissioned by the NHS Information Centre for Health and Social Care (NHS IC). Dental anxiety was defined using the Modified Dental Anxiety (MDAS) with the cut-off point set at 19 and above as indicating dental phobia. Descriptive statistics were calculated and the chi-square test was used to compare both groups in terms of their demographics, oral health, oral health-related behaviour and attitudes, and treatment. **Results** More women (16.8% [1,023]) than men (7% [344]) reported dental phobia. Generally, people with dental phobia were in routine occupations (648 [47.7%]), single (402 [29.4%]) and with lower educational attainment (858 [80.9%]). They were irregular attendees (798 [58.5%]), had a less restored dentition, increased numbers of one or more teeth with caries (292 [39.9%]), and were more likely to have PUFA (puss, ulceration, fistulae, abscess) scores of one or more (89 [12.2%]) in comparison to the non-phobic group (314 [5.6%]). However, people with and without dental phobia had similar numbers of sound and missing teeth (34.5% of the phobic group had 20 or more sound teeth in comparison to 31.7% of the non-phobic group). There were significant differences ($p < 0.001$) between the phobic group's and non-phobic group's Oral Health Impact Profile-14 (OHIP) and Oral Impacts on Daily Performance (OIDP) scores with phobic participants having generally higher scores. Additionally, the phobic group responded negatively more commonly about their most recent dental treatment in terms of dentists' ability to listen to their concerns, explaining the reasons for their dental care while paying full attention to their needs by treating them with respect and dignity. The difference between the two groups was statistically significant ($p < 0.001$). **Conclusions** Participants reporting dental phobia are mostly females, irregular attendees and have a greater treatment need with increased caries levels.

INTRODUCTION

The incidence and prevalence of dental phobia in the general population has been constant over the past decade. Its prevalence varies from 5% to 21% of the population depending on how dental phobia has been defined and measured.¹⁻³ Dental anxiety has for the first time been measured/recorded in the latest Adult Dental Health Survey (ADHS, 2009).⁴ The 2009 ADHS is the fifth in a series of

national dental surveys that has been carried out every ten years in the United Kingdom since 1968. According to the 2009 ADHS, 11.6% of the adult population in England, Wales and Northern Ireland have dental phobia as measured using the Modified Dental Anxiety (MDAS) (cut-off score = 19), similar to other studies.⁵⁻⁷ Humphris *et al.* validated the use of this cut off score.⁸

Locker and Allen⁹ defined oral health-related quality of life (OH-QoL) as 'the impact of oral disorders on aspects of everyday life that are important to patients and persons with those impact being of sufficient magnitude, whether in terms of severity, frequency or duration, to affect an individuals' perception of their life overall'. This study was interested in identifying how dental phobia affects QoL; to date small scale studies have suggested poorer OH-QoL in this group of people.^{10,11}

Dental phobia may have its onset in childhood and decrease later in life with people 55 years or older showing lower levels of

anxiety. Individuals with high levels of dental anxiety tend to attend for only occasional 'check-ups' or only when they suffer acutely from dental pain.¹² Therefore, dentate people with dental phobia may present with poorer oral health, reporting frequent episodes of toothache within the last year as a result of irregular attendance.³ People from lower social classes tend not to attend the dentist on a regular basis.¹³ This might have an effect on their wellbeing and their quality of life (QoL).¹⁴ Irregular attendees also tend to come from the lower social classes¹³ with females expressing dental anxiety more commonly than males.¹² The aim of this study was to conduct an exploration of differences in oral health behaviours and outcomes between dentally phobic and non-phobic participants in the UK Adult Dental Health Survey (2009). Included in the analysis were the oral health determinants (diet, attitude and oral health-related behaviours), oral health-related quality of life (oral health impact profile [OHIP-14] and oral

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Refereed Paper – online article number E9

Accepted 14 September 2015

DOI: 10.1038/sj.bdj.2015.853

©British Dental Journal 2015; 219: E9

impacts on daily performance [OIDP]) in both participant groups. The null hypotheses for this study were that there are no differences in oral health status of non-phobic and dental phobic individuals.

MATERIALS AND METHOD

The data from Adult Dental Health Survey (ADHS) (UKDA study number 6,884) was collected by the Office for National Statistics, Social Survey Division Information Centre for Health and Social Care. The second edition of data was distributed in August 2012 by UK Data Archive, University of Essex, Colchester Essex (UK Data Archive [distributor], August 2012, SN: 6,884, <http://dx.doi.org/10.5255/UKDA-SN-6884-2>). The survey covered the adult population in England, Wales and Northern Ireland and was commissioned by the NHS Information Centre for Health and Social Care (NHS IC). Details of the methodology and abbreviation used in the ADHS and the measures adopted can be found in O’Sullivan *et al.*¹⁵

The Adult Dental Health Survey is a decennial survey of the residential adult UK population. The most recent 2009 survey was conducted in England, Wales and Northern Ireland. The survey comprised two elements – a questionnaire survey and a clinical survey. Participants were identified using a two-stage cluster sample comprising of 253 primary sampling units (PSU) across England and Wales, and a further 15 PSUs in Northern Ireland. The questionnaire survey had 11,380 participants of whom, 6,469 subsets were also examined clinically. For the present study only data for those individuals with a clinical examination were included.¹⁵ The following variables were extracted from the data set:

Socio-demographic variables:

- Gender
- Age
- Material status
- Personal income
- The index multiple of deprivation (IMD) decile
- Social class
- Education
- Smoking
- Illness that limited ability to attend dentist
- Long standing illness.

Clinical variables:

- Decay experience
- Number of sound, missed, filled teeth
- Numbers of crown, implants and bridge pontics
- Periodontal disease (plaque score, bleeding pocket depth and loss of attachment)
- Other: pulp involvement, ulceration, fistuale, abscess (PUFA)

Table 1 Demographic characteristics of phobic and non-phobic participants analysed in this study

		Non-phobic (%)	Phobic (%)	Chi ² (%)	P value (%)
Gender	Male	4,553 (47.3)	344 (25.2)	237.7	P <0.001
	Female	5,070 (52.7)	1023 (74.8)		
	Total: 10,990	9,623 (87.6)	1,367 (12.4)		
Marital status	Single (never married)	2,317 (24.1)	402 (29.4)	0.059	P = 0.81
	Cohabiting	5,453 (56.7)	961 (50.5)		
	Total: 10,987	9,620 (87.6)	1,367 (12.4)		
Personal income	<£200	363 (48)	60 (56)	2.4	P = 0.16
	>£200	393 (52.1)	47 (44)		
	Total: 863	756 (87.6)	107 (12.4)		
The Index Multiple of Deprivation (IMD) Decile	1-5	3,533 (43.4)	615 (52.4)	34	P <0.001
	6-10	4,620 (56.6)	559 (47.6)		
	Total: 9,327	8,153 (87.4)	1,174 (12.6)		
Age	16-34	2,068 (21.5)	392 (28.7)	98.1	P <0.001
	35-54	3,434 (35.7)	579 (42.4)		
	55 and over	4,121 (42.8)	396 (29)		
	Total: 10,990	9,623 (87.6)	1,367 (12.4)		
Smoking status	Current	1880 (19.6)	431 (31.6)	104.6	P <0.001
	Previous	3,328 (34.6)	391(28.7)		
	Never	4,405 (45.8)	542(39.7)		
	Total: 10,977	5,208 (54.2)	822 (60.3)		
Highest qualification	At degree level or above	2,298 (29.5)	202 (19.1)	50.5	P <0.001
	Another kind of qualification	5,483 (70.5)	858 (80.9)		
	Total: 8,841	7,781 (88)	1,060 (12.0)		
National Statistics Socio-Economic Classification (NS-SEC)	Managerial	3,302 (34.3)	342 (25)	82.9	P <0.001
	Professional	1982(20.6)	251 (18.4)		
	Intermediate	3,456 (35.9)	648 (47.4)		
	Routine	722 (7.5)	91 (6.7)		
	Never	161 (1.7)	35 (2.6)		
	Not classified	9,623 (87.6)	1,367 (12.4)		
	Total: 10,990				
Illness that limits ability to attend dentist	Yes	357 (11.5)	107 (21.2)	36.3	P <0.001
	No	2,738 (88.5)	397 (78.8)		
	Total: 3,599	3,095 (86)	504 (14)		
Long standing illness	Yes	3,096 (32.2)	504 (36.9)	11.9	P <0.001
	No	6,524 (67.8)	863 (63.1)		
	Total: 10,987	9,620 (87.6)	1,367 (12.4)		

Oral health-related quality of life:

- Self-rated oral and general health
- OHIP-14
- OIDP
- Attitudes: sugar intake, cost of treatment, back tooth taken out or crowned, tooth brushing habits, dental attendance.

Dental anxiety (MDAS)

Other: dental visit experience

Simple descriptive analyses were undertaken comparing the phobic and non-phobic participants' variables. The statistics used included cross tabulation and chi-square test to determine whether there was a significant difference phobic and non-phobic participants for categorical variables. For the continuous data (OHIP and OIDP scores) the t-test was used to compare the means of the two groups. Owing to the large numbers of comparisons made, and the large sample size a p value of 0.001 was adopted as the level of statistical significance in order to reduce the possibility of type I errors.

RESULTS

Out of the 13,400 households, 11,380 individuals were interviewed and 6,469 dentate adults underwent a dental examination. There were a total of 10,900 participants, of whom 4,897 were men and 6,093 women. Of the males, 344 scored above the cut off on the MDAS indicating phobic levels of dental fear (7.0%) and 1,023 females (16.7%). Significantly more women than men were phobic ($\chi^2 = 237.7$, $p < 0.001$). Table 1 describes the demographic characteristics of participants, grouped into non-phobic and phobic on the basis of their MDAS score.

There were significant differences between phobic and non-phobic participants on all measures with the exception of marital status and personal income. The majority (971 [71.1%]) of participants who expressed dental anxiety were between the ages of 16 and 54) in comparison to the non-phobic (5,502 [57%]) group. In general those with a phobic level of anxiety as judged by their response to the MDAS were female, single, with a lower personal income, less likely to be educated to university degree level, working in routine occupations according to the National Statistics Socio-economic Classification (NS-SEC) and to have a long standing illness disability or infirmity that has troubled the study participant over a period of time or that is likely to affect he/she over a period of time.

Oral health status

The oral health status of the phobic and non-phobic participants is summarised in Table 2. The self-reported oral health of individuals

Table 2 Oral health status of phobic and non-phobic participants, grouped on the basis of MDAS score (phobic score ≥ 19)

		Non-phobic (%)	Phobic (%)	Chi ² (%)	P value (%)
Self-rated oral health	Very good	2,480 (25.8)	207 (15.2)	400.6	P <0.001
	Good	4,671 (48.6)	518 (37.9)		
	Fair	1,933 (20.1)	400 (29.3)		
	Bad	459 (4.8)	184 (13.5)		
	Very bad	75 (0.8)	57 (4.2)		
	Total: 10,984	9,618 (87.6)	1366 (12.4)		
If you went to the dentist tomorrow, do you think you would need any treatment?	Yes	3,396 (35.6)	826 (61.0)	321	P <0.001
	No	6,149 (64.4)	530 (39.0)		
	Total: 10903	9,545 (87.5)	1358 (12.5)		
Self-reported general health	Very good/good	7,756 (80.6)	980 (71.7)	65	P <0.001
	Fair	1409 (14.6)	271 (19.8)		
	Very bad/bad	457 (4.7)	116 (8.5)		
	Total: 10,989	9,622 (87.6)	1367 (12.4)		
Total OHIP score	0	4,881 (50.8)	490 (36.0)	104.7	P <0.001
	1 and more	4,723 (49.2)	871 (64)		
	Total: 10,965	9,604 (87.6)	1,361 (12.4)		
Overall ODIP prevalence	0	6,696 (69.6)	695 (50.9)	191.2	P <0.001
	1 and more	2,920 (30.4)	671 (49.1)		
	Total: 10,982	9,616 (87.6)	1,366 (12.4)		
Dentate/edentate	Dentate	9,035 (93.9)	1307 (95.6)	6.4	P <0.001
	Edentate	588 (6.1)	60 (4.4)		
	Total: 10,990	9,623 (87.6)	1,367 (12.4)		
No. of crowns	0	3,230 (57.6)	501 (68.4)	31.2	P <0.001
	1 or more	2374 (42.4)	231(31.6)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
No. of sound teeth	Up to 20	3,826 (68.4)	468 (65.5)	3.5	P = 0.06
	20 or more	1778 (31.7)	254 (34.5)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
All sound tooth surfaces	Up including 96	1629 (29)	183 (25)	5.25	P = 0.02
	After including 97	3,975 (71)	549 (75)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
No. of filled teeth	0	608 (10.8)	97 (13.3)	3.8	P = 0.05
	1 or more	4 996 (89.2)	635 (86.7)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
No. of filled teeth	0	608 (10.8)	97 (13.3)	3.8	P = 0.05
	1 or more	4 996 (89.2)	635 (86.7)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
No. of missing teeth	0	314 (5.6)	43 (5.9)	0.089	P = 0.76
	1 or more	5,290 (94.4)	689 (94.1)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		

Table 2 Oral health status of phobic and non-phobic participants, grouped on the basis of MDAS score (phobic score ≥19)

		Non-phobic (%)	Phobic (%)	Chi ² (%)	P value (%)
No. of bridge pontics	0	5,117 (91.3)	693 (94.7)	9.6	P = 0.001
	1 or more	487(8.7)	39 (5.3)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
No. of implants	0	5,548 (99.0)	727 (99.3)	0.67	P = 0.41
	1 or more	56 (1)	5 (0.7)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
No. of decayed teeth	0	4,118 (73.5)	440 (60.1)	57.4	P <0.001
	1 or more	1,486 (26.5)	292 (39.9)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
Pulp involvement, ulceration, fistulae, abscess(PUFA)	0	5,290 (94.4)	643 (87.8)	46.7	P <0.001
	1 or more	314 (5.6)	89 (12.2)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
Plaque score (no. of teeth with visible plaque)	0	2,011 (35.9)	216 (29.5)	11.5	P <0.001
	1 or more	3,593 (64.1)	516 (70.5)		
	Total: 6,336	5,604 (88.4)	732 (11.6)		
Pocket depth (whole mouth)	0 -3.5 mm	2947 (52.9)	366 (50.8)	0.9	P = 0.34
	4 - more	2,628 (47.1)	352 (49.2)		
	Total:6,295	5,575 (88.6)	720 (11.4)		
Loss of attachment (whole mouth)	Up to 3.5mm	715 (32.8)	73 (38.4)	2.5	P = 0.11
	4 mm or more	1,466 (67.2)	117 (61.6)		
	Total: 2,371	2,181 (92)	190 (80)		
Any bleeding	Yes	3,037 (54.4)	456 (62.4)	16.8	P <0.001
	No	2,550 (45.6)	275 (37.6)		
	Total: 6,318	5,587 (88.4)	731 (11.6)		

Table 3 Mean (SD) of total OHIP and total OIDP scores of phobic and non-phobic participants, grouped on the basis of MDAS score (phobic ≥19)

		Non-phobic	Phobic	T-test	P value
OHIP (Oral Health Impact Profile-14, scale)	Mean	3.03	6.18	17.76	P <0.001
	Standard deviation (SD)	5.69	8.77		
OIDP (Oral Impacts on Daily Performance).	Mean	3.7	9.46	18.47	P <0.001
	Standard deviation (SD)	9.65	7.03		

with a phobia of dental treatment was rated as poorer than non-phobic participants on all measures and those exhibiting dental phobia were more likely to anticipate treatment need. However, there were some differences in levels of active disease between phobic and non-phobic participants. There was no difference between the two groups in the number of sound, missing and filled teeth, periodontal pocket depth or loss of attachment. The phobic participants presented more commonly

with one or more decayed teeth (39.9% for phobic participants compared to 26.5% for non-phobic participants).

There were significant differences (p <0.001) in levels of periodontal bleeding and plaque levels, and in the PUFA score. Non-phobic participants were more likely to be edentate which may reflect the age differences between the phobic and non-phobic groups. Measures which reflect treatment received did demonstrate differences

(p <0.001) as might be expected, between the phobic and non-phobic participants. Non-phobic participants were more likely to have at least one crown and one or more bridge pontics.

Oral health-related quality of life (OH-QoL)

For both measures of oral health-related quality of life (OHIP and OIDP) participants with a phobic level of dental fear reported a greater impact (see Table 3). On average, non-phobic participants had mean score of 3.03 (SD 5.69) in OHIP and 3.70 (SD 9.65) in OIDP scores in contrast to phobic participants who had 6.18 (SD 8.77) in OHIP and 9.46 (SD 7.03) in OIDP scores.

Oral health-related behaviour and attitudes.

The self-related oral health-related behaviours and attitudes of the ADHS participants are summarised in Table 4.

Individuals identified as having a phobia of dental treatment were more likely to report cleaning their teeth less frequently than the ideal twice a day, less likely to report using interdental cleaning methods and to use an electric toothbrush, attend the dentist less frequently and more often only attend when in perceived trouble. The differences between the two groups in all the previous mentioned parameters were statistically significant (p <0.001). However, phobic patients were more likely to report using a mouthwash (452 [59.3%]). Both groups of participants had similar levels of consumption of sugar.

In terms of attitudes towards care, patients with a dental phobia were less likely to agree to filling or crowning a back tooth (p <0.001). They were more likely to avoid treatment as a result of the cost of care. This latter observation may correlate with the poorer social status of phobic participants.

Experience of treatment

Participants' responses to questions concerning their most recent treatment visits are summarised in Table 5. Overall, participants with phobic levels of fear of dental treatment judged their experience as more negative than those who were not phobic. Phobic participants were more likely to express that their dentist didn't listen, did not give them enough time to discuss their dental treatment needs in a way that was understandable and with respected and dignified manner (p <0.001). Furthermore individuals with dental phobia, as might be expected, were more likely to have received treatment under conscious sedation (145 [10.7%]) during their last completed course of treatment.

Table 4 Self-reported oral health-related behaviours and attitudes of phobic and non-phobic participants, grouped on the basis of MDAS score (phobic ≥ 19)

		Non-phobic (%)	Phobic (%)	Chi ² (%)	P value (%)
If you went to the dentist would you have a back tooth taken out or crowned?	Taken Out (extracted)	2,529 (29.0)	549 (43.6)	110.3	P <0.001
	Crowned	6,197 (71.0)	710 (56.4)		
	Total 9,985	8,726 (87.4)	1,259 (12.6)		
Has the cost of dental care affected the type of dental care/treatment you have received in the past?	Yes	2,305 (24.0)	461 (33.9)	61.5	P <0.001
	No	7,289 (76.0)	899 (66.1)		
	Total: 10,954	9,594 (87.6)	1,360 (12.4)		
In the past, have you had to delay dental care or treatment because of the cost?	Yes	1,589 (16.5)	369 (27)	89.65	P <0.001
	No	8,030 (83.5)	998 (73)		
	Total: 10,986	9,619 (87.6)	1,367 (12.4)		
High sugar intake	High	4,779 (49.7)	700 (51.2)	1.127	P = 0.05
	Not high	4,842 (50.3)	667 (48.8)		
	Total: 10,988	9,621 (87.6)	1,367 (12.4)		
How often do you clean your teeth nowadays?	Twice a day or more	6,858 (75.9)	930 (71.1)	14.89	P <0.001
	Once a day and less (up to no regular pattern)	2,151 (23.8)	376 (28.7)		
	Total: 10,340	9,033 (87.4)	1307 (12.6)		
Other dental hygiene products Do you use anything other than an ordinary (manual) toothbrush and toothpaste for dental hygiene purpose? What do you use?	Yes	5,578 (58.3)	754 (56.0)	2.91	P = 0.087
	No	3,914 (40.9)	585 (43.4)		
	Total: 10,916	9,569 (87.7)	1,347(12.3)+		
Floss Not mentioned	Floss Not mentioned	3,628 (64.2)	504 (66.1)	1.14	P = 0.285
	Floss mentioned	2,026 (35.8)	258 (33.9)		
	Total: 6,416	5,654 (88.1)	762 (11.9)		
Interdental not mentioned	Interdental not mentioned	4,937 (87.3)	692 (90.8)	7.62	P <0.001
	Interdental mentioned	717 (12.7)	70 (9.2)		
	Total: 6,416	5,654 (88.1)	762 (11.9)		
Mouthwash Not mentioned	Mouthwash Not mentioned	3,003 (53.1)	2,651 (46.9)	914.7	P <0.001
	Mouthwash Mentioned	2,651 (46.9)	452 (59.3)		
	Total: 6,416	5,654 (88.1)	762 (11.9)		
Interspace brush not mentioned	Interspace brush not mentioned	5,040 (89.1)	709 (93.0)	10.99	P <0.001
	Interspace mentioned	614 (10.9)	53 (7.0)		
	Total: 6,416	5,654 (88.1)	762 (11.9)		
Electric toothbrush not mentioned	Electric toothbrush not mentioned	3,081 (54.5)	466 (61.2)	12.05	P <0.001
	Electric toothbrush mentioned	2,573 (45.5)	296 (38.8)		
	Total: 6,416	5,654 (88.1)	762 (11.9)		
Sugar free gum not mentioned	Sugar free gum not mentioned	5,437 (96.2)	710 (93.2)	14.91	P <0.001
	Sugar free gum mentioned	217 (3.8)	52 (6.8)		
	Total: 6,416	5,654 (88.1)	762 (11.9)		
Approx. how long ago was your last visit to the dentist?	Less than 2 years ago	8,017 (83.4)	878(64.3)	287.45	P <0.001
	More than 2 years	1,587 (16.5)	488 (35.7)		
	Total: 10,970	9,604(87.5)	1,366(12.5)		
In general, do you go to the dentist for ...	Only when having trouble	2,364 (24.6)	693 (50.8)	417.9	P <0.001
	Occasional check up	784 (8.2)	105 (7.7)		
	Regular check up	6,449 (67.2)	565 (41.5)		
	Total: 10,960	9,597 (87.6)	1,363 (12.4)		

Overall summary of the findings for individuals with dental phobia

Phobic participants were mostly female, single, with a lower personal income as they are working in routine occupations commonly as they are less likely to be educated to university degree level. They also reported to have a long-standing illness disability. Although the self-reported general health of individuals with phobia was reported as good, their OH-QoL and self-reported oral health was more likely to be rated as poor with anticipation of treatment. Despite rating their oral health as poor, there was no difference between the two groups in the number of sound, missing and filled teeth, periodontal pocket depth or loss of attachment. Participants who were phobic reported brushing their teeth less frequently and tended to use other dental hygiene less frequently.

People with dental phobia were most likely to attend dentist when in perceived trouble and judged their dental experience more negatively than those who were not phobic. They also tend to express that their dentist didn't listen carefully to their concerns and did not spend time to discuss their dental treatment needs.

DISCUSSION

This study reports the findings of a descriptive secondary analysis comparing individuals defined as phobic of dental treatment or non-phobic on the basis of a questionnaire assessment of Dental Anxiety – the Modified Dental Anxiety Scale (MDAS). The MDAS has good reliability and validity, and the cut-offs for 'phobic' vs 'non-phobic' respondents is well defined.⁸

Demographic and social status

Clear differences in the demographic characteristics and social status of the two groups were observed. Individuals with a phobic level of fear were more likely to be female, younger, have lower levels of education and social status and were more likely to have a long-standing illness. The influence of social class on dental anxiety has been previously established.¹⁶ People from lower social classes report more anxiety and attend the dentist less frequently.^{17,18} Donaldson *et al.* (2008) found that in adults, there is a direct relationship between social class and number of sound teeth.¹⁹ Another influence of social class is that people from lower social classes, mainly men, seem to dislike visiting the dentist.¹³ Gender differences in all anxiety, including specific dental anxiety, are commonly found.²⁰⁻²² The cost of dental treatment will potentially have a greater limiting effect on people with dental phobia who are also in lower

Table 5 Reports of most recent experience dental treatment by phobic and non-phobic participants, grouped on the basis of MDAS score (phobic ≥19)

		Non-phobic (%)	Phobic (%)	Chi ² (%)	P value (%)
During your last completed course of dental treatment did you have sedation?	Yes	575 (6)	145 (10.7)	42.44	P <0.001
	No	9,037 (94.0)	1,216 (89.3)		
	Total:10,973	9,612 (87.6)	1,361 (12.4)		
Did the dentist listen carefully to what you had to say about your oral health?	Yes	8,778 (92.4)	1,090 (81.6)	169.2	P <0.001
	No	720 (7.6)	246 (18.4)		
	Total: 10,834	9,498 (87.7)	1,336 (12.3)		
Were you involved as much as you wanted to be in decisions about any dental care or treatment you may have needed?	Yes	7,531 (91.4)	955 (80)	149.43	P <0.001
	No	711 (8.6)	239 (20)		
	Total: 10,919	9,571(87.7)	1,348 (12.3)		
Did the dentist explain the reasons for any dental care and/or treatment in a way that you could understand?	Yes	8,837 (92.8)	1,133 (84.2)	113.5	P <0.001
	No	687 (7.2)	212 (15.8)		
	Total: 10,869	9,524 (87.6)	1,345 (12.4)		
Did the dentist treat you with respect and dignity?	Yes	9,365 (97.7)	1,237 (91.2)	170.14	P <0.001
	No	216 (2.3)	119 (8.8)		
	Total: 10,937	9,581 (87.6)	1,356 (12.4)		
Did you have confidence and trust in the dentist?	Yes	9,084 (95)	1,123 (82.9)	288.48	P <0.001
	No	476 (5.0)	232 (17.1)		
	Total: 10951	9,560 (87.6)	1,355 (12.4)		
Were you given enough time to discuss your oral health with the dentist?	Yes	7,899 (82.6)	987 (73.4)	114.65	P <0.001
	No	747 (7.8)	223 (16.6)		
	Total: 10,907	9,562 (87.7)	1,345 (12.3)		
If you had questions to ask the dentist, did you get answers that you could understand?	Yes	7,973 (95.4)	1,005 (86.4)	151.79	P <0.001
	No	387 (4.6)	158 (13.6)		
	Total: 9,523	8,360 (87.8)	1,163 (12.2)		

social classes with less disposable income. Removing barriers to accessing dental care in this group may involve more than simply reducing their anxiety.

Oral health status

Individuals with phobic levels of dental anxiety reported lower levels of self-rated oral health, lower levels of general health and were more likely to perceive that they would require dental treatment should they visit a dentist. Furthermore they reported higher levels of impact of their oral health on quality of life (OHIP and OIDP data). However, in terms of those individuals who were examined clinically, the only significant differences in clinical status were increased plaque and bleeding; increased PUFA scores; and increased levels of dental caries. Caries is a chronic, life-style-related and cumulative disease that occurs in the majority of cases in adults;²³ however, in

individuals with high risk it can be detected from early childhood all the way into adulthood. The higher PUFA score found among the phobic sample was concerning and may relate to higher levels of non-attendance for dental 'check-ups' – it has been suggested that up to a third of dental phobic patients delay visiting the dentist, sometimes for two or more years.^{1,12,17,18,24-27}

In contrast with previous research, individuals with dental phobia did not have higher numbers of missing teeth¹⁷ and had decreased numbers of filled teeth;²⁴ indeed, they were more likely to be dentate. This may in part reflect the age differences between the phobic and non-phobic groups (the former being younger in general). Additionally, measures that reflected the treatment that both groups had experienced did demonstrate differences (p <0.001) as might be expected, between the phobic and non-phobic participants.

The findings of the present study are likely to be reliable given the size of the sample studied and the quality of the data collection methods used. Furthermore, the present study comprised a survey of a non-clinical population who were not attending dental treatment centres – in contrast to many other surveys, which may explain the lower level of treatment need identified.

Oral health-related behaviours and attitudes

Individuals with dental phobia demonstrated attitudes which suggested that they tended to avoid dental treatment and would prefer to have a tooth extracted rather than undertake a more complex restorative treatment option. For almost all measures of oral health-related behaviours, the phobic group demonstrated unhealthy behaviours – they were more likely to smoke, less likely to attend, and brushed their teeth less frequently. However, the use of mouthwash and chewing gum was higher in the phobic group – suggesting they are more likely to use ‘preventive’ techniques that were perceived to be less invasive. This may be related to negative cognitions about their oral health; for example, imagining that their teeth were at risk of damage if they used more invasive techniques.²⁶ Additionally, individuals from lower social classes are less likely to participate in health-enhancing behaviours, such as eating fresh fruits and vegetables.²⁸

Regular dental attendance is important for maintenance of good oral health. Dolan *et al.* found that regular attendees opted for fixed prosthodontics (such as crowns and bridges).²⁹ These services are often needed to avoid or manage tooth loss. Dentally phobic patients might perceive that dentists will only provide symptomatic care for their declining oral health, rather than a comprehensive one because of their previous more negatively perceived experience(s).¹²

Treatment experience

Those respondents who were identified as having a dental phobia were more likely to have received treatment under conscious sedation at their last dental visit, though the majority had not received sedation (see Table 5). The dentally phobic respondents also recorded their treatment experience as being consistently more negative than their non-phobic counterparts.

The finding that phobic patients rate their interactions with the dental treatment more negatively echoes the findings of previous research. Porritt *et al.* found that a suggested area of improvement in the management of dental anxiety was dentist-patient communication, where patients (18%) asked for

clearer explanation of treatment procedures and more involvement in decision making.³⁰ The perception that interactions with the oral healthcare team are likely to be negative may provide a reason for avoiding a dental visit for treatment among phobic patients. However, in this cross-sectional survey, the direction of causality may be two-way. Individuals with high levels of anxiety may interact with the dentist in a manner which leads to a negative response or they are more sensitive to the dentist’s interaction with them.³¹ To our knowledge there are no studies available to date that have investigated phobic patients’ experiences after their visit to dental care professionals. Furthermore, the interaction may be viewed negatively retrospectively on the basis of the poor outcome of the interaction – with health needs identified and the experience of distress.³²

The ADHS has several strengths. The methodology has undergone an extensive development and validation process and used questionnaires (MDAS, OHIP and ODP) with good reliability and validity, as well as clinical indices conducted by trained and calibrated assessors. Participants were randomly chosen and were not a care-seeking study sample in contrast to many other studies in this field of research. The participation rate was good in comparison to other cohort studies with the majority of the participants being willing to be examined. However, phobic people might not volunteer to participate in surveys hence providing a true prevalence of dental fear is challenging.²⁴ One limitation of this study is its cross-sectional nature with the concomitant limitations of such designs being that causal attributions cannot be made nor will it highlight issues such as changing levels of dental anxiety over the lifespan since the study is susceptible of cohort effects. However, many studies about dental anxiety are cross-sectional.^{12,16,18,32-34} Secondly, the MDAS, while having high validity, does not provide a definitive psychiatric diagnosis of phobia. Nevertheless, the sensitivity and specificity of its cut off of 19 are high.⁸

The difference in instruments that are used to measure dental anxiety making the standardisation of dental phobia difficult,³ and socio-economic status and quality of life might explain the different levels of anxiety and impact found across the studies.

CONCLUSIONS

In this secondary analysis of the ADHS (2009), the majority of the phobic participants were women, from lower social classes in routine occupations and had low income. Although, there was no difference in the number of sound and missing teeth

and the sugar intake, the phobic group presented with more teeth with active caries. The null hypotheses for this study that there are no differences in oral health status of non-phobic and dental phobic individuals has now been disproved. They also perceived that they had poorer oral health that led to high score on the QoL questionnaires. There was a strong perception among the phobic group that their visits to the dental surgery were more negative than those experienced by non-phobic patients.

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