

Dental attendance, perceptions of cost and self-care of school year 12 and 13 students: A focus on Southland, New Zealand

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ABSTRACT

Background and Objectives: Adolescents and emerging adults can provide dentists with many challenges. Little information is available on their perceptions of dental costs once they turn 18 and dentistry is no longer State-funded. The aim of this study was to explore the use of dental care by Southland students in years 12 and 13, their perceptions of the cost of four common dental procedures, self-related oral health and dental self-care habits, time off school related to dental problems, and knowledge and views regarding fluoride.

Methods: After ethical approval, a 26-question survey was conducted of all Southland students in years 12 and 13. Data were statistically analysed in SPSS version 20 with the alpha value set at 0.05.

Results: The participation rate was 49.6%. Regular attendance for examinations was reported by 77.5% with non-attendance mainly related to attitudes around lack of importance or necessity. Reported dental attendance varied according to gender, ethnicity and decile rating of school attended. Although some were accurate in their estimations of dental costs, the standard deviation for all procedures was large. The majority thought that costs put people off going to the dentist. While 74.8% brushed their teeth at least twice daily, only 26.6% flossed regularly. Knowledge regarding fluoride was lacking.

Conclusions: It may be advantageous to include education regarding costs of dental care with patients of this age. This may motivate them to improve their self-care and ensure that their oral health is of a high standard before their dental needs are no longer State-funded.

INTRODUCTION

The cost of treatment has frequently been identified as a barrier to seeking dental care (Johansson and Fridlund, 1996; Land, 2000; Fitzgerald et al. 2004; New Zealand Ministry of Health, 2010). Although in New Zealand dental care is provided free to children and adolescents from birth up until their 18th birthday, for many adult patients dentistry is perceived as unaffordable and perhaps even as an optional extra for those who can afford it (Fitzgerald et al. 2004). The 2009 New Zealand Oral Health Survey (New Zealand Ministry of Health, 2010) found that a larger percentage (79.9%) of adolescents who were still receiving free dental care (aged 12-17 years) had seen a dental professional within the last year than among those in the 18-24 age group, where only 36.9% had done so. Among adults, 44.1% had avoided dental care and 25.3% had gone without the recommended routine treatment in the previous year with cost cited as the reason for both. Dental caries remains the

most prevalent chronic and irreversible disease in New Zealand adolescents (New Zealand Ministry of Health, 2010; Foster Page and Thomson, 2011), with negative impacts on general health and quality of life. Unacceptable inequalities exist in the oral health of New Zealand children, especially among those of Māori and Pacific ethnicity, and those children from low socioeconomic status (SES) families (New Zealand Ministry of Health, 2010).

While several studies have explored New Zealand adolescents' views and beliefs pertaining to oral health and investigated oral-health-related quality of life in this group (Fitzgerald et al, 2004; Broadbent et al, 2006; Areai et al, 2011; Foster Page and Thomson, 2012; Foster Page et al, 2013), their perceptions of the costs of dental care once it is no longer state-funded have not been examined. Fitzgerald et al (2004) reported that the uptake of the free service for adolescents was less than 80% in some regions. Oral health was perceived by many of their participants to be irrelevant, and a large gap existed between the views of the dental health professionals and those of the average high school student in terms of motivation for self-care. Many were of the fatalistic view that dentistry is too expensive or unaffordable and therefore going to the dentist is put off until there is an urgent problem. The 2011 New Zealand Ministry of Health Adolescent Oral Health Service Utilisation data-set shows that the percentage of eligible adolescents using dental services that year ranged from 91.4% in North Canterbury down to 59.4% in Northland. Although details from 2011 were not available for Southland, 73.3% of eligible adolescents were utilising dental services in 2009.

Not only are adolescents no longer eligible to receive free basic oral health services once they turn 18, these patients are recognised as having distinctive needs. These include: a potentially high caries rate; higher risk for traumatic injury and periodontal disease; a tendency for poor nutritional habits; a greater aesthetic desire and awareness; complexity of combined orthodontic and restorative care (such as congenitally missing teeth); dental anxiety; use of tobacco, alcohol, and other drugs; pregnancy; eating disorders; and unique social and psychological needs (AAPD, 2010). In addition, adolescents tend to underestimate risks, perceiving themselves as not susceptible to health problems (Brukienė and Aleksejūnienė, 2009).

The boundary between adolescence and adulthood is difficult to define (West, 1997), with no universally accepted standard definition of the term "adolescent". The years of transition from childhood to maturity have expanded in contemporary technologically advanced society with the term "emerging adulthood" being used to capture the unique developmental challenges facing many individuals between 18 and 25 (Lightfoot et al, 2013). As 637 (71.8%) of respondents were aged 16-17 years, and the remaining 250 (28.2%) were aged 18-20 years, the decision was made for this study to define adolescence in terms of educational stage, with current

attendance at school defining the participant as an adolescent regardless of chronological age. The lack of a consistent pattern of age ranges in the literature makes comparisons of data sources problematic (Irwin et al, 2002).

The purpose of this study was to investigate the use of dental care by Southland students in years 12 and 13 (the final two years of schooling), their perceptions of the cost of four common dental procedures, their self-related oral health and dental self-care habits, time off school related to dental problems, and their knowledge and views regarding fluoride.

METHODS

Ethical approval for this study was obtained from the Lower South Regional Ethics Committee prior to administering two pilot-studies, and again once the questionnaire had been finalised (reference number: LRS/11/EXP/022). Consultation was made with local Māori Runaka via the liaison officer for Southern District Health Board.

Questionnaire

Two independent dentists reviewed a draft questionnaire after which two small pilot studies were conducted. In order to prevent sampling the target participants, the first study (n = 22), was carried out on a visiting Canterbury cycling team, while the second (n = 19) involved a younger group of Southland cyclists. This led to improvements in the clarity and wording of the final questionnaire. The final 26-question survey consisted of simple multiple choice tick boxes and one 5-point Likert-style question which was used to determine the participants self-reported oral health with participants classifying their oral health as “excellent”, “very good”, “good”, “fair” or “poor”.

The questionnaire consisted of three main sections: use of dental services and self-reported oral health status; estimates of the costs of a range of dental treatments; and socio-demographic information replicated from the 2009 New Zealand Oral Health Survey to allow for a direct comparison. Three questions relating to fluoride use were also included.

The first part of the questionnaire covered participants’ use of the free Adolescent Oral Health Services, their views on the importance of regular dental examinations, reasons for non-attendance (if this was the case) and personal oral hygiene

habits. Self-reported oral health was also measured.

The second section, which examined participants’ estimations of dental costs, used four commonly carried out dental procedures namely a dental examination, a simple restoration, a crown, and root canal treatment of a single rooted tooth. To avoid confusion, a few lines of explanation regarding each were included in the questionnaire as pretesting had identified that some guidance was required. Prices for each option were obtained using the average values from the 2010 New Zealand Dental Association Fees Survey as a starting point. To obtain a range of numerical options, these values were altered by subtracting and adding 15%, 30%, 45% and 60% respectively. This created nine options, which were then randomly arranged.

The final section of the questionnaire covered socio-demographic details such as age, sex, gender, school attended, suburb of residence and ethnicity. Participants were given the opportunity to select from a Level 2 Statistics New Zealand Ethnicity classification with 21 ethnic categories. Ethnicities were prioritised (New Zealand Ministry of Health, 2004) and, for reporting purposes, further narrowed to a Level 0 four-code classification of Māori, Pacific, Asian and European/Other in line with the 2009 New Zealand Oral Health Survey (New Zealand Ministry of Health, 2010).

Selection of sample

A list of all secondary schools in the Southland area was obtained from the Ministry of Education’s website. Wakatipu High School in Queenstown was included as it falls within the catchment area of Southland Hospital. Participants for this study were recruited through the principals of all sixteen high schools who were contacted and agreed to distribute the questionnaire to all year 12 and 13 students. Teachers at the participating schools distributed the questionnaires during class time under supervision. Exclusion criteria included the inability to give consent due to a language barrier, any intellectual, behavioural or cognitive disability which could affect understanding of the questionnaire, or any participants who were under 16 years of age. The decision to exclude a pupil from participation, based strictly on the afore-mentioned criteria, was left up to the discretion of the teacher administering the questionnaire.

Table 1. Sociodemographic characteristics of survey participants (brackets contain row percentages unless otherwise indicated)

	Gender		Age group		European/Other
	Female	Male	16-17	18-20	
Gender					
Female	506 (100.0)	–	363 (71.7)	143 (28.3)	418 (82.6)
Male	–	381 (100.0)	274 (71.9)	107 (28.1)	286 (75.1)
Age group					
16-17	363 (57.0)	274 (43.0)	637 (100.0)	–	514 (80.7)
18-20	143 (28.3)	107 (42.8)	–	250 (100.0)	190 (76.0)
Ethnic group					
European/Other	418 (59.4)	286 (40.6)	514 (73.0)	190 (27.0)	704 (100.0)
Maori	61 (53.0)	54 (47.0)	83 (72.2)	32 (27.8)	–
Pacific	13 (44.8)	16 (55.2)	22 (75.9)	7 (24.1)	–
Asian	14 (35.9)	25 (64.1)	18 (46.2)	21 (53.8)	–
School decile rating					
Low	58 (67.4)	28 (32.6)	66 (76.7)	20 (23.3)	62 (72.1)
Medium	102 (33.2)	205 (66.8)	226 (73.6)	81 (26.4)	236 (76.9)
High	346 (70.0)	148 (30.0)	345 (69.8)	149 (30.2)	406 (82.2)

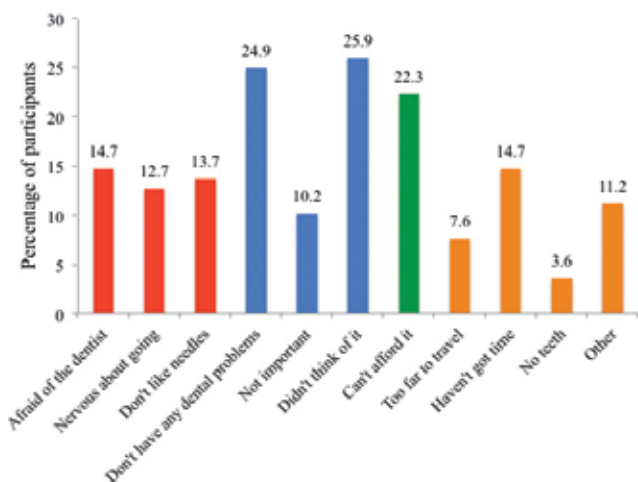


Figure 1. Reasons for not attending for regular examinations. These are colour coded into the main themes from Table 2, namely Anxiety/Fear, Attitudes/perceptions, Cost and Other.

Note: Total percentages may be more than 100% as several options could be chosen.

While it was noted that visually impaired participants would require assistance with the questionnaire and help was offered by the researchers, this offer was not taken up at any of the schools. Once completed, questionnaires were either collected or returned by courier.

Statistical analysis

Data were managed and analysed in IBM Statistical Package for the Social Sciences (SPSS Version 20, Chicago, IL, USA). The Chi-square test was used to test the statistical significance of observed associations, with an alpha level of 0.05.

RESULTS

Of the 1790 questionnaires distributed, 957 (53.5%) were returned. Of those, 70 (7.3%) were excluded due to a lack of demographic information or because the participant was below the minimum age of 16, giving a total of 887 valid questionnaires and an overall response rate of 49.6%.

The demographic characteristics of the participants are shown in Table 1. Students ranged in age from 16 to 20 years, over half were female, and just under 80% were European/

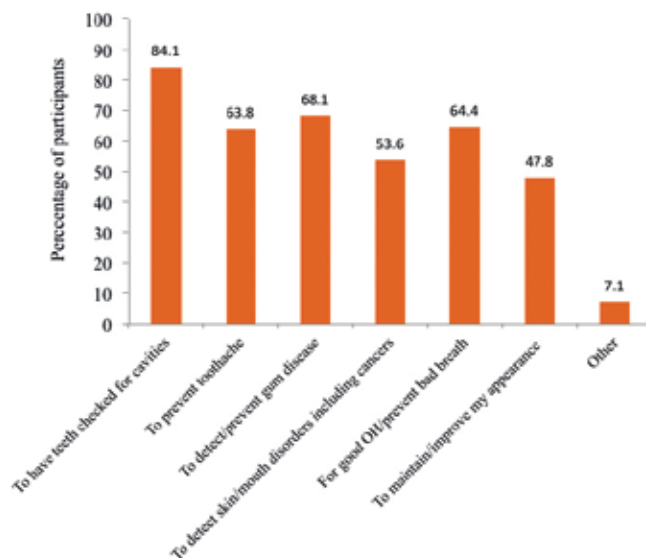


Figure 2: Reasons for the importance of regular dental examinations (within participants who reported that they perceive dental examinations as important)

Note: Total percentages may be more than 100% as several options could be chosen

Other with the next largest ethnic group being Māori (13.0%). Two hundred and fifty participants were aged 18 years or over and therefore no longer eligible for free dental care.

As shown in Table 2, over three quarters (n=679, 77.5%) of the students reported visiting the dentist regularly for examinations. Female attendance figures (n=405, 80.8%) were slightly higher than those of males (n=274, 73.1%), as were those of European/Other (n=566, 81.2%) and Māori students (n=78, 68.4%) compared with Asian (n=20, 54.1%), and Pacific students (n=15, 53.6%). Of those students attending low decile schools, only 59.5% (n=50) reported visiting a dentist regularly for an examination. Regular attendance figures were better in the medium (n=237, 79.0%) and high decile schools (n=392, 79.7%).

The most common themes for not attending for regular examinations are shown in Table 2. These were related to attitudes around their lack of importance or necessity (n=111, 56.3%), cost (n=44, 22.3%) and anxiety/fear about dental care (n=41, 20.8%). More detailed reasons are shown in Figure 1. Additional comments from participants included "The dentist is useless and disorganised", "My old dentist tried to drown me"

Ethnic Group			School Decile		
Maori	Pacific	Asian	Low	Medium	High
61 (12.1)	13 (2.6)	14 (2.7)	58 (11.5)	102 (20.2)	346 (68.3)
54 (14.2)	16 (4.2)	25 (6.5)	28 (7.3)	205 (53.8)	148 (38.9)
83 (13.0)	22 (3.5)	18 (2.8)	66 (10.4)	226 (35.5)	345 (54.1)
32 (12.8)	7 (2.8)	21 (8.4)	20 (8.0)	81 (32.4)	149 (59.6)
–	–	–	62 (8.8)	236 (33.5)	406 (57.7)
115 (100.0)	–	–	18 (15.7)	46 (40.0)	51 (44.3)
–	29 (100.0)	–	6 (20.7)	12 (41.4)	11 (37.9)
–	–	39 (100.0)	0 (0.0)	13 (33.3)	26 (66.7)
18 (20.9)	6 (7.0)	0 (0.0)	86 (100.0)	–	–
46 (15.0)	12 (3.9)	13 (4.2)	–	307 (100.0)	–
51 (10.3)	11 (2.2)	26 (5.3)	–	–	494 (100.0)

Table 2. Frequency of reported attendance for routine examination and reasons for non-attendance by sociodemographic characteristics (brackets contain row percentages unless otherwise indicated)

	Attends for routine examination		Reasons for non-attendance by those who do not attend for routine examinations (More than one option could be selected)		
	Yes	No	Anxiety/Fear	Attitudes / Perceptions	Costs
Gender					
Female	405 (80.8)	96 (19.2) ^a	23 (24.0)	48 (50.0)	30 (31.2) ^a
Male	274 (73.1)	101 (26.9)	18 (17.8)	63 (62.4)	14 (13.9)
Age group					
16-17	501 (79.7)	128 (20.3)	33 (25.8)	78 (60.9)	13 (10.2)
18-20	178 (72.1)	69 (27.9)	8 (11.6)	33 (47.8)	31 (44.9)
Ethnic group					
European/Other	566 (81.2)	131 (18.8) ^a	29 (22.1)	72 (55.0)	30 (22.9)
Maori	78 (68.4)	36 (31.6)	9 (25.0)	22 (61.1)	7 (19.4)
Pacific	15 (53.6)	13 (46.4)	3 (23.1)	10 (76.9)	5 (38.5)
Asian	20 (54.1)	17 (45.9)	0 (0.0)	7 (41.2)	2 (11.8)
School decile rating					
Low	50 (59.5)	34 (40.5) ^a	7 (20.6)	14 (41.2)	15 (44.1) ^a
Medium	237 (79.0)	63 (21.0)	14 (23.1)	38 (60.3)	16 (26.2)
High	392 (79.7)	100 (20.3)	20 (20.0)	59 (59.0)	13 (13.0)
All combined	679 (77.5)	197 (22.5)	41 (20.8)	111 (56.3)	44 (22.3)

^a P<0.05

Note: The combined number and percentage may be lower than the total number of participants (n=887,100%) as 11 participants did not answer all questions in this section.

Table 3. Participants' mean estimations of the cost of a range of dental procedures in NZ\$ (brackets contain standard deviations)

	Examination with radiographs and a clean	One surface amalgam filling	Crown (PFM or FGC)	Simple root canal treatment
Gender				
Female	127 (50)	112 (45) ^a	1125 (470) ^a	510 (189)
Male	129 (52)	116 (45)	1252 (513)	513 (183)
Age group				
16-17	129 (51)	113 (46)	1178 (491)	512 (183)
18-20	125 (50)	114 (43)	1183 (492)	509 (195)
Ethnic group				
European/Other	125 (50) ^a	113 (45)	1172 (487)	513 (187)
Maori	141 (53)	114 (45)	1199 (499)	517 (185)
Pacific	127 (52)	110 (51)	1195 (591)	462 (212)
Asian	134 (46)	123 (45)	1256 (476)	501 (171)
School decile rating				
Low	137 (50)	108 (43)		
Medium	131 (53)	113 (47)	1110 (440)	515 (188)
High	125 (49)	115 (44)	1213 (520)	509 (191)
			1171 (481)	512 (184)
All combined	128 (51)	114 (45)	1183 (493)	512 (186)
Regional average at time of study	126	112	1221	467

^a P<0.05

and “No dentist would accept me”. Although just under a quarter of participants did not attend for a regular examination, the 91.1% of participants who thought these are important gave a variety of reasons, the main one being to have teeth checked for cavities (see Figure 2).

The majority of participants (n=804, 90.6%) reported that they thought the cost of dental care puts people off going to the dentist. Overall, the estimated costs of an examination, simple filling and simple canal root canal treatment were slightly overestimated, although for all procedures there was a large standard deviation. The cost of a crown was underestimated, again with a large standard deviation. An analysis of the socio-demographic subgroups of these results is summarised in Table 3.

Data on self-rated oral health are presented in Table 4. Almost half of the participants rated their oral health as excellent/very good (n=408, 46.5%) while 111 participants (12.7%) rated their oral health as fair/poor. Although there were no significant age, sex or ethnic differences, a higher proportion of Pacific participants rated themselves as having fair/poor oral health (n=7, 25.0%) than those who were Asian (n=6, 15.4%), Māori (n=17, 15.2%) or European/Other (n=81, 11.6%; P=0.06). Participants from high decile schools were much more likely to rate their own oral health as excellent/very good (n=251, 51.2%) rather than fair/poor (n=47, 9.6%; P=0.001). This is in stark contrast to those from low decile schools, where only a quarter of participants reported excellent/very good oral health status (n=21, 25.0%) while over a quarter reported fair/poor self-rated oral health (n=23, 27.4%).

Time off school according to the socio-demographic characteristics of the participants is shown in Table 5. During the previous twelve months 114 participants (13.0%) had missed some schooling due to problems with their teeth or mouth. There were no significant differences between age groups, school deciles or ethnic groups. There was, however, an association between poor self-reported oral health and having to take time off school for dental problems (P=0.012).

The frequencies of self-reported oral health practices are reported in Table 6. Overall, almost three-quarters (74.8%) of the participants reported brushing their teeth at least twice daily. The proportion was higher among females (n=414, 83.5%) than males (n=237, 63.4%; P=0.001). Only 233 participants (26.6%) reported flossing at least once per week while 239 (27.3%) stated they never flossed their teeth. The remainder flossed sporadically. Regular flossing was more common in females (n=169, 33.9%) than males (n=64, 17.0%) and lowest in the Pacific group (n=2, 7.1%).

The participants’ awareness of water fluoridation, and knowledge and use of fluoridated toothpaste is shown in Table 7. Some 72.8% did not definitively know if their drinking water was fluoridated. A little over half (53.7%) reported that they use fluoridated toothpaste. Over three-quarters (77.6%) either did not know, or were unsure, why toothpaste contains fluoride. Those who reported that they knew why provided a variety of reasons: “protection of teeth”, “strengthening the teeth”, “good for your teeth”, “repairs enamel”, “kills bacteria”, and “fights plaque”. As expected from adolescents, any mention of fluoridation would not be complete without at least a couple of comments such as “to placate us into submission while evil Dutch conspirators throw the world into chaos” and “fluoride is poisonis” (sic).

Table 4. Self-reported oral health (Locker item) by socio-demographic characteristics (brackets contain row percentages unless otherwise indicated)

	Very Good/ Excellent	Good	Fair/Poor
Gender			
Female	248 (49.8)	195 (39.2)	55 (11.0)
Male	160 (42.2)	163 (43.0)	56 (14.8)
Age group			
16-17	294 (46.7)	261 (41.5)	74 (11.8)
18-20	114 (46.0)	97 (39.1)	37 (14.9)
Ethnic group			
European/Other	346 (49.6)	271 (38.8)	81 (11.6)
Maori	45 (40.2)	50 (44.6)	17 (15.2)
Pacific	6 (21.4)	15 (53.6)	7 (25.0)
Asian	11 (28.2)	22 (56.4)	6 (15.4)
School decile rating			
Low	21 (25.0)	40 (47.6)	23 (27.4) ^a
Medium	136 (44.9)	126 (41.6)	41 (13.5)
High	251 (51.2)	192 (39.2)	47 (9.6)
All combined	408 (46.5)	358 (40.8)	111 (12.7)

^a P<0.05

Table 5. Frequency of participants having to take time off school in the last 12 months due to dental problems by sociodemographic characteristics (brackets contain row percentages unless otherwise indicated)

	No	Yes
Gender		
Female	426 (85.0)	75 (15.0)
Male	338 (89.7)	39 (10.3) ^a
Age group		
16-17	549 (87.0)	82 (13.0)
18-20	215 (87.0)	32 (13.0)
Ethnic group		
European/Other	607 (87.1)	90 (12.9)
Maori	97 (85.1)	17 (14.9)
Pacific	25 (89.3)	3 (10.7)
Asian	35 (89.7)	4 (10.3)
School decile rating		
Low	74 (87.1)	11 (12.9)
Medium	266 (88.1)	36 (11.9)
High	431 (86.5)	67 (13.6)
All combined	764 (87.0)	114 (13.0)

^a P<0.05

Note: The combined number and percentages may be lower than the total number of participants (n=887,100%) as 9 participants did not answer all questions in this section.

Table 6: Frequency of self-reported preventive oral health practices by sociodemographic characteristics (brackets contain row percentages unless otherwise indicated)

	Attends routine examinations	Brushes twice daily or more	Flosses regularly (at least once per week)	Has been to the dentist within last 12 months
Gender				
Female	405 (80.8)	414 (83.5) ^a	169 (33.9) ^a	436 (86.2)
Male	274 (73.1)	237 (63.4)	64 (17.0)	307 (80.3)
Age group				
16-17	501 (79.7) ^a	466 (74.9)	167 (26.6)	536 (84.1)
18-20	178 (72.1)	185 (74.6)	66 (26.6)	207 (82.8)
Ethnic group				
European/Other	566 (81.2) ^a	524 (75.9)	190 (27.3)	609 (86.5) ^a
Maori	78 (68.4)	78 (69.6)	32 (28.1)	92 (80.0)
Pacific	15 (53.6)	17 (58.6)	2 (7.1)	16 (55.2)
Asian	20 (54.1)	32 (82.1)	9 (23.7)	26 (66.7)
School decile rating				
Low	50 (59.5) ^a	51 (59.3) ^a	21 (24.7) ^a	60 (69.8) ^a
Medium	237 (79.0)	195 (65.2)	58 (19.3)	254 (82.7)
High	392 (79.7)	405 (83.5)	154 (31.5)	429 (86.8)
All combined	679 (77.5)	651 (74.8)	233 (26.6)	743 (83.8)
No answer	11 (1.2)	17 (1.9)	12 (1.4)	0 (0.0)

^a P<0.05

Table 7. Participants' awareness of water fluoridation, and knowledge and use of fluoridated toothpaste (brackets contain row percentages unless otherwise indicated)

	Do you know if fluoride is added to your water?			Do you use fluoride toothpaste?		
	Yes	No	Not Sure	Yes	No	Not Sure
Gender						
Female	119 (23.5)	161 (31.8)	226 (44.7)	269 (53.5)	33 (6.6)	201 (40.0)
Male	122 (32.1)	110 (28.9)	148 (38.9) ^a	206 (54.1)	34 (8.9)	141 (37.0)
Age group						
16-17	168 (26.4)	184 (28.9)	285 (44.7)	342 (53.8)	42 (6.6)	252 (39.6)
18-20	73 (29.3)	87 (34.9)	89 (35.7)	133 (53.6)	25 (10.1)	90 (36.3)
Ethnic group						
European/Other	195 (27.7)	212 (30.2)	296 (42.1)	383 (54.6)	4 (6.8)	270 (38.5)
Maori	29 (25.2)	36 (31.3)	50 (43.5)	57 (49.6)	14 (12.2)	44 (38.3)
Pacific	6 (20.7)	10 (34.5)	13 (44.8)	16 (55.2)	1 (3.4)	12 (41.4)
Asian	11 (28.2)	13 (33.3)	15 (38.5)	19 (48.7)	4 (10.3)	16 (41.0)
School decile rating						
Low	16 (18.6)	27 (31.4)	43 (50.0)	43 (50.0)	7 (8.1)	36 (41.9)
Medium	75 (24.5)	95 (31.0)	136 (44.4)	155 (50.7)	36 (11.8)	115 (37.6)
High	150 (30.4)	149 (30.2)	195 (39.5)	277 (56.3)	24 (4.9)	191 (38.8) ^a
All combined	241 (27.2)	271 (30.6)	374 (42.2)	475 (53.7)	67 (7.6)	342 (38.7)
No answer	1			3		

DISCUSSION

This study investigated the use of dental care by Southland adolescents in their final two years of schooling. It also examined their reasons for non-attendance, self-care habits, perceptions of costs of a range of common dental procedures and knowledge of fluoride. The study identified significant socio-demographic differences in attendance for routine dental examinations and self-reported oral health. While the majority of participants thought the cost of dental care discourages people from going to the dentist, they did not appear to have realistic ideas regarding the costs of the four commonly carried out dental procedures included in the questionnaire. A lack of knowledge regarding water fluoridation and reasons for the inclusion of fluoride in toothpaste was also evident.

Some weaknesses have been identified in this study. The participation rate was relatively low and it is unknown if substantial differences existed between those who chose to participate and the non-respondents. As this study investigated only adolescents still attending school in Southland, the findings may not be generalizable to adolescents in other parts of New Zealand or those in Southland who were no longer attending school. In addition, as participants ranged in age from 16 to 20 years, the findings may not be applicable to younger adolescents. However, for those approaching or past their 18th birthday, self-funded dental care is either a not too distant reality or they have already experienced the lack of State funding, making this study more relevant than if adolescents aged 10 to 15 years old had also been included.

Among the adult population of New Zealand, 44.1% reported in the 2009 Oral Health Survey that they had avoided dental care in the past year due to cost (New Zealand Ministry of Health, 2010). However, free basic oral care is available in this

country for children and adolescents from birth until their 18th birthday. Just over three quarters (77.5%) of the participants of this Southland study reported regular attendance, which is lower than the figures obtained in the national survey where 79.9% of adolescents reported having visited a dental professional in the past 12 months (New Zealand Ministry of Health, 2010). This could be partly explained by the cost as 250 participants (28.2%) were no longer eligible for free dental care. Regular dental visits are an important healthcare behaviour for prevention, early treatment of disease and reinforcement of healthy self-care practices.

Southland adolescents are not alone in their less-than-ideal dental attendance figures. Adolescents in Norway, as with other Scandinavian countries, also receive free dental care but exhibit poor attendance levels. Skaret et al (1998) collected data from the dental records of 968 12- to 18-year-olds and found that 13.6% had missed more than 20% of their appointments with the frequency of individuals with missed or cancelled appointments showing an almost linear increase from age 12 to 18 years. A constant unfavourable decrease in the use of dental services by Finnish adolescents as they got older was also described by Honkala et al (1997). Since the Southland participants were all aged between 16 and 20 years, this may, in part, explain the poorer attendance figures. In their follow-up study, Skaret et al (2000) combined information collected from dental records with questionnaires completed by 754 20-year-old participants. They found that forgetting to attend dental appointments was regarded as socially accepted behaviour and that dislike of the dentist had a stronger relationship to a high frequency of missed/cancelled appointments than high dental anxiety. Among the Southland adolescents, 20.8% were either afraid or nervous of the dentist or don't like needles. It is unclear whether this translates to a mere "dislike" or whether some of the participants were genuinely dental phobic.

A United States national household survey carried out in 2003 involved 12,434 adolescents aged between 10 and 18 years (Newacheck et al, 2003). One in five had not seen a dentist in the previous year, with 7% needing, but not receiving, dental care due to concerns about cost. The authors found these figures troubling, as virtually all adolescents involved in the survey were eligible for Medicaid or the State Children's Health Insurance Program. This finding is similar to the Southland adolescents, where almost one quarter mentioned cost as a reason for non-attendance. It is, however, not known what costs they were referring to. Possibilities could include transportation costs, or loss of earnings from part-time after-school employment, but that aspect was not explored as part of the study.

In Chile, where the National Health Fund (FONASA) provides free primary dental care to the 70% of the population who do not have private insurance, data from an epidemiological study carried out in 2000 showed 43% of the 9,204 adolescents involved reported that their last dental visit was more than a year previous to the study, with more of this group being males (OR = 1.3) (Lopez and Baelum, 2007). Almost four fifths of all participants had attended their last dental visit because of

	Do you know why fluoride is added to toothpaste?		
	Yes	No	Not Sure
	93 (18.6)	250 (50.1)	156 (31.3)
	103 (27.2)	180 (47.6)	95 (25.1)
	136 (21.5)	308 (48.6)	190 (30.0)
	60 (24.7)	122 (50.2)	61 (25.1)
	164 (23.6)	339 (48.7)	193 (27.7)
	17 (14.8)	66 (57.4)	32 (27.8)
	7 (25.0)	9 (32.1)	12 (42.9)
	8 (21.1)	16 (42.1)	14 (36.8)
	14 (16.3)	42 (48.8)	30 (34.9)
	70 (23.1)	162 (53.5)	71 (23.4)
	112 (23.0)	226 (46.3)	150 (30.7)
	196 (22.3)	430 (49.0)	251 (28.6)
	10		

symptoms. It was proposed by the authors that, because dental care is free, barriers to attendance might include factors such as negative beliefs about dentists, lack of knowledge, cultural and parental values about the importance of oral health, and limited access to transportation to and from the health care centres. These barriers may also be applicable to the almost one-quarter of Southland adolescents in this study who do not attend for regular dental examinations. From an ethnicity perspective, the current findings were in agreement with the 2009 New Zealand Oral Health Survey which showed Māori and Pacific children and adolescents were less likely to have accessed oral health services in the previous year than non-Māori and non-Pacific children and adolescents, respectively (New Zealand Ministry of Health, 2010). This unequal uptake of dental care was confirmed by Børsting et al (2015) in their secondary analysis of the cross-sectional data from the 2009 New Zealand Oral Health Survey.

While many adolescents give “cost” as a reason for non-attendance even when dental care is free (Östberg et al, 2002; Newacheck et al, 2003), it appears that this reason is used even when their ideas of costs are incorrect. Fitzgerald et al (2004) found that Otago adolescents were not accurate in their approximations of the cost of a routine dental check-up, basing their perceptions that dental care is prohibitively expensive on received information and not personal experience. Östberg et al (2002) suggested that these opinions probably mirrored the attitudes of parents and significant others. Although the Southland adolescents managed to produce estimates that were reasonably accurate when compared with regional averages, the standard deviations indicate that there was considerable variation for all four procedures investigated. It is possible that this group may appear to have a better idea of costs, since 28.2% of the participants were 18 years or older (250/887), and could have already personally experienced the lack of State funding of dental care for adults.

There were no significant gender differences in self-rated oral health. In this aspect, the findings differed from other studies. Östberg et al (2001) found that girls report better self-perceived oral health than boys; by contrast, other studies have shown that girls are more likely to report poor oral health (Jiang et al, 2005; Patussi et al, 2007; New Zealand Ministry of Health, 2010). However, our findings on self-rated oral health and SES were consistent with those from other studies, in which the prevalence of poor self-rated oral health is higher in lower-SES adolescents (Gilbert, 1994; Patussi et al, 2007). The percentage of participants who rated their oral health as fair/poor (12.7%) is similar to that found in the 2009 NZ Oral Health Survey where 14.4% of 12-17 year-olds (95%CI 9.2-19.6) had reported fair or poor oral health (New Zealand Ministry of Health, 2010).

Published studies from both New Zealand and overseas show that there appear to be significant gender differences regarding oral self-care practices (Honkala et al, 1997; Brukiené and Aleksejuniene, 2009; Dorri et al, 2010; Areai et al, 2011). Although our results are consistent with these findings, we found no statistically significant differences in brushing frequency between ethnic groups. This differs from findings by Areai et al (2011) who reported socio-demographic differences, with a lower proportion of Māori secondary school students having brushed twice daily.

Southland adolescents did not appear to be very knowledgeable about water fluoridation. Data from the 1990 National Health Interview Survey (NHIS) showed that only 49% of young adults aged 18-24 years knew the purpose of water fluoridation, and only 7% believed that it is the best way to prevent tooth decay (Gift et al, 1994). Participants who were aware of reasons for using fluoridated toothpaste appeared to have understood the role of fluoride in caries prevention. A cross-sectional survey of 2662 Chinese adolescents found that 61.2% identified fluoride as a good way of preventing caries (Jiang, 2005).

Adolescence is an important time in which to develop healthy life-long lifestyle habits. Unfortunately, this age group is often at higher risk for dental disease due to a variety of factors such as increased independence from parental supervision, and a low priority for oral hygiene with their habits influenced by socio-demographic factors, sense of coherence, and peer social networks (Macgregor et al, 1997). In general, adolescents tend to underestimate risks, perceiving themselves as not susceptible to health problems (Dorri et al, 2009). As a result, adolescence is a difficult and challenging period of life for dental health education, with positive changes in attitude and habits generally short-lived.

The literature shows us that poor dental attendance by adolescents is not a phenomenon restricted to New Zealand. Research in the United Kingdom suggested that patient education and explanation of intended procedures increases the patient's perception of the value of dental care by over 60% (Brown et al, 1999). It is therefore possible that education on the cost of dental treatment could be a useful tool in motivating adolescents to improve their oral health and prevent future disease, because they will be responsible for funding all care from 18 years of age. While some of these participants appeared to have a reasonable perception of dental costs, this does not necessarily mean they fully understand the long-term financial implications of dental care in the private sector. It is important that we engage with our adolescent patients, providing education and motivation on personal oral hygiene, dietary advice, and professional preventive care so that they can transition beyond adolescence with realistic expectations and the perception that dental care goes beyond being an optional extra in life. As suggested by Fitzgerald et al (2004), this may require a shift in how we view the world and interests of our adolescent patients.

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