

Non-attendance of appointments at the orthodontic clinic

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Aims: To investigate the non-attendance of patients at orthodontic appointments and to determine related reasons.

Methods: Appointment data were collected from the Faculty of Dentistry, University of Otago between August and October in 2013 (paper-appointment system using post letters) and 2019 (digital-appointment system using automatically generated short message service (SMS) texts before the Covid-19 pandemic). The demographic and time characteristics of patients who attended and failed their appointments were collected for statistical analysis.

Results: The total number of appointments was 5810, including 2761 by 1901 patients in 2013 and 3049 by 2009 patients in 2019. The overall fail to attend (FTA) rates were 16.1% in 2013 and 12.9% in 2019. Morning appointments showed a higher failure rate (16.0% in 2013 and 14.2% in 2019) than the afternoon appointments (12.1% in 2013 and 11.1% in 2019) ($p < 0.05$). Bonding appointments had a significantly lower failure rate (6.2%) compared with other treatment procedures with an attendance rate of 93.8% ($p < 0.05$). People living between the 901 and 950 (higher socioeconomic status, SES) suburb index were 1.5 times less likely to fail compared with people living in other categories ($p < 0.05$).

Conclusion: The fail to attend (FTA) of orthodontic appointments was approximately 15% in the Otago University Orthodontic Clinic, New Zealand. Patients from lower SES, Māori and Pasifika peoples, and morning appointments had higher FTA rates. Bonding appointments had the lowest FTA rate. FTA significantly decreased after the introduction of a SMS text reminder system. An effort is still required to improve the orthodontic attendance rate, and future studies could consider investigating the digital reminder systems, such as smart phone apps, to enhance clinical attendance in the electronic age.

(Aust Orthod J 2023; 39: 185 - 193. DOI: 10.2478/aoj-2023-0035)

Received for publication: July, 2023

accepted: October, 2023.

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Introduction

Missed dental appointments have a negative impact on clinical efficiency and patients' oral health. A failure to receive timely treatment prolongs dental management, further exacerbates disease, and denies opportunities for other patients to receive care. It has been found that the non-attended appointments in health care facilities create a disruption in the planned schedule and wastes resources, resulting in inefficiencies and a loss of clinical productivity.¹ This problem is not only a concern in private practices but more so at educational institutions as students rely on patient attendance to fulfil curriculum

requirements and academic competency. Patients miss their appointments for various reasons and will either cancel their appointment ahead of time, or by not attending their appointment on the day. Both of the cancelled or failed to attend (FTA) appointments cause pressure on administrative staff who have to reschedule appointments and fill the vacant times with other patients. In facilities that function as education institutions, non-attendance has a negative impact on teaching activities and an overall negative influence on the quantity and quality of clinical learning within the undergraduate and postgraduate clinics.² Non-attendance could lead to

Table I. Demographic characteristics of the patients (% , *N*) in 2013 and 2019

	2013			2019		
	Male	Female	Total	Male	Female	Total
<i>New Zealand European</i>	35.8% (681)	47.0% (894)	82.8% (1575)	31.0% (622)	37.4% (752)	68.4% (1374)
<i>Māori/Pasifika</i>	3.5% (66)	3.7% (70)	7.2% (136)	3.3% (67)	4.9% (99)	8.3% (166)
<i>Asian</i>	1.7% (33)	2.0% (38)	3.7% (71)	2.2% (44)	2.2% (44)	4.4% (88)
<i>Others (Latino, Middle Eastern, or unstated)</i>	2.6% (49)	3.7% (70)	6.3% (119)	8.2% (165)	10.8% (216)	19.0% (381)
<i>Total</i>	43.6% (829)	56.4% (1072)	100% (1901)	44.7% (898)	55.3% (1111)	100% (2009)

reduced clinical teaching times, increased waiting times for patients to secure an appointment, further challenging students to meet requirements and in the future, compromising competency required for professional registration.^{3,4}

The majority of studies on non-attendance have primarily focused on general medical practices, with fewer studies conducted at dental facilities.⁵ A study in the United Kingdom estimated the general medical practice non-attendance rate to be 6.5% to 7.7%.⁶ Similar studies conducted in the United States showed primary health care non-attendance rates ranging from 5% to 55%.⁵ Two Australian studies conducted at different dental schools reported similar rates of non-attendance of 33% and 35%.^{4,7} Research conducted at King Saud University Dental College in Saudi Arabia showed that 24% to 34% of patients missed their

appointments, which negatively impacted on student's learning and academic progress³.

The most common reasons of non-attendance have been found to be a lack of time, forgetfulness, limited access to transportation, the cost of treatment, weather conditions, and travel distance.^{3,4} Dental anxiety has also been a major factor affecting non-attendance, particularly involving paediatric patients.⁸ In addition, demographic characteristics such as age, gender, location and socioeconomic status (SES) had a role in non-attendance rates.^{4,7} A study conducted at The School of Dentistry and Oral Health at Griffith University reported that females had a greater chance of failing appointments due to family commitments as well as young adults due to forgetfulness.⁷ However, an additional study revealed that males had a higher proportion

Table II. Age categories of the patients (% , *N*) in 2013 and 2019

Age (Years)	2013			2019		
	Male	Female	Total	Male	Female	Total
<12	8.3% (157)	13.2% (250)	21.4% (407)	13.8% (277)	16.2% (325)	30.0% (602)
13-18	29.7% (565)	33.1% (629)	62.8% (1194)	23.2% (466)	27.2% (547)	50.4% (1013)
19-25	4.1% (78)	6.8% (129)	10.9% (207)	5.4% (108)	7.3% (147)	12.7% (255)
26-49	0.9% (18)	2.5% (48)	3.5% (66)	1.8% (37)	3.6% (73)	5.5% (110)
50-64	0.4% (7)	0.7% (14)	1.1% (21)	0.3% (6)	0.5% (11)	0.8% (17)
65+	0.2% (4)	0.1% (2)	0.3% (6)	0.2% (4)	0.4% (8)	0.6% (12)
<i>Total</i>	43.6% (829)	56.4% (1072)	100% (1901)	44.7% (898)	55.3% (1111)	100% (2009)

Table III. Distribution of demographic and time characteristics, treatment and odds ratios (OR) for appointment status ($N = 1,901$) in 2013

Variable	Attended % (N)	FTA % (N)	FTA OR (95% CI)	P-value
<i>Overall</i>	83.9% (1594)	16.1% (306)	—	
<i>Ethnicity</i>				
NZ European	83.4% (1314)	16.5% (260)	0.90 (0.54-1.51)	0.70
Māori/Pasifika	86.0% (117)	14.0% (19)	1.10 (0.55-2.20)	0.79
Asian	87.3% (62)	12.7% (9)	1.23 (0.52-2.90)	0.64
Others	84.9% (101)	15.1% (18)	1	
<i>Gender</i>				
Male	82.5% (684)	17.5% (145)	0.83 (0.65-1.07)	0.15
Female	85.0% (911)	15.0% (161)	1	
<i>Age group</i>				
<12	86.0% (350)	14.0% (57)	1.23 (0.14-10.70)	0.85
13-18	83.2% (993)	16.8% (201)	0.99 (0.12-8.50)	0.99
19-25	81.6% (169)	18.4% (38)	0.89 (0.10-7.84)	0.92
26-49	89.4% (59)	10.6% (7)	1.69 (0.17-16.57)	0.65
50-64	85.7% (18)	14.3% (3)	0.89 (0.10-14.20)	0.20
65+	83.3% (5)	16.7% (1)	1	
<i>Suburb index</i>				
<900	72.2% (13)	27.8% (5)	0.62 (0.21-1.83)	0.39
901-950	86.2% (676)	13.8% (108)	1.50 (1.05-2.15)	0.03
951-1000	82.2% (341)	17.8% (74)	1.11 (0.75-1.63)	0.61
1001+	84.0% (336)	16.0% (64)	1.26 (0.85-1.88)	0.25
Others	80.6% (229)	19.4% (55)	1	
<i>Time of day</i>				
Morning	84.0% (561)	16.0% (107)	0.99 (0.77-1.28)	0.45
Afternoon	87.9% (1034)	12.1% (199)	1	
<i>Day</i>				
Monday	80.1% (278)	19.9% (69)	0.68 (0.45-1.03)	0.07
Tuesday	85.0% (271)	15.0% (48)	0.95 (0.61-1.48)	0.83
Wednesday	85.7% (444)	14.3% (74)	1.01 (0.68-1.51)	0.96
Thursday	82.7% (335)	17.3% (70)	0.81 (0.54-1.21)	0.30
Friday	85.6% (267)	14.4% (45)	1	
<i>Treatment</i>				
Consultation	82.6% (161)	17.4% (34)	0.73 (0.29-1.86)	0.51
Records	83.9% (26)	16.1% (5)	0.80 (0.22-2.90)	0.73
Bonding	75.0% (6)	25.0% (2)	0.46 (0.08-2.84)	0.40
Review/adjustment	81.9% (929)	18.1% (205)	0.70 (0.29-1.67)	0.42
Debonding	92.1% (58)	7.9% (5)	1.79 (0.51-6.26)	0.37
Retainer/retention	88.4% (374)	11.6% (49)	1.17 (0.47-2.92)	0.73
Others	86.7% (39)	13.3% (6)	1	
<i>Month</i>				
August	80.3% (392)	19.7% (96)	0.70 (0.52-0.95)	0.02
September	84.9% (585)	15.1% (104)	0.97 (0.72-1.29)	0.81
October	85.4% (618)	14.6% (106)	1	

Table IV. Distribution of demographic and time characteristics, treatment and odds ratios (OR) for appointment status ($N = 2,009$) in 2019

Variable	Attended % (N)	FTA % (N)	FTA OR (95% CI)	P-value
<i>Overall (appointments)</i>	87.1% (2657)	12.9% (392)	—	
<i>Ethnicity</i>				
NZ European	92.8% (1275)	7.2% (99)	1.22 (0.81-1.84)	0.34
Māori/Pasifika	87.3% (145)	12.7% (21)	0.66 (0.37-1.17)	0.15
Asian	90.9% (80)	9.1% (8)	0.95 (0.42-2.13)	0.90
Others	91.3% (348)	8.7% (33)	1	
<i>Gender</i>				
Male	92.0% (826)	8.0% (72)	1.00 (0.72-1.38)	1.00
Female	92.0% (1022)	8.0% (89)	1	
<i>Age group</i>				
<12	90.7% (546)	9.3% (56)	0.89 (0.11-6.99)	0.91
13-18	93.3% (945)	6.7% (68)	1.26 (0.16-9.93)	0.82
19-25	89.8% (229)	10.2% (26)	0.80 (0.01-6.45)	0.84
26-49	92.7% (102)	7.3% (8)	1.16 (0.13-10.15)	0.89
50-64	88.2% (15)	11.8% (2)	0.68 (0.06-8.50)	0.76
65+	91.7% (11)	8.3% (1)	1	
<i>Suburb index</i>				
<900	92.9% (13)	7.1% (1)	0.72 (0.09-5.85)	0.76
901-950	93.6% (654)	6.4% (45)	0.81 (0.47-1.40)	0.46
951-1000	91.2% (385)	8.8% (37)	0.58 (0.33-1.02)	0.06
1001+	88.3% (439)	11.7% (58)	0.42 (0.25-0.72)	0.00
Others	94.7% (357)	5.3% (20)	1	
<i>Notification</i>				
Yes	87.3% (2477)	12.7 (358)	1.26 (0.86-1.86)	0.23
No	84.5% (180)	15.5% (33)	1	
SMS	88.1% (2001)	11.9% (271)	0.74 (0.50-1.09)	0.03
Letter	82.8% (82)	17.2% (17)	1.13 (0.60-2.14)	0.71
None	84.5% (180)	15.5% (33)	1	
<i>Time of day</i>				
Morning	85.8% (386)	14.2% (64)	0.60 (0.40-0.91)	0.03
After noon	88.9% (442)	11.1% (55)	1	
<i>Day</i>				
Monday	83.2% (663)	16.8% (97)	0.98 (0.71- 1.34)	0.49
Tuesday	87.7% (455)	12.3% (64)	0.94 (0.662- 1.33)	0.73
Wednesday	87.6% (572)	12.4% (96)	1.12 (0.815- 1.54)	0.48
Thursday	88.7% (425)	11.3% (54)	0.85 (0.59- 1.23)	0.38
Friday	87.0% (541)	13.0% (81)	1	
<i>Treatment</i>				
Consultation	81.8% (139)	18.2% 31	0.96 (0.39-2.38)	0.92
Records	86.7% (78)	13.3% (12)	0.66 (0.24-1.83)	0.43
Bonding	93.8% (196)	6.2% (13)	0.28 (0.11-0.77)	0.01
Review/adjustment	87.4% (1995)	12.6% (288)	0.62 (0.27-1.42)	0.26
Debonding	85.7% (6)	14.3% (1)	0.71 (0.07-6.92)	0.77
Retainer/retention	84.2% (213)	15.8% (40)	0.81 (0.33-1.96)	0.63
Others	81.1% (30)	18.9% (7)	1	

of missed appointments compared with females.³ Multiple studies have shown that interventions such as text messages, voice messages, written reminders, or appointment cards, have been effective in reducing the non-attendance rates.^{4,9} A better understanding of the reasons for non-attendance can assist in improving clinical efficiency and dental education.

The aim of the present study was to therefore investigate the non-attendance of appointments at the University of Otago's Orthodontic clinic, and to explore the possible reasons for the attendance failure.

Materials and methods

Appointment data were collected from the Faculty of Dentistry, University of Otago, Dunedin, New Zealand, between August and October in 2013 (paper-appointment system using physical logbooks and posted letters) and 2019 (digital-appointment system using automatically generated short message service (SMS texts in the Titanium Management system) before the Covid-19 pandemic). August to October was a quarter of a year of routinely normal clinical time without disruption due to public holidays at the Faculty of Dentistry, University of Otago which is New Zealand's National Centre for Dentistry.

The data of demographics and time attached to each appointment were collected. No patient names nor identifiable information collected for this study were disclosed in the manuscript. The percentage of FTA appointments was analysed according to gender, age, ethnicity, residential location, time of appointment, day of the week, type of treatment provided, and month. The residential location of the patient was converted into an index using the Social Deprivation Index (<https://profile.idnz.co.nz/dunedin/deprivation-index>), in which data is presented as a scale, and ranks the suburbs of Dunedin from the least deprived to the most deprived. The mean is 1000 index points of which the higher the number, the greater the deprivation. Data from 2013 and 2019 were also compared to analyse the effect of a SMS reminder system in improving attendance rate.

Statistical analysis

The frequency distribution of FTA appointments by patient demographics, treatment type, and time

characteristics were analysed. The relationship between demographic characteristics of patients and non-attendance was evaluated using a multivariate multinomial regression analysis. An odds ratio (OR) and 95% confidence interval (CI) were presented for FTA rates. A *p*-value less than 0.05 was considered statistically significant.

Results

The total number of appointments was 5810, including 2761 by 1901 patients in 2013 and 3049 by 2009 patients in 2019. The overall FTA rates were 16.1% in 2013 and 12.9% in 2019. Female patients (56.4% in 2013 and 55.3% in 2019) missed attending slightly more than male patients (43.6% in 2013 and 44.7% in 2019). There was an increase in the variety of ethnicities from 2013 to 2019: Māori and Pasifika people had an increased missed attendance rate from 7.2% to 8.3%, Asian ethnicity increased from 3.7% to 4.4%, and the 'other' category increased from 6.3% to 19.0%. Over half of the patients who attended the orthodontic clinic were between the ages of 13 and 18 years (62.8% in 2013 and 50.4% in 2019) (Tables I and II).

The overall non-attendance rate in 2013 was 16.1% (*N* = 306) (Table III). People living in the 901 to 950 (higher SES) suburb index were 1.5 times less likely to fail compared with people living in the 'others' category (*p* < 0.05). The 'others' category included those who lived outside of central Dunedin or in suburbs without an index. August had the highest rate of failed appointments of 19.7% (*N* = 96) compared with the other months of September and October (*p* < 0.05).

The overall appointment non-attendance rate in 2019 was 12.9% (392) (Table IV). Of the suburb index group, those over 1001+ had the lowest attendance rate of 88.3% (*p* < 0.05) and were 0.42 times less likely to fail in comparison to the 'others' category.

Morning appointments (10.00am–1.00pm) had more FTAs than the afternoon appointments (2.00–5.00pm) (*p* < 0.05) (Tables II and III). Bonding appointments had a significantly lower failure rate compared with other treatment procedures with an attendance rate of 93.8% (*p* < 0.01). Monday was likely to have a higher FTA rate (*p* < 0.05) (Tables II and III).

FTA rates decreased from 2013 to 2019 after the automatic SMS text reminder system was implemented (*p* < 0.05 for all) (Tables IV and V).

Discussion

The present study analysed the non-attendance of appointments at the University of Otago Dental School's Orthodontic Clinic. The overall non-attendance rate in 2013 was significantly higher than that in 2019. The introduction of SMS text reminders was a likely factor for this improvement in attendance rate which was consistent with other studies reporting similar results.^{10,11} The findings suggested that patients of lower SES may be more likely to miss their appointments compared with higher SES patients. Bonding appointments had a significantly higher rate of attendance compared with other types of appointments.

A limitation of the present study was that only three months of data were analysed. This was considered due to the nature of the orthodontic course as post-graduate orthodontic students have clinical breaks from November to January, June to July and an Easter break in April; the months of August to October had relatively less interruption due to public holidays. For a more robust study, an analysis of attendance throughout a 12-month period may be more accurate. An additional limitation was that reasons why patients missed their appointments were not collected and further research into identifying reasons would be useful in improving attendance rates.

With the introduction of the digital Titanium management system, patients were able to receive text reminders of their appointments, and were therefore more likely to remember compared with those without text reminders. Although the literature shows varied results related to appointment reminders and attendance rates, it has been noted that patients who received either postal or telephone reminders were more likely to attend their appointments.¹² There have also been multiple studies that have indicated the effectiveness of SMS text reminders in improving attendance in health care settings.^{10,11} A similar study was undertaken in a dental setting and results revealed that SMS appointment reminders significantly reduced the number of failed appointments.¹³

The present results have shown that patients with morning appointments were more likely to fail to attend than those with the afternoon appointments. In addition, it was noted that certain days of the week appeared to have a higher rate of non-attendance,

in particular Monday appointments. This is in agreement with the previous studies in which it was found that patients with morning appointments were less likely to cancel or FTA compared with afternoon appointments.^{4,14} A study by Storrs *et al.*, also revealed that Monday appointments had a higher rate of failure and suggested amendments in the number of non-attended appointments such as rescheduling Monday appointments to an alternative session when the proportion of non-attendance is lower.⁴ Failure to attend appointments places pressure on the management of the clinic and decreases the efficiency for both clinicians and patients. Patients who fail to receive treatment at an optimal time, may extend treatment duration which may be more harmful than not starting treatment.¹⁵

It has been suggested that FTA appointments may be reconsidered for double bookings, or by booking extra patients to overcome the problem.¹⁶ This may also be a reason why bonding appointments had a significantly lower rate of non-attendance compared with other treatment appointments. Public system patients have often waited a long time to receive orthodontic treatment and have anticipated the start and may be less likely to fail to attend their initial bonding appointment.

In New Zealand, it is reported that Māori and Pasifika people are largely represented in the relatively lower SES groups.¹⁷ Statistics show that Māori and Pasifika people had poorer oral health outcomes and were less likely access dental services.¹⁸ This is also reflected in the current data as Māori and Pasifika people had the highest level of non-attendance amongst the different ethnicities in 2019 and the second highest in 2013. A failure to attend appointments meant that they missed out on required treatment, which could lead to poorer oral health outcomes. Patients from lower income families were more likely to miss appointments and this may be due to factors related to the difficulty in taking time off of work, a lack of transportation or access to transport, or orthodontic appointments not being a priority. This is supported by earlier studies and national data that have reported that patients from lower socio-economic areas were more likely to miss their appointments.^{9,18} The National Health Service (NHS) has stated that, although dental care is free for children and certain groups of adults, patients from lower socio-economic areas are least likely to

Table V. Comparison of non-attendance between 2013 and 2019

Variable	B	Std. Error	Exp (B)	95% CI	P-value
<i>Ethnicity</i>					
NZ European	0.40	0.10	1.49	1.24-1.80	0.00
Māori	-0.15	0.27	0.86	0.51-1.48	0.59
Asian	-0.54	0.41	0.59	0.26-1.30	0.19
Others	0.33	0.37	1.39	0.67-2.78	0.37
<i>Gender</i>					
Male	0.22	0.12	1.24	0.98-1.57	0.07
Female	0.32	0.11	1.37	1.10-1.72	0.01
<i>Age group</i>					
<12	0.11	0.24	1.12	0.70-1.79	0.64
13-18	0.49	0.10	1.63	1.33-2.00	0.00
19-25	-0.07	0.21	0.94	0.62-1.41	0.76
26-49	-0.29	0.46	0.75	0.30-1.85	0.53
50-64	0.19	0.82	1.21	0.24-6.04	0.82
65+	-18.74	0.00	—	—	—
<i>Suburb index</i>					
<900	1.64	0.66	5.17	1.43-18.69	0.01
901-950	0.21	0.15	1.23	0.91-1.66	0.17
951-1000	0.30	0.17	1.35	0.97-1.90	0.08
1001+	0.15	0.16	1.16	0.84-1.59	0.37
Others	0.57	0.21	1.78	1.18-2.67	0.01
<i>Time of day</i>					
Morning	0.40	0.11	1.50	1.21-1.84	0.00
Afternoon	0.09	0.13	1.09	0.84-1.42	0.50
<i>Day</i>					
Monday	0.52	0.17	1.68	1.20-2.35	0.00
Tuesday	0.23	0.21	1.26	0.84-1.89	0.26
Wednesday	-0.01	0.17	0.99	0.72-1.38	0.97
Thursday	0.50	0.20	1.65	1.12-2.42	0.01
Friday	0.16	0.20	1.17	0.79-1.73	0.43
<i>Treatment</i>					
Consultation	-0.67	0.27	0.94	0.55-1.60	0.81
Records	0.22	0.58	1.25	0.40-3.88	0.70
Bonding	1.62	0.87	5.03	0.92-27.40	0.06
Review/adjustment	0.43	0.10	1.54	1.27-1.87	0.00
Debonding	-0.66	1.18	0.52	0.05-5.19	0.58
Retainer/retention	-0.36	0.23	0.70	0.45-1.09	0.12
Others	-0.42	0.61	0.66	0.20-2.17	0.49
<i>Month</i>					
August	0.62	0.16	1.85	1.36-2.51	0.00
September	0.26	0.15	1.29	0.97-1.73	0.08
October	0.05	0.13	1.05	0.81-1.36	0.71

Table VI. Comparison of attendance between 2013 and 2019

Variable	B	Std. Error	Exp (B)	95% CI	P-value
<i>Ethnicity</i>					
NZ European	-0.40	0.10	0.67	0.557-0.807	0.00
Mā ori	-0.15	0.27	1.60	0.68-1.98	0.59
Asian	0.54	0.41	1.71	0.77-3.79	0.19
Others	-0.33	0.37	0.72	0.35-1.48	0.37
<i>Gender</i>					
Male	-0.22	0.12	0.81	0.64-1.02	0.07
Female	-0.32	0.11	0.73	0.59-0.91	0.01
<i>Age group</i>					
<12	-0.11	0.24	0.89	0.56-1.43	0.64
13-18	-0.49	0.10	0.62	0.50-0.75	0.00
19-25	0.07	0.21	1.01	0.71-1.61	0.76
26-49	0.29	0.46	1.33	0.54-3.29	0.53
50-64	-0.19	0.82	0.83	0.17-4.13	0.82
65+	-0.34	1.53	0.71	0.04-14.35	0.83
<i>Suburb index</i>					
<900	-1.64	0.66	0.19	0.05-0.70	0.01
901-950	-0.21	0.15	0.81	0.60-1.10	0.17
951-1000	-0.30	0.17	0.74	0.53-1.04	0.08
1001+	-0.15	0.16	0.87	0.63-1.19	0.37
Others	-0.57	0.21	1.78	1.18-2.67	0.01
<i>Time of day</i>					
Morning	-0.40	0.11	0.67	0.54-0.83	0.00
Afternoon	-0.09	0.13	0.92	0.71-1.19	0.50
<i>Day</i>					
Monday	-0.52	0.17	0.60	0.43-0.84	0.00
Tuesday	-0.23	0.21	0.79	0.53-1.19	0.26
Wednesday	0.01	0.17	1.01	0.73-1.40	0.97
Thursday	-0.50	0.20	0.61	0.41-0.89	0.01
Friday	-0.16	0.20	0.85	0.58-1.26	0.43
<i>Treatment</i>					
Consultation	0.67	0.27	1.01	0.63-1.83	0.81
Records	-0.22	0.58	0.80	0.26-2.49	0.70
Bonding	-1.62	0.87	0.20	0.04-1.09	0.06
Review/adjustment	-0.43	0.10	0.65	0.54-0.79	0.00
Debonding	0.66	1.18	1.93	0.19-19.39	0.58
Retainer/retention	0.36	0.23	1.43	0.91-2.25	0.12
Others	0.42	0.61	1.52	0.46-4.89	0.49
<i>Month</i>					
August	-0.62	0.16	0.54	0.40-0.73	0.00
September	-0.26	0.15	0.77	0.58-1.03	0.08
October	-0.05	0.13	0.95	0.74-1.23	0.71

attend their annual dental visits.¹⁹ More research is required to improve attendance rates in patients from lower socio-economic areas.

Improving FTA rates will help increase clinic productivity and further reduce the loss of clinical teaching hours, resources, and cost. This is particularly important at education institutions as students rely heavily on patient attendance to fulfil their treatment and academic requirements. More information would also be useful to determine the relationship between oral health status and attendance as studies show that participants with optimal oral hygiene practices were almost six times more likely to attend appointments.²⁰ Although the SMS text reminders have shown attendance rate improvements, other efforts such as telephone reminders and smart phone 'apps', as well educating patients of the importance of attendance should be implemented to increase compliance.

Conclusion

The failure to attend orthodontic appointments was approximately 15% in the Otago University's Orthodontic Clinic, New Zealand. Patients of lower socioeconomic status, Māori and Pasifika peoples and morning appointments showed higher FTA rates. Bonding appointments had the lowest FTA rate. FTA significantly decreased after the introduction of a SMS text reminder system. The results of the present study may be useful in predicting potential missed appointments and further, to implement strategies that target particular groups to improve attendance rates for the enhancement of clinical efficiency (Table VI).

Conflicts of interest

The authors declare that there is no conflict of interest.

Data availability statement

All data have been presented in the article.

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Acknowledgement

The authors would like to thank Professor Mauro Farella for his contribution in this study.

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