

# Sociodemographic Backgrounds and Career Decisions of Australian and New Zealand Dental Students

Rodrigo J. Mariño, Ph.D.; Michael V. Morgan, Ph.D.; Tracey Winning, Ph.D.;  
W. Murray Thomson, Ph.D.; Roderick I. Marshall, M.D.Sc.; Theo Gotjamanos, Ph.D.;  
Wendell Evans, D.D.S.

*Abstract:* This article describes the sociodemographic and career selection characteristics of dental students in Australia and New Zealand. A total of 672 dental students participated in the study. The survey covered age, language proficiency, type of school attended, place of residence, parental occupation, and level of education. The respondents had an average age of twenty-two years, with a range of eighteen to fifty. Fifty-six percent of respondents were female, and approximately half had completed secondary education in private schools with 44.3 percent having finished in public schools. The majority of students lived with their parents, with only a few respondents reporting a rural home address (6.8 percent). The majority of students (65.3 percent) had placed dentistry as their first career choice and had most likely made the decision after leaving high school or near the end of high school (81.4 percent), with self-motivation being the major influence on their decision. This study provides a description of the sociodemographic profile of Australian and New Zealand dental students and provides a better understanding of career decision issues. It also highlights areas for further investigation and management by educational institutions and public policy.

Dr. Mariño is Senior Research Fellow, Cooperative Research Centre in Oral Health Science, University of Melbourne, Australia; Dr. Morgan is Associate Professor, School of Dental Science, University of Melbourne, Australia; Dr. Winning is Senior Lecturer, Dental School, University of Adelaide, Australia; Dr. Thomson is Associate Professor, School of Dentistry, University of Otago, New Zealand; Dr. Marshall is Senior Lecturer, School of Dentistry, University of Queensland, Australia; Dr. Gotjamanos is Associate Professor, School of Dentistry, University of Western Australia, Australia; and Dr. Evans is Associate Professor, Faculty of Dentistry, University of Sydney, Australia. Direct correspondence and requests for reprints to Dr. Rodrigo Mariño, Cooperative Research Centre in Oral Health Science, University of Melbourne, Melbourne VIC 3010, Australia; 61-03-9341-0225 phone; 61-03-9341-0339 fax; rmarino@unimelb.edu.au.

This project was supported by a University of New England, NSW, Australia, Internal Research Grant.

*Key words:* sociodemographic profile, dental students, Australia, New Zealand, career decision

*Submitted for publication 6/20/05; accepted 10/17/05*

The proportion of overseas-born students, particularly from Asian countries, in Australian and New Zealand universities has increased substantially.<sup>1</sup> This is mainly due to immigrations to Australia and New Zealand (NZ) that have increased substantially in the last fifty years and because of increasing numbers of students who choose to study outside their own country. Accordingly, there has also been a concomitant increase in ethnic and cultural diversity among students in dental schools. At the time of this survey, around 1,500 students were enrolled in the five dental schools in Australia (Adelaide, Melbourne, Queensland, Sydney, and Western Australia) and one in NZ (Otago). One year later, a sixth Australian dental school was opened at Griffith University in Queensland.

Until 1985, most dental graduates and students were from European or Anglo-Australian/NZ backgrounds. Since then, Asian-background students have enrolled in increasing numbers, altering the ethnic composition of dental classes. At the University of Melbourne's School of Dental Science, students born overseas comprised 32 percent of the dental student population in 1994. In the same year, this proportion was greater than 65 percent at the University of Sydney's Faculty of Dentistry and almost 80 percent in 1995.<sup>2</sup> This demographic trend indicates that Australia's future dental workforce, like other health professions, will have a growing proportion of professionals who have culturally and linguistically diverse (CALD) backgrounds. In the future, many dentists will be from Asian backgrounds, as reflected by

the current dental student composition.<sup>3,4</sup> With the exception of some studies conducted in Sydney<sup>2,5,6</sup> and in NZ,<sup>7</sup> no attempt has been made recently in Australia or NZ to describe the sociodemographic profile of dental students nationally. Furthermore, little research has been conducted on multicultural dental education in Australia and NZ.

There are two main ways in which this type of research has practical significance for dental education. First, there is a need for up-to-date data on dental students for planning purposes (for example, type and location of career information and support provided for students); second, an increasingly diverse student population will have an impact on curricula, as well as continuing and postgraduate education, professional retention, and practice location (e.g., to address the rural/remote areas shortage); and third, there is a need for information on students' satisfaction with their courses. Improved knowledge of these characteristics will provide a base for guiding planners in the design of dental education programs particularly in the area of cultural diversity awareness both within the profession and in its interaction with the community. Better knowledge of these characteristics will also provide a base to describe and better manage the future dental workforce in Australia and NZ. Therefore, the purpose of this study was to offer descriptive data on Australia and New Zealand dental students as a necessary first step that can inform policymakers in the design and implementation of recruitment and retention programs.

---

## Methods

Data were collected using a self-completion questionnaire that was part of a study of the cultural values of Australia and NZ dental students.<sup>8,9</sup> Data were collected in 2002 from undergraduate dental students in all years at the universities of Melbourne, Adelaide, and Western Australia. The same year, data were collected from those in the second, fourth, and fifth years at the University of Queensland School of Dentistry and from second- to fifth-year students at the University of Otago School of Dentistry. In 2002, the University of Queensland's Dental School was under curriculum modification and did not offer first- and third-year classes for that year. During 2003, data were collected from students in all years at the University of Sydney Faculty of Dentistry. Participation was anonymous and voluntary. The Human

Research Ethics Committee (or its equivalent) at each of the universities involved in this project approved the study protocol.

A short description of the Australian/NZ systems of dental training is essential to place our findings into a context. All courses are of five-year duration, except Sydney, which offers a four-year program. Two schools (Queensland and Otago) have a common first year with science/health science students. At the University of Otago, first-year dentistry is common with other health sciences courses, and students apply for admission to dental school at the end of that first year. With the exception of Sydney, which only accepts students after completion of a university degree (college education), all schools accept students directly from high school as well as students who have had other university experience ("tertiary transfer"). The selection process and policies differ across schools, with some using academic components based only on university performance (Queensland and Otago), while the rest use a combination of academic performance, admissions tests, and structured interviews. Since the study was conducted, the University of Otago has changed to the latter system. Because the Faculty of Dentistry in Sydney was in transition, students from the first to third years were from the graduate Bachelor of Dentistry program (introduced in 2001) and students from the fourth and fifth years were from the previous Bachelor of Dental Surgery program.

Academics at each dental school/faculty coordinated the data collection at each site. The questionnaire consisted of three sections: sociodemographic (thirty-four items), career choice (nineteen items), and value orientations (forty-five items; reported elsewhere).<sup>9</sup> The questionnaire also sought information on parental socioeconomic status (SES). All questionnaires were returned to the principal investigator (RJM) for input and analysis.

The following sociodemographic variables were selected based on previous studies to enable analysis of similarities/differences.<sup>2,5-7</sup> Other variables related to immigration were selected as these have been shown to enable classification of members of a ethnically diverse society.<sup>10</sup> Sociodemographic information used in this analysis included age, sex, marital status, and living arrangement classified into four groups: "Parental home"; "Renting shared home with non-family members"; "Boarding house, hostel, or university housing (dormitories)"; and "Others," which included living in

home of other relative or family friend, own place, etc. Participants were classified according to their last high school attended using the following categories: "Public high school" (government); "Private high school" (fee-paying); "Technical school"; and "Other high schools."

The following immigration variables were collected: age at arrival and year of arrival. Ethnicity in the dental students sample was determined by country of birth and/or parents' birthplace and classified into four groups: "Anglo-Australian," "Asian," "Other," and "International students." Anglo-Australian students were those born in Australia, the United Kingdom, NZ, or Ireland with parents and grandparents also born in these countries. Although it is hard to argue that there is such a thing as an "Asian culture" due to the diversity among Asian countries, "Asian" students were defined as those Australian/NZ-born or permanent residents in Australia and NZ whose ancestral origins were in east Asia, China (Taiwan, Hong Kong, or PRC), south Asia (India, Sri Lanka, Mauritius, and Burma), or southeast Asia (Vietnam, Malaysia, and Indonesia).<sup>11,12</sup> Those students identified as "Other" came from a range of European backgrounds other than the United Kingdom or Ireland (e.g., Greek, Italian, Russian) or from Latin America, Africa, or the Middle East. International students were those residing in Australia for the purpose of studying, but whose permanent residence was overseas. Generation relative to Australia was determined by report of place of birth or place of birth of parents and grandparents. For those from non-English-speaking backgrounds, language proficiency was assessed by asking about the language first learned and their proficiency in written and spoken English and understanding spoken English. Answers were in a multiple-choice format, coded 1 (Very well) to 4 (Not well).

Career choice variables included their career option preferences and the time of choosing dentistry as a career option, classified as "Early in high school," "Late in high school," and "After leaving high school." Students were also asked whether they worked or commenced other degrees before entering dental school (and how many years they had studied at that university). Those who answered positively were asked further to state the period before commencing dentistry.

Students were also asked to indicate their level of agreement with six statements about their reasons for choosing dentistry as a career and their level of

agreement with eight persons influencing their selection of dentistry as a career (including self-motivation, father, mother, relative or family friend, family dentist, other person within the dental profession, vocational counselor, and school teacher) utilizing a 5-point scale (1=Little influence to 5=Strong influence).

Participants were asked to indicate the postal code (zip code) of their parents or usual place of residence. Using the Australia Post's local delivery service guidelines,<sup>13</sup> Australian home addresses were classified as being "Urban," "Rural," or "International" (there was also an "Interstate" category). Locations in NZ were classified according to size. Socioeconomic status was determined by asking students to identify the parental level of education (including primary, secondary, technical, and trade; undergraduate; and postgraduate education) and parental occupation. Parental occupation was reclassified into four groups, based on the Australian industrial classification<sup>14</sup>: "Managers and professionals," "Paraprofessionals," "Trades clerks and personal services," and "Laborers and related workers and not in paid jobs."

The first part of the analysis provides a comprehensive profile of dental students in Australia based on the distribution of selected socio-demographic, immigration, and study variables. Chi-square analysis was used for nominal or ordinal variables, while continuous variables were compared using one-way analysis of variance (ANOVA) and post hoc comparisons using Tukey's Honestly Significant Differences test. Data were analyzed using SPSS v.13.0.

---

## Results

Six hundred and seventy-two students participated in the study. One hundred and fifty-five were from the School of Dental Science, University of Melbourne (23.1 percent); 141 were from the Faculty of Dentistry, University of Sydney (21.0 percent); 120 were from the Dental School, University of Adelaide (17.8 percent); seventy were from the School of Dentistry, University of Queensland (10.4 percent); and sixty-five were from the School of Dentistry, University of Western Australia (9.7 percent). The remaining 121 (18.0 percent) were from the School of Dentistry, University of Otago. Response rates at each of the dental schools ranged from

51 percent to 59 percent. Table 1 presents the distribution of students by school.

## Sociodemographic Profile

Students' ages ranged from eighteen to fifty years with an overall mean of 22.2 years (s.d. 3.9 years). Owing to differences in study plan, there were differences in students' ages among the different schools ( $p < 0.001$ ), with Sydney showing a higher mean age (24.6 years) than all of the other dental schools. Over half of the total responding students were between twenty-one and twenty-four years old, while one-third were younger than twenty-one and almost one in six were older than twenty-four (including sixteen students who were thirty-five years or older). More than half of the participants (56.1

percent) were female, with no significant differences by school. However, about two-thirds of the international students were female (67.1 percent).

Where marital status is concerned, most reported being single (90.0 percent); another 8.4 percent were married or cohabiting; and the remaining 1.6 percent indicated being divorced, widowed, or other status.

In addition to Australia and NZ, the students reported forty-nine different countries of birth, with those from Sydney and Melbourne presenting the most variation. Of those who reported an overseas country of birth, the most frequent countries of origin were China (including PRC, Taiwan, and Hong Kong; 15.8 percent), Malaysia (9.1 percent), Korea (4.8 percent), Vietnam (3.6 percent), India (3.1 percent), and Singapore (3.1 percent). Some 203 par-

**Table 1. Distribution of demographic characteristics (percentages) of dental students in Sydney, Melbourne, Adelaide, Western Australia, Brisbane, and Otago (New Zealand)**

	Australia					New Zealand
	Sydney (n=141) <sup>‡</sup>	Melbourne (n=155)	Adelaide (n=120)	Queensland (n=70)	W. Australia (n=65)	Otago (n=121)
Mean age (s.d.)	24.6 (3.9)	20.7 (2.2)	21.6 (3.6)	22.8 (4.7)	20.8 (3.2)	22.3 (4.2)
Age group						
Younger than 21	1 (0.7%)	71 (46.1%)	54 (45.4%)	23 (32.9%)	38 (58.4%)	39 (32.2%)
21 to 24 years old	91 (65.0%)	74 (48.1%)	48 (40.3%)	35 (50.0%)	20 (30.8%)	71 (58.7%)
Older than 24 years	48 (34.3%)	9 (5.8%)	17 (14.3%)	12 (17.1%)	7 (10.8%)	11 (9.1%)
Gender						
Female	70 (49.6%)	88 (57.5%)	77 (64.2%)	37 (53.6%)	37 (56.9%)	66 (54.5%)
Male	71 (50.4%)	65 (42.5%)	43 (35.8%)	32 (46.4%)	28 (43.1%)	55 (45.5%)
Ethnic group						
Anglo Austr/NZ	36 (25.5%)	29 (18.7%)	41 (34.1%)	29 (41.4%)	25 (38.5%)	44 (36.4%)
Asian	58 (41.1%)	96 (61.9%)	38 (31.7%)	24 (34.3%)	28 (43.1%)	64 (52.8%)
Other	29 (20.6%)	13 (8.4%)	17 (14.2%)	13 (18.6%)	11 (16.9%)	7 (5.8%)
International	18 (12.8%)	17 (11.0%)	24 (20.0%)	4 (5.7%)	1 (1.5%)	6 (5.0%)
Secondary education						
Public school	51 (36.4%)	57 (37.2%)	36 (30.3%)	28 (40.0%)	30 (46.2%)	75 (62.5%)
Private school	62 (44.3%)	80 (52.3%)	58 (48.7%)	35 (50.0%)	33 (50.8%)	27 (22.5%)
Other	27 (19.3%)	16 (10.5%)	25 (21.0%)	7 (10.0%)	2 (3.1%)	18 (15.0%)
Living arrangement						
With parents	61 (43.6%)	98 (63.2%)	47 (39.2%)	46 (65.7%)	49 (75.4%)	7 (5.8%)
Renting	25 (17.8%)	9 (5.8%)	23 (19.2%)	8 (11.4%)	8 (12.3%)	17 (14.0%)
Colleges	5 (3.6%)	14 (9.0%)	19 (15.8%)	4 (5.7%)	2 (3.1%)	6 (5.0%)
Other	49 (35.0%)	34 (21.9%)	31 (25.8%)	12 (17.2%)	6 (9.2%)	91 (75.2%)
Place of residence*						
Urban	74 (70.4%)	103 (79.8%)	51 (63.0%)	42 (76.4%)	55 (90.2%)	75 (88.2%)
Rural	3 (2.9%)	10 (7.8%)	3 (3.7%)	8 (14.5%)	3 (4.9%)	10 (10.8%)
Interstate	28 (26.7%)	16 (12.4%)	27 (33.3%)	5 (9.1%)	3 (4.9%)	—

<sup>‡</sup> Number on each of the categories may vary from the total due to missing values.

\* International students, not reported, and other not well defined places not included.

ticipants were Anglo-Australian/New Zealanders (30.2 percent), while 309 were Asian (46.0 percent) and 90 (13.4 percent) were of "Other" origins.

Additionally, there were seventy "International students" (10.4 percent), defined as students whose permanent residences are overseas. International students were from eighteen countries, mainly Malaysia (30.0 percent), Singapore (21.4 percent), Canada (12.9 percent), and Korea (5.7 percent). In Adelaide, 20 percent of the respondents were international students, while there was only one international student in Western Australia. A significant association was found in the ethnic distribution by location ( $\chi^2(15)=69.26$ ;  $p<0.001$ ), with respondents from Melbourne (61.9 percent) more likely to have an Asian background, but less likely to report the "Other" background.

Those who were not born in Australia/NZ and who were not from Anglo-Australian/New Zealander descent or international students were immigrants or children of immigrants ( $n=297$ ) who arrived in Australia before 1990 (38.2 percent) or between 1990 and 1994 (30.3 percent). Another 31.5 percent had arrived after 1994. The average age of arrival was 12.0 years (s.d. 7.1 years) with Otago showing a higher age of arrival than the students from Melbourne and Western Australia ( $F(5,266)=7.75$ ;  $p<0.001$ ). Of those born in Australia from non-Anglo-Australian/New Zealander descent ( $n=99$ ), 90.9 percent were first-generation Australians (born in Australia from overseas-born parents), three were second-generation (3.0 percent), and 6.1 percent were third-generation Australians. Parental country of birth included thirty-four different countries, such as Malaysia (45.9 percent), Vietnam (24.5 percent), China (13.3 percent), Hong Kong (12.2 percent), Italy (12.2 percent), and India (11.2 percent).

Of those students with Australian or NZ residence, 47.8 percent had attended a private high school; 44.3 percent had completed secondary education in a public high school; and 7.9 percent attended other types of schools. Participants from NZ were more likely to have attended public schools (62.5 percent), and students from Adelaide were less likely to have attended a public school (32.6 percent) ( $\chi^2(10)=45.42$ ;  $p<0.001$ ). Moreover, students of Asian or "Other" backgrounds were more likely to have attended a public high school ( $\chi^2(4)=23.56$ ;  $p<0.001$ ).

Almost half of the respondents (45.9 percent) were living with parents while studying. Another one-third (32.2 percent) were living in rented accommo-

modation, and 7.5 percent were living in university housing (dormitories). The remaining 13.4 percent were in "Other" types of accommodation. The type of accommodation differed significantly among locations ( $\chi^2(15)=190.77$ ;  $p<0.001$ ): NZ students were more likely to live outside their home (94.2 percent), while this was true of only 45.3 percent of Australian students, although a substantial proportion of Adelaide and Sydney students were also living outside the parental home (60.8 percent and 56.4 percent, respectively). Additionally, there were differences among those who reported their home address. For example, in Western Australia, 90.2 percent of the students indicated urban home addresses, by comparison with only 63.0 percent in South Australia ( $p<0.001$ ). The highest proportion of rural students was reported by Queensland (14.5 percent), followed by Otago (9.8 percent), while the lowest was Sydney (2.9 percent). Consistent with the information reported previously on living arrangement, a substantial proportion of Adelaide and Sydney students reported interstate parental addresses (33.3 percent and 26.7 percent, respectively).

The great majority of non-Anglo-Australian background (>90 percent) reported that they understood spoken and written English "very well" or "well." In addition, 80.6 percent of the participants indicated that they could express themselves in English "very well" or "well." Only four students (1.3 percent) indicated that they could not express themselves well in English. On the other hand, English was regarded as the first language for only 6.0 percent ( $n=19$ ).

## Parents' Occupation and Education

Most fathers (67.6 percent) and mothers (51.4 percent) had an undergraduate or postgraduate education; this included 26.0 percent of fathers and 11.8 percent of mothers with postgraduate studies. There was no significant association between parents' level of education and location. With respect to ethnicity, Asian fathers were more likely to have reported an undergraduate or postgraduate education (76.7 percent) than those from other groups [ $\chi^2(12)=39.18$ ;  $p<0.001$ ].

A substantial proportion of fathers (64.4 percent) and mothers (42.1 percent) were employed in managerial or professional occupations, while another 21.7 percent of fathers and 29.3 percent of mothers were working in paraprofessional or personal services occupations. A further 5.1 percent of

fathers and 3.2 percent of mothers were employed in laboring occupations. Additionally, 18.1 percent of mothers were not in remunerated employment. The remaining 9.0 percent of fathers and 7.5 percent of mothers were in other or not well-defined occupations. With respect to ethnicity, Asian and international students' mothers were less likely to have reported managerial or professional occupations and more likely to report "Other" occupations than those from other groups [ $\chi^2(12)=35.20$ ;  $p<0.001$ ].

## Choosing Dentistry as a Career

The majority of students (65.3 percent) had placed dentistry as their first career choice. This proportion ranged from 58.1 percent in Melbourne to 77.1 percent in South Australia. On the other hand, 24.8 percent had placed medicine as their first preference. The remaining (9.9 percent) indicated nineteen other professions, mostly in the biological/health sciences area. Of the 225 who completed this question and had not placed dentistry as their first career preference, 65 percent had selected dentistry as their second choice, and only twenty-six students reported dentistry as their third career choice. In particular, Asian students were less likely to have named dentistry (54.8 percent) as their first career option [ $\chi^2(2)=24.43$ ;  $p<0.01$ ]. Among those Asian students

who had not named dentistry as their first choice, 73 percent had named medicine. No gender differences were present.

The most common reported time for choosing dentistry as a career was after leaving high school (42.8 percent), followed by late in high school (38.6 percent); only 18.6 percent indicated early in high school. More Asian students decided later (either late in high school or after leaving high school) [ $\chi^2(6)=16.54$ ;  $p<0.05$ ]. In particular, females of Asian descent tended to choose dentistry either late in high school or after leaving high school more frequently than other females [ $\chi^2(6)=18.62$ ;  $p<0.01$ ]. No significant differences were observed among males.

Over half the respondents (58.2 percent) had started studying dentistry immediately after leaving high school. Of those who did not, 63.0 percent had had some previous university experience. Reflecting entry requirements, students from Melbourne (79.7 percent) and Otago (89.0 percent) were significantly more likely to have started immediately after leaving high school, while those from Sydney (25.0 percent) and Queensland (32.9 percent) were less likely to start the career immediately after leaving high school [ $\chi^2(5)=157.84$ ;  $p<0.001$ ]. No gender differences were observed, but Asian students were more likely to have started immediately after leaving high school (71.4 percent) [ $\chi^2(3)=44.40$ ;

**Table 2. Percent response for all participants for person influencing student's choice of dentistry as a career and motivation for choosing dentistry as a career**

Influence on choice/decision	Little influence ←————→ Strong influence				
	①	②	③	④	⑤
Self-motivation	3.8	2.3	12.5	33.9	47.5
Father	22.4	14.0	24.2	25.1	14.3
Mother	18.5	16.1	28.5	24.2	12.7
Relative or family friend	40.2	17.7	21.9	14.3	5.9
Family dentist	47.5	13.7	16.3	15.5	7.0
Other person within the dental profession	51.0	12.8	14.3	13.6	8.3
Vocational counselor	78.0	10.7	7.9	2.6	0.8
School teacher	80.5	10.9	6.6	1.2	0.8
<b>Motivation for choice</b>					
Desire to work for and with people	2.5	3.6	12.9	39.1	41.9
Expected lifestyle perceived within the profession	2.9	6.7	18.2	41.1	31.1
Interest in work of the profession	2.5	4.5	20.2	39.0	32.8
Desire to work independently	6.2	12.6	19.4	28.6	33.2
Monetary advantages of the profession	3.8	8.9	26.3	41.5	19.5
Better chance of entering and completing dental course than other courses	51.6	19.5	17.4	7.1	4.4

$p < 0.001$ ]. For those who did not start immediately after leaving high school ( $n=280$ ), the intervening period ranged from one to twenty-three years. However, the largest group (43.9 percent) indicated either that they started dentistry after one (29.0 percent) or two years (14.9 percent) after leaving high school. Another 33.5 percent started their career between three and five years after leaving high school.

Data on the persons influencing the selection of dentistry as a career are presented in Table 2. For most respondents (81.4 percent), the decision was strongly self-motivated. In addition, parents and dental professionals played an influential role in that decision for a lower proportion of participants (around 39.0 percent and 22.0 percent, respectively). On the other hand, few students indicated that school-teachers (2.0 percent) or vocational counselors (3.4 percent) exerted any influence on their career selection. No significant differences were present between the dental schools. However, Anglo-Australian/New Zealanders and "Other" students indicated that self-motivation strongly influenced their selection [ $\chi^2(12)=62.72$ ;  $p < 0.001$ ]. Similarly, the influence of the dentist and dental professionals was stronger among Anglo-Australian/New Zealanders or international students compared with Asian and "Other" students [ $\chi^2(12)=34.41$ ;  $p < 0.001$ ;  $\chi^2(12)=31.24$ ;  $p < 0.01$ , respectively]. Parents were more influential among Asian students, in particular the mother, than among Anglo-Australian or New Zealander students [ $\chi^2(12)=25.21$ ;  $p < 0.02$ ].

Students were also asked why they chose dentistry as a profession (Table 2). Almost all items in this assessment were reported as strong influences (more than 60 percent), with the exception of the item "Better chance of entering and completing dental course than other courses," where 71.1 percent indicated little influence. There was only one significant difference by school: the reason "Desire to work independently" was more influential among Sydney students but less important for students from Queensland compared to students from other schools [ $\chi^2(20)=45.78$ ;  $p < 0.01$ ]. Statistically significant differences were also present by ethnic group and by gender. The "desire to work for and with people" was endorsed by fewer Asian students than by any other ethnic groups [ $\chi^2(12)=32.52$ ;  $p < 0.001$ ]. Similarly, the "desire to work independently" was less important for Anglo-Australian/New Zealanders, by comparison with international students [ $\chi^2(12)=22.83$ ;  $p < 0.05$ ]. Asian students were more likely to indicate that, by choosing dentistry, they had a "bet-

ter chance of entering and completing dental course than other courses" [ $\chi^2(12)=24.72$ ;  $p < 0.05$ ]. There were also gender differences, whereby more females than males tended to agree with the statement "desire to work for and with people" [ $\chi^2(4)=17.09$ ;  $p < 0.01$ ]; the "monetary advantages of the profession" statement was endorsed by significantly more males than females [ $\chi^2(4)=11.09$ ;  $p < 0.05$ ].

---

## Discussion

The educational philosophy, entry requirements, and selection procedures varied enormously among schools, and, not surprisingly, the impact of these requirements was reflected in the students' sociodemographic profile. In Sydney, for example, students must possess a previous degree to enter the dental school, meaning that Sydney students were considerably older than the others. Despite this, the profile of the dental students in Australia/NZ was generally in agreement with findings from earlier studies.<sup>2,5-7</sup> For example, the majority of students started dentistry immediately after high school, reported dentistry as their first career choice, made that choice as a reflection of their desire to work with and for people, and made it independently.<sup>6</sup> Financial security was also an important factor in this decision. The gender ratio indicates that the "feminization of dentistry" continues.<sup>2,6</sup> This trend has also been reported in the United States,<sup>15,16</sup> Denmark,<sup>17</sup> France,<sup>18</sup> the UK,<sup>19,20</sup> and Tunisia.<sup>21</sup> For example, the proportion of female first-year students in Sydney went from 29 percent in 1985 to 62 percent in 1999.<sup>6</sup> This is important for workforce planning as previous research has indicated that women follow a pattern different from their male counterparts.<sup>22-27</sup> Male students were also underrepresented among international students.

In addition to an increase in the female representation among dental students, there was an increasing number of students from minority groups. A similar trend has been observed in the United States,<sup>28</sup> the UK,<sup>29</sup> and South Africa.<sup>30</sup> However, unlike those other countries, the largest proportion of dental students in Australia/NZ is not from an Anglo-Australian/NZ background. In fact, using this study's ethnic groups categories, Anglo-Celtics are, by and large, a minority within Australia and NZ dental schools, where CALD students are more highly represented. For example, in 1992, 34 percent of dental students in the first year at Sydney University were

Anglo-Australian,<sup>6</sup> whereas, in 2003, 25.5 percent were from Anglo-Australian backgrounds. In considering ethnic patterns among dental students, it is important to take into account the size of these groups in the Australian and NZ population. For example, in 2001, nearly 16 percent (417,300) of the fifteen to twenty-four-year-olds indicated that they spoke a language other than English at home.<sup>31</sup> This overrepresentation of minorities in dental education has also been reported by Bedi and Gilthorpe<sup>19</sup> in England, where Indian representation in dental schools was higher than in the broader English population.

Concerning the socioeconomic status of students, details of their parental income was not sought, but the data on parental professional status and level of education (as well as the students' secondary school attendance) indicate that, across locations and consistent with other studies,<sup>2,6,29</sup> the majority of students came from high socioeconomic groups or highly educated families. For example, at the University of Sydney, the data show a decrease in the number of students who attended public high schools, down to 36.4 percent in the present study from 50 percent in 1995<sup>2</sup> and 55 percent in 1985.<sup>5</sup>

Dental students appear to be fairly dependent, given that (overall) 45 percent live with parents during their studies (compared with only 24 percent of French students<sup>18</sup>). Moreover, when the Otago students are omitted from the analysis (because the geographic location of the Otago School of Dentistry is far from the parental home for most students) and international students are not considered, 61 percent of Australian students were living at home, which approaches recent data reported by Gietzelt<sup>2</sup> in 1995 where 70 percent of Sydney first-year dental students were living with their parents. It should be noted that the dependence noted in the current study is only with respect to housing accommodation; we did not explore the issue of economic independence.

In Australia and NZ, there has been a reduction of government funding for the higher education sector.<sup>7,32,33</sup> To compensate for this reduction, some schools have increased the recruitment of international and domestic full-fee paying students.<sup>1,33</sup> However, other researchers have attributed the increase in international students numbers to an effort to compensate for the decrease in the local youth population.<sup>34</sup> Whatever the case, an average of almost one in ten of the students enrolled in Australian/NZ dental schools in 2002-03 were international students, the majority of them being Asian-born. The majority of these students are, however, located in Adelaide with substantial

numbers in Sydney and Melbourne. For those schools where the numbers of these students have continued to increase (nearly 40 percent in Adelaide), additional efforts to better understand the impact of globalization in dental education are needed.

Future lines of inquiry should include developing a better understanding of the effects of different approaches to learning and education, in particular that of CALD and international students. This already has commenced in medical education and requires an institutional response to determine the level to which the Australian and NZ approaches to education might disadvantage these students with respect to their learning or communication styles or in relation to power and the evaluation of their performance.<sup>35</sup> There may be reluctance to actively participate in tutorials and class discussion; note taking; lecture comprehension; writing and language skills; interaction with academics, clinicians, and patients; and application of knowledge about cultural rules to assess patients' emotional states and/or health situation.<sup>35,36</sup> However, CALD students (including international students) are a diverse group; therefore, there is a need to characterize them and their experience and then identify a range of strategies to support them in their studies. For example, the Faculty of Medicine, Dentistry, and Health Science at the University of Melbourne has developed a support program for international and CALD students designed to provide linguistic and cross-cultural support throughout their academic studies.<sup>35</sup>

Diversity is not only about culture; from a broader perspective, diversity also includes the rural vs. urban divide and issues of socioeconomic disadvantage. Regarding the former, there is a shortage of dentists in rural areas, and the present study found a very small number of students came from rural areas. This suggests that programs aimed at attracting rural students to dentistry and promoting working in areas of shortage should continue to be supported publicly and possibly be more specifically and appropriately targeted for specific subgroups within the secondary students' population.

Evidence in Australia indicates that rural background and rural under- and postgraduate medical education increase the probability that doctors will work in rural practices.<sup>37,38</sup> Still, further evaluation of the impact of these initiatives, particularly in dentistry, including longitudinal approaches, is warranted. This information would increase our understanding of how the decision process develops over time and the effectiveness of the different strategies

used to attract, recruit, and retain rural dental practitioners. This information would also provide valuable guidance for policymakers searching for information to develop plans for public policy and funding to address the key question of access to oral health care in rural/remote communities by addressing workforce issues.

Most of the students (65 percent) placed dentistry first in their career choice, and the majority of those who did not had dentistry as their second choice (65 percent). This represents an increase from the 43 percent who placed dentistry as the first choice for the 1981-85 period reported by Sivanewaran and Barnard<sup>39</sup> and by Geitzel<sup>2</sup> in the mid-1990s. However, Sivanewaran and Barnard<sup>39</sup> found no difference in the academic performance or graduation rate between “first choice” students and other students. Still, this is in contrast to the almost 90 percent reported by Stewart et al. in the UK.<sup>20</sup> Qualitative approaches are required to explore and understand students’ reasons for choosing or not choosing dentistry as a career. In addition, in light of the oral health professional shortage, longitudinal studies should investigate the career path and retention in the profession according to career choices.

The study’s findings indicate that the profile of students is changing rapidly. In the light of this, it is important to determine which societal groups are underrepresented in or omitted from dental education. This requires not only examination of the economic forces at play in society, but also the impact of how we socially organize dentistry as a profession. This is consistent with the notion of equality of access to higher education.<sup>7</sup> Future studies should also examine Australian and NZ policy on crucial areas such as dental student selection from rural and other underrepresented communities.

Certain limitations of this study need to be pointed out—notably, the self-selection of participants and the self-reported nature of the data. Furthermore, although the response rates were consistent with other reports for dental students,<sup>7,40,41</sup> they were low. As in other studies and consistent with ethical guidelines, we did not use any method to influence participants to respond. While it is uncertain whether the present sample truly reflects the demographic profile of dental students in Australia and NZ, as noted previously, there are similarities in the findings to other national and international studies. Thus, despite this low response, the results contribute to our knowledge of differences/similarities among dental students. The findings should help

identify issues for analysis and clarify the task of each university to address the current and growing diversity of dental students and inequalities in dental education that are arising. These inequalities relate to the decreased enrollment of lower SES groups, limited rural/remote involvement, potential language issues, and support that may be needed for students living away from home.

---

## Acknowledgments

This study was supported by a grant from the Faculty of Education Health and Professional Studies, University of New England (Armidale, NSW, Australia) Internal Research Grant. The authors would like to acknowledge the cooperation of students and their participating dental schools in the conduct of this study.

---

## REFERENCES

1. Dobson I, Birrell B, Rapson V. The participation of non-English-speaking-background persons in higher education. *People and Places*. At: [elecpress.monash.edu.au/pnp/free/pnpv4n1/dobson.htm](http://elecpress.monash.edu.au/pnp/free/pnpv4n1/dobson.htm). Accessed: October 7, 2005.
2. Geitzel D. Social profile of first-year dentistry students at the University of Sydney. *Aust Dent J* 1997;42:259-66.
3. National Health Strategy. Removing cultural and language barriers to health. Issues paper No. 6. 1993.
4. Betts C. Medical students and the changing make up of the Australian Medical Force. *People and Places* 1994; 2:24-7.
5. Sivanewaran S, Barnard PD. Some social characteristics and background of first-year dental students, University of Sydney, 1976-85. *Aust Dent J* 1992;37:378-85.
6. Brand AA, Chikte UM, Thomas CJ. Choosing dentistry as a career: a profile of entering students (1992) to the University of Sydney, Australia. *Aust Dent J* 1996;41:198-205.
7. Dixon G. The changing profile of undergraduate dental students at the University of Otago 1992-1994. *N Z Dent J* 1996;92:9-12.
8. Mariño R, Stuart G. The validity and reliability of the Tertiary Student Values Scale (TSVS). *Med Educ* 2005;39:895-903.
9. Mariño R, Stuart G, Morgan M, Winning T, Thompson M. Cultural consistency in Australian dental students from different ethnic backgrounds. *J Dent Educ* 2004;11: 1178-84.
10. Mariño R, Stuart GW, Minas H. Acculturation of values and behaviour: a study of Vietnamese immigrants. *Meas Eval Couns Dev* 2000;33:21-41.
11. Su Z, Golstain S, Suzuki G, Kim T. Socialization of Asian American in human service professional schools: a comparative study. *Urban Educ* 1997;32:279-303.
12. Schwartz SH, Bardi A. Value hierarchies across cultures: taking a similarities perspective. *J Cross Cult Psychol* 2001;32:268-90.

13. Australia Post. Local delivery service. At: [www.auspost.com.au/BCP/0,1080,CH2040percent7EMO19,00.html](http://www.auspost.com.au/BCP/0,1080,CH2040percent7EMO19,00.html). Accessed: March 2, 2005.
14. Australian Bureau Statistics. Australian standard industrial classification. Canberra: Australian Government Publishing Services, 1985.
15. American Dental Association. The future of dentistry. At: [www.ada.org/prof/resources/topics/futuredent/index.asp](http://www.ada.org/prof/resources/topics/futuredent/index.asp). Accessed: May 5, 2005.
16. Scarbecz M, Ross JA. Gender differences in first-year dental students' motivation to attend dental school. *J Dent Educ* 2002;66:952-61.
17. Vigild M, Schwarz E. Characteristics and study motivation of Danish dental students in a longitudinal perspective. *Eur J Dent Educ* 2001;5:127-33.
18. Hennequin M, Tubert S, Devillers A, Muller M, Michalesco P, Peli JF, et al. Socioeconomic and schooling status of dental undergraduates from six French universities. *Eur J Dent Educ* 2002;6:95-103.
19. Bedi R, Gilthorpe MS. Ethnic and gender variations in university applicants to United Kingdom medical and dental schools. *Br Dent J* 2000;189:212-5.
20. Stewart FMJ, Drummond JR, Carson L, Hoad Reddick G. The future of the profession: a survey of dental school applicants. *Br Dent J* 2004;197:569-73.
21. Maatouk F, El-May W, Ghedira H, Fathallah N. Profile of first year dental students in Tunisia. *East Mediterr Health J* 2001;7:52-9.
22. Seward MH, McEwen ME. The provision of dental care by women dentists in England and Wales in 1985: a ten year review. *Br Dent J* 1987;162:50-1.
23. Matthews RW, Scully C. Working patterns of male and female dentists in the UK. *Br Dent J* 1994;176:463-66.
24. de Wet E, Truter M, Ligthelm AJ. Working patterns of male and female dentists in South Africa. *J Dent Assoc S Afr* 1997;52:15-7.
25. Atchison KA, Bibb CA, Lefever KH, Mito RS, Lin S, Engelhardt R. Gender differences in career and practice patterns of PGD-trained dentists. *J Dent Educ* 2002;66:1358-67.
26. Kruger E, Tennant M. A baseline study of the demographics of the oral health workforce in rural and remote Western Australia. *Aust Dent J* 2004;49:136-40.
27. Teusner D, Spencer J. Dental labour force, Australia 2000. AIHW Cat No, DEB 116. Canberra: Australian Institute of Health and Welfare, 2003.
28. Noonan AS, Evans CA. The need for diversity in the health professions. *J Dent Educ* 2003;67:1030-3.
29. Bedi R, Gilthorpe MS. Social background of minority ethnic applicants to medicine and dentistry. *Br Dent J* 2000;189:152-4.
30. Brand AA, Chikte UM. Choosing dentistry as a career—Part I: A comparison of student motives. *J Dent Assoc S Afr* 1992;47:469-73.
31. Australian Bureau Statistics. Census of Population and Housing: Australia's youth. 2004. (cat. no. 2059.0) At: [www.abs.gov.au/Ausstats/abs@.nsf/0/ab3f340b33c8abc4ca256e97007a7857](http://www.abs.gov.au/Ausstats/abs@.nsf/0/ab3f340b33c8abc4ca256e97007a7857). Accessed: April 22, 2005.
32. Buckridge C. Revenue tops \$1 billion as government funding falls. *UniNews* May 2004;13(8):17-31. At: [unimelb.edu.au/articleid\\_1423.html](http://unimelb.edu.au/articleid_1423.html). Accessed: May 9, 2005.
33. Productivity Commission. University resourcing: Australia in an international context, Research Report, Melbourne, Victoria, Australia 2002. At: [www.pc.gov.au/study/highered/finalreport/index.html](http://www.pc.gov.au/study/highered/finalreport/index.html). Accessed: May 9, 2005.
34. Morio I, Kawaguchi Y, Suda H, Eto K. Educating overseas students: just another responsibility or a chance to grow for faculty? *Eur J Dent Educ* 2000;4:128-32.
35. Hawthorne L, Minas IH, Singh B. A case study in the globalization of medical education: assisting overseas-born students at the University of Melbourne. *Med Teach* 2004;26:150-9.
36. Renshaw P, Volet, S. South East Asian students in Australian universities: a reappraisal of their tutorial participation and approaches to study. *Aust Educ Res* 1995;22:85-106.
37. Wilkinson D. Evidence-based rural workforce policy: an enduring challenge. *Rural and Remote Health* (online), 2003. At: [rrh.deakin.edu.au/articles/defaultnew.asp?IssueNo=3x](http://rrh.deakin.edu.au/articles/defaultnew.asp?IssueNo=3x). Accessed: October 7, 2005.
38. Dunbabin JS, Levitt L. Rural origin and rural medical exposure: their impact on the rural and remote medical workforce in Australia. *Rural and Remote Health* (online), 2003. At: [rrh.deakin.edu.au/articles/defaultnew.asp?IssueNo=3x](http://rrh.deakin.edu.au/articles/defaultnew.asp?IssueNo=3x). Accessed: October 7, 2005.
39. Sivaneswaran S, Barnard PD. First choice dentistry or medicine? Academic performance of dental students. 31<sup>st</sup> Annual Scientific Meeting IADR ANZ Section, 1991.
40. Davenport E, Williamson M. Progress files enhance student patient interactions. Abstract 180. *J Dent Res* 2005;84(Special Issue A).
41. Uribe S, Mariño R. Internet and information technology use by dental students in Chile. Abstract 3243. *J Dent Res* 2005;84(Special Issue A).