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Empathetic, persistent and female: a snapshot of Oral Health Therapy Students in Australia and New Zealand

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Abstract

Introduction: Dental therapists, hygienists and oral health therapists constitute up to a third of the dental workforce in Australia and New Zealand. Personality is often explored in health professions to provide insights into traits that are conducive to workforce retention and to assist in planning and training. This study aimed to investigate the current demographic and personality characteristics of oral health students in Australia and New Zealand.

Methods: Students in years one to three of all eight undergraduate Bachelor of Oral Health programs in Australia and New Zealand were invited to complete an online survey. The survey measured activities prior to entering into oral health, career intentions and included a personality questionnaire, the Temperament and Character Inventory (TCI).

Results: Three quarters of participants (n=336; 30% response rate; females=90%) were single, from an urban area and 20 to 29 years of age. Oral health students overall portrayed high trait levels of Persistence and Cooperativeness. Cluster analysis of TCI traits identified three groups. Groups of students with high Persistence and Cooperativeness tended to be older, were working in non-dental and dental careers prior to their degree and were interested in working in regional areas after graduation.

Conclusions: Students with high levels of persistence and cooperativeness were interested in working in regional areas after graduation, highlighting the importance of industriousness and persistence in overcoming barriers to practicing in regional areas. Further research is

warranted to investigate barriers and enablers in recruitment and retention of males in a primarily female dominated profession.

Introduction

Dental therapists (DTs), dental hygienists (DHs) and oral health therapists (OHTs) are dental practitioners that are employed in many countries.^{1, 2} The role and scope of practice for these professions varies between countries. These oral health professionals (OHPs) provide oral health care for children, adolescents and adults which can include examinations, education, prevention and treatment, including restorations and extractions.^{3, 4} In Australia and New Zealand (ANZ) OHPs are registered dental practitioners.^{4, 5} There are currently over 4700 and 1600 registered OHPs in Australia and New Zealand respectively, representing approximately 20% and 33% of the total dental workforces.^{6, 7}

As the health workforce can influence population health and access to care, workforce recruitment, roles, scope, retention and geographic distribution are some of the factors considered in health workforce planning.⁸ The role and scope of the OHP workforces in ANZ vary due to historical contexts. Deteriorating population oral health in New Zealand in the 1920's prompted the formation of a new profession of dental nurses to provide routine dental care for school children.⁹ Between 1966 and 1976, states across Australia developed school dental programs modelled on the New Zealand program.¹⁰ While dental therapy was being established in the 1970's in Australia, the dental hygiene profession was also being introduced in ANZ.¹¹⁻¹³ In the late 1990's and early 2000's, ANZ introduced dual training courses producing practitioners registered as oral health therapists (OHTs) or dual registered as DTs and DHs. To date, OHTs constitute the majority of the OHP workforce in ANZ.^{6, 7} Current oral health programs in ANZ are three-year undergraduate degrees.^{3, 4}

Entry into oral health programs across ANZ vary, but generally require mid to high range school exit rankings and science pre-requisites. Historically, only females were permitted to undertake dental nurse training in Australia and New Zealand.¹⁰ Female only programs ceased in the early 1980's and oral health programs transitioned to university training courses in the early 2000's.¹⁴ Despite current programs including males, recent literature and available workforce data continue to report a dominance of females in the OHP workforce in ANZ.^{7, 15} Dentists and dental prosthetists were traditionally a male dominated profession with

less than 15% females prior to the 1980's, whereas gender distribution in dentists is now approximately even.^{6, 16} Similar to OHPs, three-year undergraduate nursing graduates in ANZ continue to be female dominated.¹⁷ The World Health Organisation recognised that although the health sector performs well with a female dominant workforce, further research and policies are needed to reduce gender imbalances, pay-gaps, increase access to full-time employment and workforce retention.¹⁸ Previous literature has indicated that males entering into oral health programs has slowly increased over time.¹⁹ Males have reported the gender distribution in nursing as a barrier to entering the profession²⁰ and it is unclear if this is also a barrier for males entering into oral health therapy.

Student selection strategies such as gender quotas, aptitude tests, personality questionnaires and interviews are often used in health programs to identify desirable characteristics in student recruitment, and assist in workforce planning.²¹ A longitudinal study on Australian oral health students found the cessation of an aptitude admissions test did not influence students' academic performance in the course, but having the course as their first preference upon entry was positively associated with students' performance.²² Personality is also explored in health professions and used as a recruitment strategy to identify traits patients often perceive as desirable in their health care providers.^{23, 24} In studies investigating personality, nurses and nursing students were characterised by high levels of persistence, self-directedness, cooperativeness and reward dependence.^{17, 24} A high level of cooperativeness is indicative of a high capacity for tolerance and empathy.^{23, 24} Similarly, some patterns of personality traits have been found to be a strong indicator for compatibility with, and retention in the nursing profession.²⁵

Personality has also been explored amongst health professions to provide insights into traits that are conducive to retention in the workforce and assist in workforce planning and training.^{24, 26, 27} Particular patterns of personality traits such as resilience, perfectionism and tolerance of ambiguity have been associated with an interest in practicing in regional areas.^{24, 28} Resilience can be defined as the ability to cope with and manage challenges.²⁹ Oral health disparities in regional and remote areas are still evident across ANZ and OHPs play an important role in reducing the oral health disease burden in this population.³⁰ Previous OHP workforce statistics reported a higher proportion of DT and OHTs working in regional areas compared to DHs and dentists.³¹ Identifying traits conducive to recruitment and retention of OHPs in regional areas could be utilised in student recruitment strategies and inform oral health workforce policy and planning.

As the scope and role of OHP's have evolved over time and are well established in the literature, an understanding of the current demographic and personality profile of oral health therapy students in ANZ may assist in workforce planning. This exploratory study aimed to investigate the current demographic, geographic and personality characteristics of oral health students in ANZ, and highlight any associations with patterns in students' activities prior to entering oral health programs and career preferences after graduation. Investigating potential challenges such as gender and geographic distribution from an institution level can inform recruitment strategies and highlight areas for further support and training in students.

Methods

Study design and participants

The design utilised in this study was a cross-sectional quantitative survey. Data were collected from students currently enrolled in a Bachelor of Oral Health (BOH) program in Australia or New Zealand. Supplementary figure 1 presents the geographical distribution of universities across Australia and New Zealand. A staff representative from all ten universities administered the online survey during Semester 2, 2019 (July to October) to all students in class and via email. The study was reviewed and approved by The University of Queensland Human Research Ethics Committee (clearance number 2018000688) and local participating institutions if specified by local ethics committees. Participants provided consent to participate prior to the commencement of the survey through a digital checkbox on the online form.

Participant characteristics, career preferences, and personality measure responses, were collected via an online questionnaire using Survey Monkey©. Demographic data included program year level, age, gender, marital status, living arrangements, background region (regional, urban) and access to a regular general medical practitioner for ongoing care. Tertiary institutions were coded by geographical location (Australian states and New

Zealand), and further defined by whether they were based in an urban or regional/remote location.

Participants were asked a series of questions regarding potential career choices and future intentions, including; was oral health was their first study preference; if no, what their first career preference was after graduating school; their main activity undertaken prior to oral health; interest in practicing in a regional/remote area (Likert scale: 1 no interest to 5 definitely interested); and primary workplace preference after graduation.

Participants were invited to complete a measure of personality using Cloninger's Temperament and Character Inventory (TCI-R140).^{32,33} The TCI-R140 is the 140-item version of the Temperament and Character Inventory measures the two dimensions of personality; temperament and character. There are four temperament traits comprising; novelty seeking, harm avoidance, reward dependence and persistence. There are three character traits comprising; self-directedness, cooperativeness and self-transcendence. See Supplementary Table 1 for high and low descriptors of each trait. Mean scores for each TCI-R140 trait were calculated as the average mean score on a 5 point Likert scale and ranked: very low (1.00- 1.50), low (1.51- 2.50), average (2.51- 3.50), high (3.51- 4.50) and very high (4.51- 5.00). This measure was selected for its previous use in the literature in measuring population personality traits and in dental and medical university students. Previous studies indicate the internal reliability (Cronbach alpha) of each trait ranged from 0.86 to 0.89 for character and 0.69 to 0.91 for temperament.^{24, 26, 28, 34}

Statistical analysis

IBM SPSS (version 25) was used for statistical analyses. The distribution of the demographic and career variables for the sample were tabulated and presented as summary statistics (number and proportions). A two-step cluster analysis (pre-clustering and hierarchical methods) was used to identify homogenous clusters of students within the seven personality traits. Cluster analysis is a multivariate method which categorises a sample into groups according to patterns of naturally occurring groups amongst the variables of interest. Mean scores and 95% confidence intervals for each personality trait were calculated and plotted for each of the resultant TCI-R140 cluster groups.

Differences between TCI-R140 cluster groups and demographics were assessed using chi-square tests for independence. The four measures of prior career activities and future career

preferences were the dependent variables of interest. Chi-square tests for independence were used to compare the demographic and TCI-R140 cluster groups amongst the dependent variables. One-way Analysis of Variance Test (ANOVA) with Bonferroni post-hoc testing was used to assess for differences amongst mean ages (in years) of dependent variable groups. Statistical significance was determined by $p < 0.05$.

Results

Participant characteristics

Demographic information for the study population are presented in Table 1. A total of 336 students participated, representing a response rate of 30%. Participants were somewhat evenly distributed across the three years of the program, with slightly fewer (26.8%) third year participants. Most participants were from universities in New Zealand and the Australian states of New South Wales and Victoria; which were locations with multiple universities. More than three quarters of participants were from a university based in an urban area (75.9%) and were from an urban background (78.6%). The majority of participants were female (89.6%), single (74.1%), aged between 20 to 29 years (77.6%), and had a regular general medical practitioner (87.2%). The median age for all participants was 22 years, with a range of 18 to 52 years. Half of the participants could speak languages other than English (52.4%), and 44.6% lived at home with family.

Temperament and Character traits

The majority of participants ($n = 242$) completed the Temperament and Character Inventory. Based on the TCI-R140 scoring, the sample overall had high levels of persistence and cooperativeness, and average levels of all other traits. Two-step cluster analysis identified three profile Groups of participants according to their temperament and character trait scores (Figure 1).

Comparing the three Groups shows several differences in the levels of some traits. Group 1 ($n = 46$) had the highest scores in novelty seeking and lowest scores in reward dependence, persistence, self-directedness and cooperativeness compared to Groups 2 and 3. Group 2 ($n = 97$) was distinguished by the lowest scores in novelty seeking and the highest scores in harm avoidance. Group 3 ($n = 99$) is notable as having the lowest scores in harm avoidance and the

highest scores in reward dependence, persistence, self-directedness and cooperativeness compared to the other Groups.

The demographic descriptors of the 3 Groups are shown in Supplementary Table 2. Group 1 had a significantly lower proportion of females than Groups 2 and 3. The age range of 20 to 29 comprised the highest proportion among all three Groups with Group 1 being slightly younger overall compared to Groups 2 and 3. All three Groups had a higher proportion of single rather than married/partnered participants. There were no other significant differences between Groups on the other demographic characteristics measured.

Program entry characteristics

The majority (61.9%) of participants had oral health as their first preference after graduation of high school (Table 2). Prior to entering the oral health program, a third of participants were in high school (34.5%), followed by 28.6% working in a career in dentistry and 24.1% studying in another field (Table 2).

Table 3 reports the significant associations between participants' activities prior to entering the oral health program, and demographic and personality characteristics. Participants who entered oral health from high school were more likely to be in personality Group 1. These participants were also more likely to be male, single, from an urban background, studying at urban universities, multi-lingual and living with family. There was a high proportion of participants from the Australian state of Victoria who entered oral health from high school. Those participants who were previously working in the dental field were significantly more likely to be female, married/partnered, from regional backgrounds, studying in a regional area, spoke no additional languages to English and lived independently. The mean age of participants previously working in a dental (27.5, SD 5.9) or non-dental field (27.1, SD 6.3) was significantly greater than participants from other backgrounds ($p < 0.001$) (Table 3).

Future career preferences

Approximately half of all participants (55.6%) were interested or definitely interested in practicing in a regional area, and half (49.4%) in the private sector after graduation (Table 4). Participants with a definite interest in practicing in a rural area more likely to be from personality Group 3. These participants were also older, more likely to be studying in a regional area and did not speak another language (Table 4). A significantly higher proportion of males than females reported they intended to do further study after graduation (Table 4).

There were also significantly higher proportions of those born in other countries, living at home with family within personality Group 2, who were undecided about practicing in a regional area (Table 4). The mean age of participants intending on doing further study was lower (21.3 years, SD 3.1) than those intending on practicing in a combination of private and public sector practice (26.3 years, SD 5.5)($p=0.032$).

Discussion

Oral health students' Temperament and Character traits

This study is the first to describe the personality characteristics, as well as the demographic, and career preferences of students from all universities offering oral health programs in Australia and New Zealand. Approximately 90% of respondent oral health students in this study were female and in their mid-twenties. This is consistent with demographic profiles of previous BOH student studies which reported between 61 and 97% were female and were on average between 20 and 24 years of age.^{15, 19, 22} However, the response rate and cross-sectional study design can limit generalisability. The self-reported nature of the questionnaire may have also introduced bias, however, students were provided their personality profile results which served to engage and raise their level of interest.

Cluster analysis of personality traits identified three Groups amongst this sample of oral health students. In this study, the entire sample of oral health students portrayed a pattern of traits consistent with what would be expected of individuals undertaking a challenging and clinically focussed degree. Similar patterns have been observed in other health professional students.^{17, 27} A distinction of this sample is the high levels of cooperativeness across all three Groups. Cooperativeness is a character trait indicative of being trustful and agreeable, which may suggest a high capacity for tolerance and empathy.^{27, 32, 33} Cooperativeness has been identified by patients as a desirable trait for health professionals.³⁵

Overall, the three personality Groups follow a similar profile. Looking at profiles of traits is the better way to understand personality because personality is not linear. Combinations of certain traits at certain levels can moderate the influence of any one trait within a profile. In this sample, the well-being of Group 1 would be considered the most vulnerable because of the high level of Harm Avoidance, meaning anxiety proneness, combined with low Self-Directedness and Persistence. Higher levels of Self-Directness and Persistence would act as a

moderator to the negative effects of high Harm Avoidance. Group 1 also has the lowest level of Cooperativeness which may signal interpersonal problems. In contrast, students with a pattern of traits demonstrated in Group 3 are very likely to have high levels of coping and enjoy well-being. Their pattern of low Harm Avoidance combined with very high Self-Directness, Persistence and Cooperativeness is the ideal combination for a resilient and mature personality. This profile of traits has consistently been shown to be conducive to the well-being and high functioning of dental, medical and nursing students.^{24, 26-28, 34}

Group demographics

These personality Groups were associated with particular demographic and program entry characteristics, as well as future career preferences. Understanding these Groups can assist in recruitment and selection strategies for institutions, as well as identifying students who may benefit from well-being and career counselling. Interestingly, those in personality cluster Group 1, were significantly younger, had more male participants, who were high school leavers and not interested in working in a regional area. This pattern of traits and demographic factors were similar to an Australian study of dentistry students' personality.²⁶ Studying the interactions of trait profiles is one approach to understanding trends in student behaviours and highlighting student groups that may benefit from early counselling and provision of support. Future studies investigating the well-being of oral health students are warranted, and identifying traits and environmental influences unique to oral health students can provide insight into how support can be tailored for these students.

Program entry characteristics

Differences were observed amongst the students' main activities prior to entering oral health, and their demographic characteristics. The most frequent prior activity was high school study as observed in previous studies.³⁷ Over a quarter of the oral health students in this study were working in a dental career prior to undertaking an oral health degree. Students who were working prior to oral health were older and had higher proportions of students with Groups 2 and 3. These Groups had high levels of persistence and cooperativeness in common, demonstrating profiles associated with empathy and resilience which are desirable in health professionals.^{23, 24} Knowledge and experience of working in the dental field may provide prospective students with knowledge of career pathways, employment opportunities, and support transition to becoming a health professional.^{38, 39} Previous literature has highlighted the benefits of observation, dental assisting and apprenticeships in retention and success

during university studies.⁴⁰ Other studies have found that studying to be in a profession that individuals have a passion for or strong desire to be in, can enhance student well-being and future retention in the workforce.⁴¹ BOH institutions could consider screening students work experience during student selection to attract cohorts of students with high levels of persistence and cooperativeness and relevant career knowledge. Alternatively, students without previous work experience could be supported to gain the work experience their peers have entered into the program with. Future studies should investigate if students who have worked in a previous career differ in their desire to be studying oral health, and whether this influences their academic progression or well-being throughout the degree.

Future career preferences

Approximately half of all students in this study reported that their primary intention after study was to work in a clinical career in the private sector, and this is similar to recent BOH literature.¹⁹ In Australia and New Zealand, the dental health system is a mixed-modelled system where OHPs can practice in private fee-for-service clinics, or in public sector clinics where treatments are subsidised or fully funded by the government. Utilisation of clinical skills and wages can differ between private and public sector careers for OHPs and may influence career choice. Few differences in demographics and primary career intention were observed in this study population. A higher proportion of males reported an intention to do further study than females. With a primarily female workforce, further research is warranted to investigate barriers and enablers in recruitment and retention of males in OHP careers. Nursing literature has found acceptance of males into the traditionally female dominant workforce, and career prospects and progression was high.^{42, 43} Difficulties socialising, educators isolating male students, and gender stereotyping have been reported as issues experienced by male students in a nursing educational environment.⁴⁴

Multiple demographic characteristics were associated with students' interest in practicing in a regional area in the future. Understanding students' intentions and interest in practicing in regional areas is important for workforce planning, as geographically isolated areas often face workforce shortages and poorer population oral health.^{45, 46} Students characterised by the highest scores in novelty seeking and lowest scores in reward dependence, persistence, self-directedness and cooperativeness (personality Group 1) were more likely to have no interest in regional practice. In comparison, students characterised by personality Group 3 (low harm avoidance and high reward dependence, persistence, self-directedness and cooperativeness)

and were interested in practicing in a regional area. This pattern of traits has been shown to be conducive to working in rural and regions areas.^{24, 28} Health professionals working in regional areas often experience isolation, a lack of professional support and financial incentive to practice.⁴⁷⁻⁴⁹ Training programs in regional areas can provide students with experience working in these areas and can assist in workforce recruitment and retention.^{50, 51} Identifying students with personality traits conducive to enduring obstacles in regional practice such as personality Group 3, could be explored as a recruitment policy to support regional practice. Follow up of these students post-graduation could be undertaken to evaluate if personality is a predictor of future geographic area of work.

Conclusion

This study is the first to describe the personality, characteristics and career preferences of students from all universities offering oral health programs in Australia and New Zealand. Most participants were female, which was consistent with the current workforce across Australia and New Zealand. Oral health students overall portrayed high levels of the trait's 'persistence' and 'cooperativeness', indicative of being trustful and empathetic and having a high capacity for tolerance. Students with these traits tended to be older and had worked prior to commencing their degree. Participants with higher persistence and cooperativeness had a significantly higher proportion express interest in working in regional areas after graduation. This highlights the importance of industriousness and persistence to overcome barriers to practicing in regional areas. Over half of the participants in this study intended to work in a private practice setting after graduation, consistent with employment opportunities within Australia and New Zealand. As males were more likely to express an intention to do further study after their oral health program a post-graduation survey would be of interest to further explore this finding. Further research is warranted to investigate barriers and enablers in recruitment and retention of males to study and pursue a career in oral health.

References

1. Nash DA, Friedman JW, Mathu-Muju KR, et al. A review of the global literature on dental therapists. *Community dentistry and oral epidemiology* 2014;42:1-10.
2. Johnson PM. International profiles of dental hygiene 1987 to 2006: a 21-nation comparative study. *International dental journal* 2009;59:63-77.
3. Dental Board of Australia. Approved programs of study. In: AHPRA, ed, 2019.
4. Dental Council New Zealand. Accreditation. 2019.
5. Australian Health Practitioner Regulation Agency. Approved Programs of Study. 2016.
6. Dental Board of Australia. Registrant Data. In: AHPRA, ed, 2019.
7. New Zealand Dental Council. Workforce Analysis 2013-2015. 2017.
8. Ono T, Lafortune G, Schoenstein M. Health workforce planning in OECD countries. 2013.
9. Leslie GH. More about dental auxiliaries. 1971;16:201-209.
10. Dunning JM. Deployment and control of dental auxiliaries in New Zealand and Australia. *Journal of the American Dental Association (1939)* 1972;85:618-626.
11. Coates DE, Kardos TB, Moffat SM, Kardos RL. Dental therapists and dental hygienists educated for the New Zealand environment. *Journal of Dental Education* 2009;73:1001-1008.
12. Wexler G. Dental hygienists in Australia and their employment in orthodontic practice. *British journal of orthodontics* 1995;22:98-100.
13. Wallace L, Cockrell D, Taylor J. The University of Newcastle's first cohort of Bachelor of Oral Health students: a social profile. *Australian dental journal* 2010;55:436-440.
14. Satur J. Australian dental policy reform and the use of dental therapists and hygienists. Deakin University, 2002.
15. Mariño R, Au-Yeung W, Habibi E, Morgan M. Sociodemographic profile and career decisions of Australian oral health profession students. *Journal of dental education* 2012;76:1241-1249.
16. Spencer AJ, Lewis JM. Service-mix in general dental practice in Australia. *Australian dental journal* 1989;34:69-74.
17. Eley D, Eley R, Bertello M, Rogers-Clark C. Why did I become a nurse? Personality traits and reasons for entering nursing. *J Adv Nurs* 2012;68:1546-1555.
18. Boniol M, Melsaac M, Xu L, Wuliji T, Diallo K, Campbell J. Gender equity in the health workforce: analysis of 104 countries. World Health Organization, 2019.
19. Gardner S, Roberts-Thomson K. Profile of oral health students over a ten year period and their practice intentions after graduation. 2017.
20. Pittman E, Fitzgerald L. The Campaigns for Men to Become Midwives in the 1970s. *Health and History* 2011;13:158-171.

21. McLaughlin K, Moutray M, Muldoon OT. The role of personality and self-efficacy in the selection and retention of successful nursing students: a longitudinal study. *Journal of advanced nursing* 2008;61:211-221.
22. Gardner S, Liu P, Roberts-Thomson K. Trajectory of performance: The role of selection criteria on student achievement in a Bachelor of Oral Health programme. *European Journal of Dental Education* 2020;n/a.
23. Williams J, Stickley T. Empathy and nurse education. *Nurse education today* 2010;30:752-755.
24. Eley D, Eley R, Young L, Rogers-Clark C. Exploring temperament and character traits in nurses and nursing students in a large regional area of Australia. *Journal of Clinical Nursing* 2011;20:563-570.
25. Adib-Hajbaghery M, Dianati M. Undergraduate nursing students' compatibility with the nursing profession. *BMC Medical Education* 2005;5:25.
26. Stormon N, Ford P, Eley D. Exploring personality in Australian dentistry students: Implications for coping with a challenging degree. *European Journal of Dental Education* 2018;0.
27. Eley D, Leung J, Hong BA, Cloninger KM, Cloninger CR. Identifying the dominant personality profiles in medical students: Implications for their well-being and resilience.(Medical condition overview). *PLoS ONE* 2016;11:e0160028.
28. Eley D, Leung JK, Campbell N, Cloninger CR. Tolerance of ambiguity, perfectionism and resilience are associated with personality profiles of medical students oriented to rural practice. *Medical teacher* 2017;39:512-519.
29. Cloninger CR, Svrakic DM, Przybeck TR. A psychobiological model of temperament and character. *Arch Gen Psychiatry* 1993;50:975-990.
30. Sanders AE. Social determinants of oral health: conditions linked to socioeconomic inequalities in oral health in the Australian population: Australian Institute of Health and Welfare (Media and Publishing Unit), 2007:Pages.
31. Teusner DN, Chrisopoulos S, Brennan DS. Geographic distribution of the Australian dental labour force, 2003: Australian Institute of Health and Welfare Canberra, 2007:Pages.
32. Cloninger CR, Thomas RP, Dragan MS. The Temperament and Character Inventory (TCI): A guide to its development and use. 1994.
33. Cloninger CR. The science of well-being: an integrated approach to mental health and its disorders. *World psychiatry : official journal of the World Psychiatric Association (WPA)* 2006;5:71.

34. Eley D, Cloninger CR, Walters L, Laurence C, Synnott R, Wilkinson D. The relationship between resilience and personality traits in doctors: implications for enhancing well being. *PeerJ* 2013;1:e216.
35. Pedersen R. Empirical research on empathy in medicine—A critical review. *Patient education and counseling* 2009;76:307-322.
36. Cloninger CR. Temperament and personality. *Current Opinion in Neurobiology* 1994;4:266-273.
37. Wallace LG. A longitudinal cohort study of Bachelor of Oral Health students from the University of Newcastle: investigating social demographics, career choice influences, employment opportunities and experiences, and job satisfaction. Newcastle: The University of Newcastle, 2017.
38. Aspden T, Cooper R, Liu Y, et al. What secondary school career advisors in New Zealand know about pharmacy and how that knowledge affects student career choices. *American journal of pharmaceutical education* 2015;79.
39. Eley RM, Hindmarsh N, Buikstra E. Informing rural and remote students about careers in health: the effect of health careers workshops on course selection. *Australian Journal of Rural Health* 2007;15:59-64.
40. Horst JA, Clark MD, Lee AH. Observation, assisting, apprenticeship: cycles of visual and kinesthetic learning in dental education. *Journal of dental education* 2009;73:919-933.
41. Duffy RD, Dik BJ, Steger MF. Calling and work-related outcomes: Career commitment as a mediator. *Journal of Vocational Behavior* 2011;78:210-218.
42. McMillian J, Morgan SA, Ament P. Acceptance of male registered nurses by female registered nurses. *Journal of Nursing Scholarship* 2006;38:100-106.
43. Chen S-H, Fu C-M, Li R-H, Lou J-H, Yu H-Y. Relationships among social support, professional empowerment, and nursing career development of male nurses: A cross-sectional analysis. *Western journal of nursing research* 2012;34:862-882.
44. Stott A. Issues in the socialisation process of the male student nurse: implications for retention in undergraduate nursing courses. *Nurse Education Today* 2004;24:91-97.
45. Kruger E, Tennant M. A baseline study of the demographics of the oral health workforce in rural and remote Western Australia. *Australian dental journal* 2004;49:136-140.
46. Godwin D, Hoang H, Crocombe L, Bell E. Dental practitioner rural work movements: a systematic review. *Rural Remote Health* 2014;14:2825.

47. Kruger E, Jacobs A, Tennant M. Sustaining oral health services in remote and indigenous communities: a review of 10 years experience in Western Australia. *International dental journal* 2010;60:129-134.
48. Kruger E, Tennant M. Oral health workforce in rural and remote Western Australia: practice perceptions. *Australian Journal of Rural Health* 2005;13:321-326.
49. Spiers M, Harris M. Challenges to student transition in allied health undergraduate education in the Australian rural and remote context: a synthesis of barriers and enablers. *Rural and remote health* 2015;15:1-17.
50. Latham H, Giffard L, Pollard M. University and health service partnership: a model to deliver undergraduate nurse education in rural Australia. *Collegian* 2007;14:5-10.
51. Williams E, D'Amore W, McMeeken J. Physiotherapy in rural and regional Australia. *Australian Journal of Rural Health* 2007;15:380-386.

Table 1. Demographic characteristics of Australia and New Zealand oral health students (n= 336)

		n (%)
Current year of study	One	125 (37.2)
	Two	121 (36.0)
	Three	90 (26.8)
University location [~]	NZ	91 (27.1)
	QLD	35 (10.4)
	NSW	73 (21.7)
	VIC	88 (26.2)
	WA	29 (8.6)
	SA	20 (6.0)
University region	Urban	255 (75.9)
	Regional	81 (24.1)
Gender	Male	35 (10.4)
	Female	301 (89.6)
Age (years [^])		24 (5)

Age (years)	<20	39 (11.6)
	20 to 29	260 (77.6)
	≥30	36 (10.7)
Country of birth	Australia	162 (48.2)
	New Zealand	56 (16.7)
	Other	118 (35.1)
Marital status	Married/Partnered	87 (25.9)
	Single	249 (74.1)
Other language(s) in addition to English	Yes	176 (52.4)
	No	160 (47.6)
Current living arrangements	At home with family	150 (44.6)
	University college	15 (4.5)
	Share accommodation	111 (33.0)
	Independently/alone	60 (17.9)
Regional background	Yes	72 (21.4)
	No	264 (78.6)
Access to a general practitioner (GP)	Yes	293 (87.2)
	No	43 (12.8)

NZ= New Zealand; QLD= Queensland; NSW= New South Wales; VIC= Victoria; WA= Western Australia; SA= South Australia.

^Mean and standard deviation reported.

Table 2. Background characteristics and career preferences of Australia and New Zealand oral health students (n= 336)

		n (%)
Main activity prior to oral health	High school	116 (34.5)
	Working dental	96 (28.6)
	Working: non dental	34 (10.1)
	Study in another field	81 (24.1)
	Other	9 (2.7)
First degree preference upon entry to oral health	Oral health	208 (61.9)
	Dentistry	46 (13.7)
	Other health field	27 (8.0)
	Other non-health field	23 (6.8)
	Unsure/not specified	20 (6.0)
	Medicine	12 (3.6)
Interest in practicing in a regional area in the future	Definite interest	79 (23.5)
	Interested	108 (32.1)
	Undecided	76 (22.6)
	A little	53 (15.8)
	No interest	20 (6.0)
Primary intention after graduation	Private sector	166 (49.4)
	Public sector	121 (36.0)
	Both private and public sector	17 (5.1)
	Research	2 (0.6)
	Further study	24 (7.1)
	Other	6 (1.8)

Table 3. Significant associations between activities prior to oral health and demographic (n=336) and personality Group (n= 242)

Main activity prior to oral health		n (%)	n (%)	n (%)	n (%)	n (%)	p-value
		High school	Working dental	Working: non dental	Study in another field	Other	
Personality groups	Group 1	*22 (47.8)	8 (17.4)	2 (4.3)	13 (28.3)	1 (2.2)	0.039
	Group 2	39 (40.2)	28 (28.9)	10 (10.3)	19 (19.6)	1 (1.0)	
	Group 3	23 (23.2)	35 (35.4)	12 (12.1)	24 (24.2)	5 (5.1)	
Age (years [^])		^{a-d} 20.2 (1.2)	^{a,e} 27.5 (5.9)	^{b,f} 27.1 (6.3)	^{c,e,f} 22.9 (3.4)	^d 25.3 (3.9)	<0.001
University location [~]	NZ	27 (29.7)	25 (27.5)	9 (9.9)	26 (28.6)	4 (4.4)	<0.001
	QLD	5 (14.3)	*19 (54.3)	4 (11.4)	7 (20.0)	0 (0.0)	
	NSW	18 (24.7)	*32 (43.8)	8 (11.0)	13 (17.8)	2 (2.7)	
	VIC	*49 (55.7)	10 (11.4)	3 (3.4)	23 (26.1)	3 (3.4)	
	WA	11 (37.9)	4 (13.8)	*7 (24.1)	7 (24.1)	0 (0.0)	
	SA	6 (30.0)	6 (30.0)	3 (15.0)	5 (25.0)	0 (0.0)	
University region [~]	Urban	*105 (41.2)	55 (21.6)	24 (9.4)	63 (24.7)	8 (3.1)	<0.001
	Regional	11 (13.6)	*41 (50.6)	10 (12.3)	18 (22.2)	1 (1.2)	
Gender	Male	*20 (57.1)	0 (0.0)	2 (5.7)	12 (34.3)	1 (2.9)	<0.001
	Female	96 (31.9)	*96 (31.9)	32 (10.6)	69 (22.9)	8 (2.7)	
Country of birth	Other	39 (33.1)	24 (20.3)	13 (11.0)	*36 (30.5)	*6 (5.1)	0.035
	Australia	62 (38.3)	*55 (34.0)	14 (8.6)	30 (18.5)	1 (0.6)	
	New Zealand	15 (26.8)	17 (30.4)	7 (12.5)	15 (26.8)	2 (3.6)	
Marital status	Married/Partnered	8 (9.2)	*43 (49.4)	*14 (16.1)	18 (20.7)	4 (4.6)	<0.001
	Single	*108 (43.4)	53 (21.3)	20 (8.0)	63 (25.3)	5 (2.0)	

Other language(s) in addition to English	Yes	*76 (43.2)	26 (14.8)	16 (9.1)	*53 (30.1)	5 (2.8)	<0.001
	No	40 (25.0)	*70 (43.8)	18 (11.3)	28 (17.5)	4 (2.5)	
Current living arrangements	At home with family	*71 (47.3)	25 (16.7)	15 (10.0)	36 (24.0)	3 (2.0)	<0.001
	University college	5 (33.3)	3 (20.0)	3 (20.0)	3 (20.0)	1 (6.7)	
	Share accommodation	29 (26.1)	36 (32.4)	9 (8.1)	34 (30.6)	3 (2.7)	
Regional background	Independently/alone	11 (18.3)	*32 (53.3)	7 (11.7)	8 (13.3)	2 (3.3)	<0.001
	Yes	13 (18.1)	*36 (50.0)	8 (11.1)	13 (18.1)	2 (2.8)	
	No	*103 (39.0)	60 (22.7)	26 (9.8)	68 (25.8)	7 (2.7)	
First degree preference upon entry to oral health		Yes	Other	Dentistry	Medicine		
Country of birth	Australia	96 (59.3)	*44 (27.2)	19 (11.7)	*3 (1.9)		0.001
	New Zealand	*41 (73.2)	11 (19.6)	4 (7.1)	0 (0.0)		
	Other	71 (60.2)	15 (12.7)	*23 (19.5)	*9 (7.6)		
Other language(s) in addition to English	Yes	101 (57.4)	33 (18.8)	*32 (18.2)	*10 (5.7)		0.007
	No	107 (66.9)	37 (23.1)	14 (8.8)	2 (1.3)		

a-f) Indicates statistically significant differences using Bonferroni post-hoc testing from the one-way Analysis of Variance Test.

~NZ= New Zealand; QLD= Queensland; NSW= New South Wales; VIC= Victoria; WA= Western Australia; SA= South Australia.

^Mean and standard deviation reported.

*Statistically significant difference $p < 0.05$.

Table 4. Significant associations between career intention and demographic (n=336) and personality Group (n= 242).

	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	p-value
Primary intention after graduation	Private	Public	Further study	Combo	Research	Other	

Age (years [^])		23.8 (5.0)	23.6 (5.5)	^a 21.3 (3.1)	^a 26.3 (5.5)	24.0 (0.0)	27.2 (5.8)	0.032
Gender	Male	16 (45.7)	9 (25.7)	[*] 9 (25.7)	1 (2.9)	0 (0.0)	0 (0.0)	0.021
	Female	150 (49.8)	112 (37.2)	15 (5.0)	16 (5.3)	2 (0.7)	6 (2.0)	
Interest in practicing in a regional area in the future		No interest	A little	Undecided	Interested	Definite interest		
Personality groups	Group 1	[*] 6 (13.0)	11 (23.9)	7 (15.2)	16 (34.8)	6 (13.0)		0.011
	Group 2	4 (4.1)	13 (13.4)	[*] 29 (29.9)	31 (32.0)	20 (20.6)		
	Group 3	4 (4.0)	14 (14.1)	15 (15.2)	33 (33.3)	[*] 33 (33.3)		
Age (years [^])		24.7 (6.3)	23.3 (3.7)	24.2 (6.1)	^a 22.6 (3.8)	^a 24.9 (6.0)		0.023
University region	Urban	14 (5.5)	45 (17.6)	62 (24.3)	87 (34.1)	47 (18.4)		0.002
	Regional	6 (7.4)	8 (9.9)	14 (17.3)	21 (25.9)	[*] 32 (39.5)		
	Australia	11 (6.8)	23 (14.2)	29 (17.9)	53 (32.7)	[*] 46 (28.4)		
Country of birth	New Zealand	3 (5.4)	7 (12.5)	12 (21.4)	16 (28.6)	18 (32.1)		0.045
	Other	6 (5.1)	23 (19.5)	[*] 35 (29.7)	39 (33.1)	15 (12.7)		
Other language(s) in addition to English	Yes	12 (6.8)	32 (18.2)	[*] 51 (29.0)	58 (33.0)	23 (13.1)		<0.001
	No	8 (5.0)	21 (13.1)	25 (15.6)	50 (31.3)	[*] 56 (35.0)		
	At home with family	8 (5.3)	22 (14.7)	[*] 46 (30.7)	[*] 52 (34.7)	22 (14.7)		
Current living arrangements	University college	0 (0.0)	1 (6.7)	3 (20.0)	5 (33.3)	6 (40.0)		0.030
	Share accommodation	7 (6.3)	21 (18.9)	20 (18.0)	30 (27.0)	33 (29.7)		
	Independently/alone	5 (8.3)	9 (15.0)	7 (11.7)	21 (35.0)	18 (30.0)		

a) Indicates statistically significant differences using Bonferroni post-hoc testing from the one-way Analysis of Variance Test.

~NZ= New Zealand; QLD= Queensland; NSW= New South Wales; VIC= Victoria; WA= Western Australia; SA= South Australia.

[^]Mean and standard deviation reported.

*Statistically significant difference $p < 0.05$.

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Figure 1. Temperament and character trait scores for personality cluster groups in oral health students (n= 242).

