SHORT REPORT

Different degrees, similar personalities: A four-year comparison of dentistry and medicine students

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Abstract

Introduction: The Doctor of Medicine (MD) and the Bachelor of Dental Science Honours (BDSc) degrees are challenging, with similar prerequisites regarding the scope of prior knowledge and academic performance. Studies have previously explored personality traits of students within each degree, but few have compared traits between the MD and BDSc cohorts.

Methods: Successive first-year cohorts of MD and BDSc students (2015 to 2018) completed a survey including demographic questions and the Temperament and Character Inventory (TCI). Generalised estimating equations compared TCI traits of students in the programs.

Results: MD students comprised a higher proportion of students who were male, older and married/partnered compared to BDSc students. Profiles of temperament and character were similar. After adjusting for sex, age and marital status, the mean scores of harm avoidance were higher, and persistence, self-directedness and cooperativeness significantly lower in BDSc compared to MD students.

Conclusions: Students pursuing medicine and dentistry demonstrate some differences in trait scores, however they are not meaningfully different when interpreting their profiles. Both groups have similar personalities, indicative of coping with their challenging degrees. A supportive learning environment is paramount to that coping success.

Keywords: dental students; medical students; personality; temperament; character; cohort studies

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Introduction

The selection of students into programs for the health professions continues to be a highly competitive process. While the emphasis on prior academic achievement and cognitive ability remains a priority, non-cognitive and personal characteristics have also been taken into consideration since the 1940s. The premise suggests that students with desired attributes will transform into clinicians who are compassionate, collaborative, confident and emotionally resilient, with good communication and interpersonal skills (Powis, 2015).

Many of the desired attributes for health professionals have been associated with personality traits. However, using testing for personality traits associated with ideal characteristics to guide the selection of students continues to be debated in the health professions. Nevertheless, research on personality has shown important associations with certain traits and behaviours, including positive academic performance, communication skills, empathy and resilience, and several universities incorporate personal trait measures in their selection processes (Powis, 2015). A problem with using these measures for selection is that regardless of one's core personality profile, actions and behaviours are largely determined by the environment, or situational context, in which they occur (Eva, 2005).

Although personality testing is infrequently used for student selection, it can be helpful for students to understand their personality as they progress through their degree. A better understanding of "what they are like" can increase self-awareness and self-acceptance. Educators may also benefit from understanding and appreciating the strengths and sensitivities of their students and using this to help design learning environments that support student success and wellbeing.

Discussions around the personality of students are often connected to the high rates of stress, anxiety and depression frequently reported in the literature (Rotenstein et al., 2016). This, in itself, is concerning because it suggests that either students increasingly cannot cope or the learning environment needs to be adapted. Educators may discuss better ways to choose students with the "right" personalities, who can cope with their education. Certainly, personality influences how an individual copes with stress. Yet this thinking places the onus on the student to survive and not on the degree program to provide the environment to help them thrive.

This study explored the temperament and character personality profiles of first-year medicine and dentistry students, their similarities and differences and what this may suggest in regard to their selection. Temperament traits manifest early in development, are moderately heritable and are stable throughout one's life. Character develops later, is less heritable and matures with sociocultural learning and life events (Cloninger et al., 1994). Dentistry and medicine degrees are similar in many ways. They share a theoretical background, and graduates have a primary role of caring for patients. Both require high prior academic achievement and have a challenging workload, including performance-

related skills and pressures, which generally demand successful implementation of coping strategies.

Previous studies have described temperament and character in medical (Eley et al., 2016) and dentistry (Stormon et al., 2019) students, but they have not yet been compared. We hypothesised that dentistry and medicine students have similar personality profiles due to the similarities in degrees, such as entry prerequisites and the clinical nature of the professional degrees.

Methodology

Participants and setting

Successive cohorts (2015–2018) of first-year students in the 4-year postgraduate Doctor of Medicine (MD) and the 5-year undergraduate Bachelor of Dental Science (Honours) (BDSc) degrees at the University of Queensland completed an online survey during a regularly scheduled activity within the first semester. Entry into the MD and BDSc programs includes science prerequisites, high academic achievement and top percentile scores in undergraduate and graduate medical admissions tests. Approximately 40 to 45% of the MD and BDSc cohorts each year are international students. The selection processes for both degrees did not change across the study time period. This research was approved by the University of Queensland Human Research Ethics Committee (clearance no. 20150011895 and 2018000688). All participants provided digital consent on the survey.

Outcome measures

The surveys included demographic questions: sex, age group (19–25, 26–30, over 31 years), marital status (married/partnered or single) and domestic or international status. The Temperament and Character Inventory (TCIR-140) was used to measure the seven personality traits within the dimensions of temperament and character (Cloninger et al., 1994). Cloninger's psychobiological model of personality describes seven main traits of personality through the domains of temperament and character and is operationalised through the TCIR-140 (Cloninger et al., 1994). Appendix 1 provides descriptors of each trait. The TCIR-140 is widely validated and has reliability alphas (Cronbach alphas) for each trait from 0.71 to 0.91 for temperament and 0.86 to 0.89 for character.

Statistical analysis

IBM SPSS (version 26) was used for descriptive tabulation and inferential statistical analyses. A chi-square test for independence was used to investigate differences in student demographics between the degrees. Mean Likert scale scores for each TCIR-140 trait were used in analysis (95% confidence intervals). Independent samples *t*-test and one-way analysis of variance (ANOVA) described differences between the groups by year in sex, marital status and age, as appropriate.

Generalised estimating equations (GEE) were used to calculate the regression coefficients of the data using a structured correlation structure. The independent variable of interest

in the GEE analysis were the programs, MD and BDSc. The dependent variables of interest were the seven TCIR-140 traits: novelty seeking, harm avoidance, reward dependence, persistence, self-directedness, cooperativeness and self-transcendence. Age, sex, marital status and cohort (year of entry into the program) were included in the model to adjust for potential confounding effects. Unadjusted and adjusted mean trait scores were reported with 95% confidence intervals. Mean differences and the corrected quasi-likelihood under independent model criterion (QICC) were reported for each GEE model.

Results

Demographics

Over the life of the study, 1,901 MD and BDSc students participated, with 86 excluded due to incomplete data. The demographic characteristics of the final sample (n = 1,815) are reported in Table 1. The mean response rate across all 4 years was 82.7% and 93.7% for the MD and BDSc cohorts, respectively. In medicine, the majority of participants were male (58.4%), single (82.7%) and 25.9 years of age on average. On average, MD students were 5 years older than dentistry students ($p < 0.001$), and this did not change between the 4 years of data collection. In dentistry, the ratio of men to women was nearly even. Most were single (94.4%), and the mean age was 20.3 years.

Table 1

Demographic Characteristics of Medicine and Dentistry Students (n = 1,815)

	Medicine n = 1,565		**Dentistry** n = 250		
	n (%)	**95% CI**	**n (%)**	**95% CI**	***p*-value**
Sex					
Male	914 (58.4)	55.9–60.8	117 (46.8)	40.7–53.0	
Female	651 (41.6)	39.2–44.1	133 (53.2)	47.0–59.3	0.001
Marital status					
Married/partnered	270 (17.3)	15.4–19.2	14 (5.6)	3.2–9.0	
Single	1,295 (82.7)	80.8–84.6	236 (94.4)	91.0–96.8	< 0.001
Cohort					
2015	460 (29.4)	27.2–31.7	56 (22.4)	17.6–27.9	
2016	419 (26.8)	24.6–29.0	66 (26.4)	21.2–32.1	
2017	375 (24.0)	21.9–26.1	56 (22.4)	17.6–27.9	0.007
2018	311 (19.9)	18.0–21.9	72 (28.8)	23.5–34.6	
Age ⸸	25.9 (49.9)	23.4–28.4	20.3 (3.2)	19.9–20.7	< 0.001

⸸ reports the mean, standard deviation and 95% confidence interval of the mean.

Table 2

Unadjusted and Adjusted Mean Temperament and Character Inventory Trait Scores in Medicine and Dentistry Students (n = 1,815)

	Unadjusted		Adjusted⸸			
	MD	**BDSc**	**MD**	**BDSc**		
	^Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean difference (95% CI)	QICC
Novelty seeking	2.76 (2.74, 2.78)	2.78 (2.73, 2.83)	2.75 (2.72, 2.78)	2.79 (2.73, 2.84)	0.03 (-0.02, 0.09)	339.03
Harm avoidance	2.76 (2.73, 2.80)	3.04 (2.96, 3.12)	2.77 (2.73, 2.82)	3.01 (2.93, 3.10)	* 0.24 (0.16, 0.33)	829.08
Reward dependence	3.30 (3.28, 3.33)	3.38 (3.32, 3.44)	3.30 (3.27, 3.33)	3.36 (3.29, 3.42)	0.05 (-0.01, 0.12)	443.47
Persistence	3.82 (3.79, 3.84)	3.46 (3.39, 3.53)	3.89 (3.85, 3.92)	3.53 (3.46, 3.61)	* 0.35 (0.28, 0.43)	520.24
Self-directedness	3.69 (3.66, 3.71)	3.31 (3.24, 3.38)	3.75 (3.71, 3.78)	3.38 (3.30, 3.45)	* 0.37 (0.30, 0.45)	543.53
Cooperativeness	4.01 (3.99, 4.04)	3.71 (3.65, 3.77)	4.04 (4.01, 4.07)	3.73 (3.66, 3.79)	* 0.32 (0.25, 0.38)	350.52
Self-transcendence	2.73 (2.69, 2.76)	2.81 (2.72, 2.88)	2.69 (2.65, 2.74)	2.74 (2.65, 2.83)	* 0.05 (-0.04, 0.14)	861.14

^ The mean scores for each TCIR-140 dimension are derived from a 5-point Likert scale of 1 (*absolutely false*) to 5 (*absolutely true*) and categorised in accordance to 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).

⸸ GEE model adjusted for age, sex, marital status and cohort

* Statistically significant at $p < 0.05$

Abbreviations: BDSc: Bachelor of Dental Science; MD: Doctor of Medicine; CI: Confidence interval; QICC: Quasi-likelihood under independent model criterion

Temperament and character trait scores

All females in both degrees were significantly higher than all males in every trait except novelty seeking, which was not different between sexes. Effect sizes were small for all traits except harm avoidance, which approached the moderate range (ANOVA partial Eta Squared $\eta^2 = 0.040$). No other differences were detected in the traits by any other demographic variable.

Table 2 presents the mean temperament and character trait scores in MD and BDSc students adjusted for age, sex, marital status and cohort. The unadjusted and adjusted models were similar, however the mean self-directedness score was significantly higher in the MD cohort in the adjusted model. In the adjusted model, BDSc students had significantly higher levels of harm avoidance and lower persistence, self-directedness and cooperativeness compared to MD students. MD students had significantly lower harm avoidance (0.24 mean difference) and higher persistence (0.35 mean difference), self-directedness (0.37 mean difference) and cooperativeness (0.32 mean difference) than BDSc students.

Discussion

This study investigated temperament and character personality traits in four successive cohorts of first-year BDSc and MD students at an Australian university. Our hypothesis was only partially supported. While the personality trait pattern was similar in both groups across all years, the level of each trait in BDSc students was different to the MD students. Overall, the trait profiles of both groups portray a balanced personality, shown as a temperament that is low in harm avoidance and high in persistence, alongside a character that is highly self-directed and cooperative. These findings are congruent with studies of other health professional students and clinicians and suggest the capacity to cope with a high academic workload and gain the sensitivity to build their personal skills, such as communication and empathy, which are essential attributes for dentists and doctors (Campbell et al., 2013; Eley et al., 2011).

To further describe this profile in a clinical learning context, we start with temperament. Harm avoidance is indicative of proneness to anxiety and worry. Low levels often translate to a greater acceptance of uncertainty and remaining confident in a professional and dynamic environment. High persistence represents perseverance despite frustration and fatigue, also an advantage for students and clinicians. However excessive persistence can be a sign of a more self-defeating quality of perfectionism, which is a cause for concern as it may exacerbate unhealthy comparison to others, already common among students and young people in general (Eley et al., 2020). The character trait self-directedness is thought to be the most influential single trait in promoting wellbeing (Cloninger & Zohar, 2011). Highly self-directed people are conscientious and have a strong sense of responsibility and self-acceptance, with the ability to change their behaviour based on personal core values—beneficial in a profession that requires constant reflection and

improvement. Cooperativeness also describes a character that is accepting, compassionate and empathetic. These are key attributes that would allow an individual to thrive in professions that require teamwork and care for others.

We have pointed out that the two degrees are similar in several ways; however, while the trait profiles are similar, BDSc students had higher levels of harm avoidance and lower persistence, self-directedness and cooperativeness compared to MD students. This trait combination suggests a greater vulnerability to stress, which could influence one's capacity to cope (Eley et al., 2016; Stormon et al., 2019.) A few differences could be proposed to explain this. Selection into medicine is often thought to be more competitive than dentistry. However, this may not be the case at this institution due to a lower intake of students into the dentistry program. An intense desire and motivation for medicine may be translated into successful selection. Additionally, being a postgraduate degree, the MD program attracts students who tend to be older, as we saw in our sample. However, the range in age at this young adult life stage may not be as influential as the additional life experience gained from a few extra years towards maturity (Josefsson et al., 2013).

Congruent with the literature, our sample also saw the trait differences associated with sex across both MD and BDSc groups. Females consistently score higher in all traits except novelty seeking, and our sample was no different (Miettunen et al., 2007). The caveat is that while higher levels of persistence, self-directedness and cooperativeness can be conveyed as desirable for academic success, higher levels of harm avoidance often predict a greater level of anxiety proneness and vulnerability to stress. This quality may be exacerbated in a competitive and pressure-filled environment, such as medical or dental school.

It could be argued that prior to entry into these competitive programs, students may have spent many years adapting to academic pressures. However, once in a degree program such as medicine or dentistry, a new culture and challenges may become evident. Providing a supportive environment that encourages personal growth and responsibility while decreasing any emphasis on competition should be achievable and beneficial to all students regardless of their particular personality.

The generalisability of this study is limited by the use of convenience sampling and investigating students in only one university, and the self-report nature of the data presents a risk of bias. The cross-sectional design, albeit over successive years, does not allow any inference of causation. However, the timing of the data collection, i.e., early in the first year, is appropriate to our research question. More detailed information about the selection processes for each degree was not possible in this study but would have lent more depth to the requirements of each. A strength of this study was its high response rate.

Conclusions

Medicine and dentistry students generally demonstrated a temperament that is low in harm avoidance and high in persistence, alongside a highly self-directed and cooperative character. Although cohorts had different demographic characteristics, such as gender and age distribution, these findings suggest that the range of students in both degrees have personalities to cope with a high academic workload. Provision of a supportive culture and learning environment is paramount to help all students further develop their individual qualities as practising clinicians of the highest calibre and standard of care for their patients.

Conflicts of interest and funding

The authors have no conflicts of interest or funding to declare.

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Appendix A

*High and Low Descriptors for Each Temperament and Character Trait**

Temperament traits	**Represents**	**LOW SCORES**	⟷	**HIGH SCORES**
Novelty seeking [NS]	Exploratory activity in response to novelty	Orderly, reflective, reserved	⟷	Exploratory, curious, seeks challenge
Harm avoidance [HA]	Worry in anticipation of problems	Confident, accepting of uncertainty & risk	⟷	Anxious, uncomfortable with accepting risk
Reward dependence [RD]	Dependence on approval of others	Not influenced by others, objective, insensitive	⟷	Needs to please, warm, attached, sociable
Persistence [PS]	Industriousness despite obstacles	Quitting, underachiever, erratic, unambitious	⟷	Ambitious, hard worker, diligent, perfectionist
Character traits	**Represents**	**LOW SCORES**	⟷	**HIGH SCORES**
Self-directedness [SD]	Responsibility, goal orientated & self-confidence	Blaming, ineffective, unreliable, irresponsible	⟷	Conscientious, self-accepted, reliable
Cooperativeness [CO]	Tolerance, empathy & cooperativeness	Intolerant, critical, opportunistic, unhelpful	⟷	Tolerant, agreeable, constructive, empathic
Self-transcendence [ST]	View of self in relation to universe	Impatient, proud, materialistic, practical	⟷	Patient, humble, spiritual, creative, compassionate

* adapted from Eley et al. (2020)