

# A pilot survey of personality traits of dental students in the United States

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## Key points

Determines personality traits of dental students in the United States.

Examines the related facets of personality traits in dental students.

Considers gender-related differences in personalities of dental students.

## Abstract

**Introduction** The training of dental students and eventual practice of dentistry involves multiple components of the 'person'; therefore, understanding the personality of dental students is critical for creating a supportive student culture.

**Aims** Our objective was to examine the personality traits of students attending Virginia Commonwealth University School of Dentistry.

**Methods** We collected qualitative descriptive research through an anonymous survey sent to all pre-doctoral students, which included the 50-item International Personality Item Pool of the Big Five Markers (IPIP-BFM). Fifty-three dental students completed the survey.

**Results** Analysis indicated that two of the personality traits were significantly different for both gender and academic year. The most significant deviation in scores between genders occurred for 'agreeableness and emotional stability'.

**Discussion** The results demonstrate there may be a degree of commonality of traits shared between dental students and other professionally trained students. Nevertheless, gender-related deviations were the most remarkable findings.

**Conclusion** Studies of personality traits have been used to consider and implement needs-based student services in other professions. The results of surveys of this kind could be considered instrumental in structuring evidence-based student services throughout the dental training curriculum, as they have been helpful for training of other professions.

## Introduction

The International Personality Item Pool of the Big Five Markers (IPIP-BFM) inventory is composed of descriptors that correlate with personality traits. The five traits are extraversion, agreeableness, conscientiousness, emotional stability (conversely listed as neuroticism) and openness; these five traits also have subcategories called facets. Facets for extraversion include positivity, warmth, activity and persuasiveness; facets for agreeableness include altruism, modesty, compliance and

trust; facets for conscientiousness include self-discipline, deliberateness, order and competence; facets of emotional stability include confidence, slow to anger, appropriate coping mechanisms and reliability; and facets for openness include curiosity, imaginative, artistic and broadmindedness.<sup>1</sup>

The use of English trait-descriptive adjectives can be traced back to the work of Allport and Odbert in 1936 and Cattell in 1957, and later Norman in 1967 and Goldberg in 1982 and 1990, which resulted in the expansion of the pool of terms.<sup>2,3,4,5,6,7</sup> The NEO Personality Inventory (NEO-PI) developed by Costa and McCrae in 1985 stands as the first alternative set of Big Five Markers.<sup>7,8</sup> In 2001, Goldberg's proposition to collaborate internationally resulted in the development of the International Personality Item Pool (IPIP), which is available to all researchers online for free.<sup>9</sup> This free online resource, and its corresponding website information, was used in the creation

of the survey in this study and scoring of the respondents.

In the United States (US), before dental school, students typically will have completed a bachelor's degree at a four-year college or university, which differs from most British models, which are five years of undergraduate. During their dental professional training, students will experience sustained, elevated levels of stress, due in part to the combination of preclinical and clinical education over the additional four years. The goal is to prepare the graduate to enter the workforce upon immediate completion. Although most US programmes have dedicated basic science courses for dental students, a handful of schools offer a joint curriculum for dental and medical students in the first two years of training. Considering this, common personality traits may exist between dental and medical students.

Studies on personalities of medical students, as well as other health profession training

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programmes, have determined that certain personality traits tend to correlate with academic and clinical success through the various stages of the educational experience. Studies of medical students have varied in their focus. Still, most themes included: typifying traits of medical students and how these influence clinical training and result in early academic success; how the various traits contribute to the predictability of behaviours during medical practice; and comparison of medical students' personality traits to those of other students.<sup>10,11</sup>

The most commonly expressed traits in medical students are extraversion and agreeableness.<sup>10,11</sup> Conscientiousness (that is, self-achievement and self-discipline), which was also a predominant score, significantly predicted exam scores in preclinical years.<sup>11</sup> Conscientiousness affects examination results and can be assessed at the start of a medical study career; therefore, personality assessment may be a useful tool in student guidance and counselling.<sup>11</sup>

Traits have an inverse relation regarding the positive predictiveness of preclinical versus clinical performance. One example is the difference in preclinical and clinical performance for students who score higher in openness and extraversion. Although there may not be many advantages to being open and extraverted for early academic performance, these traits gain importance later when applied to the clinical practice portion of the curriculum.<sup>10</sup> However, this does not diminish the importance of certain traits like conscientiousness and emotional stability, which are predictive of success due to the ability to remain calm under pressure.<sup>10,11</sup> It may logically follow that practitioners who are more gregarious and friendly would create better relationships with patients. Indeed, those who score higher for extraversion and agreeableness, two traits defining the interpersonal dynamic, may be beneficial for doctors' collaboration and communication skills in future professional practice.<sup>11</sup> Weisberg *et al.* found that some traits appear to have more gender-based expression.<sup>12</sup> In that study, which replicated previous findings, women reported higher extraversion, agreeableness and neuroticism scores than men; however, more extensive gender differences exist at the level of the facets, with significant gender differences appearing in facets of every Big Five trait.<sup>12</sup>

In a systematic review with an aggregated sample size of 13,389, consistent findings included students of arts/humanities and psychology scoring high on neuroticism and

openness, and students of political science also scoring high on openness.<sup>13</sup> Students of economics, law, political science and medicine scored high on extraversion, while students of medicine, psychology, arts/humanities and sciences scored high on agreeableness.<sup>13</sup> Students of arts/humanities scored low on conscientiousness.<sup>13</sup> Results from the review indicate the existence of substantial personality group differences across academic majors.<sup>13</sup>

In medical students, conscientiousness reflects adaptive perfectionism and higher academic expectations, which longitudinally predicts dissatisfaction with academic performance.<sup>14</sup> Additionally, neuroticism and maladaptive perfectionism in medical students are associated with symptoms of distress (depression, hopelessness), which also longitudinally predicts both distress symptoms and dissatisfaction with academic performance.<sup>14</sup> However, perfectionism profiles of medical students also demonstrated higher personal standards, lower doubts about actions and lower maladaptive perfectionism than in general arts/humanities students.<sup>14</sup> Distinguishing adaptive and maladaptive aspects of the various traits is essential in understanding the cross-sectional and longitudinal implications of perfectionism in medical students.<sup>14</sup> These studies found differences in medical students when compared to other areas of education, but there was no inclusion of data for dental students.

In the US, dental and medical students will typically complete a bachelor's degree in a pre-health science track before matriculating into their professional training. The ability to perform at the level of a technical standard, usually defined by the school, will include manual dexterity, which is unique to dental training. The nature of dental practice, allowing for private business ownership, has meant that science-based educated practitioners must also be able to navigate the social and financial aspects of practice management upon exiting their fourth year of school. Dental students, unlike medical school students, will serve as the primary care provider for their patients beginning in the third year of training and are expected to be competent, comprehensive dental providers by the conclusion of their fourth year. In the US, the majority of states do not require the completion of a dental residency programme before entering practice.

Educating a student through a dental programme to become a professional clinician involves developing and nurturing multiple components of the person (intellectual ability,

physical skills, ability to handle stress and ethical morals). Therefore, understanding the most common personality traits of dental students is beneficial for providing effective education and support. Although the identification of traits is useful in the establishment of appropriate pedagogy and student services, there is limited data on this population. The purpose of this study was to evaluate the five dimensions of personality of dental students at one US academic institution and examine the facets associated with the traits of their personalities.

## Methods and materials

The Institutional Review Board at Virginia Commonwealth University (VCU) approved this as a cross-sectional study. An introductory e-mail linked to the 50-item IPIP version of the IPIP-BFM inventory survey and demographic questions were sent to all students. The introductory e-mail stated the study's purpose, that all incoming and current students received the survey, and that participation was voluntary. Students were informed that all responses are anonymous and confidential, and that no risks for participating were anticipated. Lastly, the e-mail told students that they should skip questions that made them feel uncomfortable and that they could withdraw from the study altogether, and their answers would not be recorded. The survey was open for one month, with no reminders to record their responses during the school year's least stressful timeframe. Students received their composite score for each of the five components of personality, which were measured automatically after the survey, but no other incentive was offered. The survey was administered and study data was captured using Research Electronic Data Capture (REDCap), a secure, web-based software platform designed to support data capture for research studies hosted at VCU.<sup>15</sup>

Cronbach's alpha was calculated to determine the internal consistency of the personality-specific questions for each of the five traits (agreeableness, conscientiousness, emotional stability, extraversion and openness) in the IPIP survey. Values closer to 1 indicate that the set of ten questions related to each of the five personalities are highly consistent with each other and the scale is reliable. Due to the small sample sizes, a set of  $n = 10,000$  bootstrapped samples were constructed to determine a stable 95% confidence interval around alpha for each personality trait.

**Table 1** Dental student characteristics

Characteristic	N = 53
Academic year (%)	
First	16 (30)
Second	12 (23)
Third	14 (26)
Fourth	11 (21)
Age in years (%)	
20–25	35 (66)
26–30	12 (23)
>30	6 (11)
Gender (%)	
Male	27 (51)
Female	26 (49)
Ethnicity (%)	
White	33 (65)
Asian/Pacific Islander	14 (27)
Other	4 (8)
Plans to attend residency (%)	
Yes	26 (49)
No	27 (51)
Number of schools applied to (SD)	9.4 (4.8)
Undergraduate GPA (SD)	3.6 (0.3)
DAT score (SD)	21.1 (1.9)

The means of each five personality scores were estimated using a multivariate analysis of variance (MANOVA) model while adjusting for seven demographic and student characteristics including gender, age, ethnicity, undergraduate grade point average (GPA), Dental Admissions Test (DAT) score, year in dental school and whether they planned to attend residency (see online supplementary information for more details regarding student DAT score and each of the five personality type scores). MANOVA models were utilised to allow for the inherent association among the five facets of personality. Use of MANOVA model reduces the type I error rate that would be inflated by running five separate ANOVA models for each facet of personality. Roy's test statistics, approximate F-statistics and p values from the MANOVA model were reported for each student characteristic. Individual analysis of variance (ANOVA) models were then performed on a subset of the significant characteristics identified by the MANOVA model. Means and

**Table 2** Cronbach's alpha statistics for each personality type. Alpha ranges from 0 to 1, with values closer to 1 indicating that the personality-specific questions are highly reliable. The bootstrapped confidence intervals are evaluated on n = 10,000 random samples with replacement

Personality type	Cronbach's alpha	Bootstrap 95% CI	
		Lower	Upper
Agreeableness	0.86	0.81	0.92
Conscientiousness	0.78	0.68	0.87
Emotional stability	0.90	0.86	0.94
Extraversion	0.91	0.87	0.94
Openness	0.86	0.80	0.91

**Table 3** Roy's test statistics, approximate F-statistics and p values from the MANOVA model for each student characteristic

Student characteristic	Roy's test statistic	Approximate F-statistic	P value
Gender	0.809	5.669	<0.001
Year	0.398	2.950	0.024
Age	0.264	1.905	0.117
Undergraduate GPA	0.226	1.585	0.189
DAT score	0.077	0.542	0.742
Residency	0.041	0.293	0.913
Ethnicity	0.120	0.868	0.512

standard deviations, stratified by levels of the significant characteristics, along with p values obtained from the ANOVA models were also reported. All statistical analysis was performed in R version 3.5.1.

## Results

The student response has offered insight on trends of traits within the selected classes, and most significantly, by gender.

A total of 53 dental students completed the 50-question personality survey obtained from the IPIP, for an estimated response rate of 13% (53/400), with each class having approximately 100 students. Of the 53 students, two students did not fully complete the survey and were subsequently removed from further analyses. Demographic characteristics are provided in Table 1. Students were categorised by academic year in the programme, 16 of which were considered first-year (30%), 12 second-years (23%), 14 third-years (26%) and 11 fourth-years (21%). A majority of the dental students included in the study were in the 20–25-year-old range (n = 35 [66%]). Other age groups included 26–30-year-olds (n = 12 [23%])

and those over 30 years old (n = 6 [11%]). The gender of dental students was evenly distributed, with 27 students self-identifying as male (51%) and 26 students identifying as female (49%). A total of 33 students self-identified as White (65%), while 14 identified as Asian/Pacific Islander (27%). The remaining four students were categorised as 'Other' (8%). Additional dental student characteristics were recorded, including plans to attend residency (49% yes; 51% no), number of dental schools applied to (mean = 9.4 [4.8 SD]), undergraduate GPA (mean = 3.6 [0.3 SD]) and DAT score (mean = 21.1 [1.9 SD]).

The alpha statistics as well as bootstrapped 95% confidence intervals for each personality type are provided in Table 2. The mean alpha across each of the five personality traits was 0.86 (SD = 0.05). This indicated that, overall, respondents were highly consistent with their responses to the inter-personality-type questions.

MANOVA was performed to see which personality types exhibited the largest difference between each student characteristic listed in Table 3. Results from the MANOVA indicated that mean scores between at least two of the

**Table 4 Mean (SD) score summaries for each of the five personality types stratified by gender and year of dental school. The p values were obtained after performing ANOVA analyses using each of the five personality trait scores as dependent variables**

Student characteristic	Agreeableness	Conscientiousness	Emotional stability	Extraversion	Openness to experience
<b>Gender</b>					
Male	38.0 (6.7)	40.0 (5.5)	36.9 (7.9)	32.9 (8.8)	36.6 (8.3)
Female	45.0 (2.8)	40.7 (4.6)	30.6 (7.6)	35.0 (6.8)	35.9 (5.4)
P value	<0.0001	0.6349	0.0060	0.3228	0.7216
<b>Year</b>					
First	41.7 (5.6)	42.0 (4.5)	34.6 (7.6)	33.6 (7.5)	34.0 (6.1)
Second	41.4 (8.3)	40.9 (5.3)	33.5 (9.7)	37.8 (6.9)	36.9 (8.3)
Third	41.4 (6.5)	38.9 (5.0)	34.2 (7.9)	30.4 (8.8)	37.2 (7.6)
Fourth	41.0 (4.8)	39.2 (5.5)	32.5 (9.3)	34.5 (7.1)	37.5 (6.1)
P value	0.7872	0.2904	0.8867	0.1162	0.4697

personality traits were significantly different for both dental student gender and year ( $p < 0.001$  and  $p = 0.024$ , respectively). Results from the ANOVA analyses presented in Table 4 indicated that the largest deviation in scores between genders occurred for the agreeableness and emotional stability personality traits; that is, males and females had significantly different mean agreeableness and emotional stability scores ( $p < 0.001$  and  $p = 0.031$ , respectively). Interestingly, females tended to have higher agreeableness scores when compared to males, while males tended to have higher emotional stability scores when compared to females. Although not significant at the 0.05 level after the Bonferroni correction, the largest deviation in mean scores between student year was for the extraversion personality trait. Students in their third year had lower scores on average compared to other years (mean [SD] = 30.4 [8.8]), while students in their second year had the highest scores for the same trait on average (mean [SD] = 37.8 [6.9]).

Delving deeper, the effect of student gender on each of the specific items within the agreeableness and emotional stability personality traits was assessed (Table 5). Facets were defined by a set of ten unique questions, made up of five responses, and given a value of 1 to 5 as detailed in the scoring instructions provided by IPIP. Some questions were reverse-scored in order to keep the ordinality the same for all questions. For agreeableness, males and females presented significantly different scores for all of the facets except the following: ‘insult people’ and ‘make people feel at ease’ ( $p = 0.0685$  and  $0.2282$ , respectively). These

two questions are geared towards how dental students feel they directly affect others’ feelings and attitudes. Therefore, results indicated that gender played less of a role here, suggesting that the dental students surveyed felt they treated others similarly, regardless of gender. On the other hand, the biggest deviation in scoring between student gender was seen for the facet ‘sympathise with others’ feelings’ (males: IQR = 3–4; females: IQR = 5–5;  $p < 0.0001$ ), suggesting that female dental students tended to be much more sympathetic than male dental students.

Furthermore, for the emotional stability personality trait, males and females presented significantly different scores for all of the facets except the following: ‘am easily disturbed’, ‘get upset easily’, ‘get irritated easily’ and ‘often feel blue’ ( $p = 0.2067$ ,  $0.2699$ ,  $0.2640$  and  $0.1136$ , respectively). These facets are geared towards how dental students deal with adversity or anxiety. Again, results suggested that gender was invariant towards how the students that were surveyed felt they dealt with these types of responses. Here, the biggest deviation in scoring between student gender was seen for the facet ‘am relaxed most of the time’ (males: IQR = 3–4.75; females: IQR = 2–4;  $p = 0.0132$ ), suggesting that male students tended to be much more relaxed during their time in dental school than female students.

### Discussion

A systematic review of traits in academics found consistency in extraversion and agreeableness in medical students.<sup>13</sup> With studies of

personality traits in dental students lacking, the closest academic degree being medicine, some measure of assumptions of similarities had been made to draw parallels to existing information. Both academic degrees require similar strengths in science courses, interest in helping others and service to the community. This study demonstrates some similarities in personality traits between medical and dental students for agreeableness and extraversion. Strikingly, another trait – emotional stability – seemed to be predominant as well, but in male dental students more so than female students.

Agreeableness, a predominant trait found in this study of dental students, is the tendency to help others and behave socially, and is also found significantly in medical students.<sup>10</sup> It has been positively correlated to successful clinical performance in medical students, the essential facet being sympathy.<sup>10</sup> Sympathy was the most significant gender-related facet deviation, in which female dental students’ scores surpassed those of male students. Although results for this facet indicated that all dental students, regardless of gender, felt they treated others similarly, scoring suggested that female dental students tended to be more sympathetic than male dental students. The ability to sympathise should positively impact patient care for dentists who score high on this facet of the agreeableness trait because patients are typically fully conscious during dental treatment and require dentists to respond to their concerns, discomforts and anxieties.

Extraversion was scored highly for dental students as well, which is consistent with medical students. Extraverts seek out

**Table 5** The ten unique questions related to the agreeableness and emotional stability personality types, respectively. Each question involved five responses that were scored from 1 to 5. The corresponding median (IQR) responses are provided and stratified by gender. The p values were obtained after performing Kruskal-Wallis tests to determine if the median response scores were significantly different between genders

Personality type	Question	Gender (IQR)		P value
		Male	Female	
Agreeableness	Feel little concern for others*	4 (3–5)	5 (5–5)	0.0009
	Am interested in people	4 (3–5)	5 (4–5)	0.0099
	Insult people*	4.5 (3–5)	5.0 (4–5)	0.0685
	Sympathise with others' feelings	4 (3–4)	5 (5–5)	<0.0001
	Am not interested in other people's problems*	4 (3–4)	4 (4–5)	0.0003
	Have a soft heart	4 (3–4)	4 (4–5)	0.0133
	Am not really interested in others*	4 (3–4.75)	5 (4–5)	0.0046
	Take time out for others	4 (4–4)	4 (4–5)	0.0402
	Feel others' emotions	4 (3–4)	5 (4–5)	0.0010
	Make people feel at ease	4 (3.25–4.75)	4 (4–5)	0.2282
Emotional stability	Get stressed out easily*	4 (2–4)	3 (2–3)	0.0167
	Am relaxed most of the time	4 (3–4.75)	3 (2–4)	0.0132
	Worry about things*	2 (2–3.75)	2 (1–2)	0.0143
	Seldom feel blue	4 (3–4)	3 (2–3)	0.0337
	Am easily disturbed*	4 (3–4.75)	3 (3–4)	0.2067
	Get upset easily	4 (3–5)	4 (2–4)	0.2699
	Change my mood a lot*	4 (3–5)	3 (2–4)	0.0431
	Have frequent mood swings	5 (4–5)	4 (3–5)	0.0135
	Get irritated easily*	4 (2–4)	3 (3–4.75)	0.2640
	Often feel blue*	4.5 (3–5)	4 (4–5)	0.1136

Key:  
\* = items that have been reverse-scored

interpersonal interactions and are typically positive, gregarious, active and energetic.<sup>10</sup> Their tendencies towards sociability, distractibility and impulsivity may also contribute to their propensity to score lower on tests of knowledge than introverts.<sup>10</sup> At VCU, the educational focus shifts from all 108 class members daily taking courses together during the first two years, to the third and fourth year when the class is divided between eight clinical groups. Extraversion scores were highest in the second (preclinical) year and lowest in the third (first clinical) year, representing the most significant deviation between years in this study. There was a slight reversal of this expression in the fourth year. Future studies to compare the differences and similarities of traits throughout the curriculum for medical and dental students may provide insight.

The last predominant trait in dental students was emotional stability. Male dental students' scores reflect a high level of emotional stability, while female dental students score highly on the inverse or negative pole of this factor. The negative pole of emotional stability is neuroticism, which increases during emerging adulthood among females, but not in males.<sup>10,12,16</sup> At the facet level, females tend to show higher levels of anxiety, depression, self-consciousness and vulnerability; these load heavily on the variance of withdrawal more than volatility.<sup>12</sup> Early academic performance may be negatively affected due to anxiety and maladaptive coping strategies in stressful situations, like high-stakes test-taking.<sup>10</sup> Professional counselling and strategies for managing stressful situations are provided on many campuses in the US

to mitigate long-term, high-stakes stress. Students exhibiting emotional withdrawal should be monitored, particularly if academic struggles are noted. Making students aware of counselling and stress management services available to them on campus are strategies for moderating the effects of neuroticism and may help students as they work through challenging circumstances.

The results demonstrate there may be some common traits shared with other professionally trained students, as well as correlation to the gender-related deviations determined in previous studies. A limitation of this study is the small sample size, which was partially due to limiting the availability of the survey to try and register responses before the beginning of the highly stressful courses and tests. Students' responses may differ throughout the course



of the academic year due to changes in self-perception and perceived competence in relation to peers. However, re-administering the survey and sending frequent completion requests further into the academic year to increase the number of respondents may provide additional evidence.

Future studies should explore changes in traits through professional training, gender-related deviations and the influences of broader demographic factors on student personality. Lastly, gender-related neuroticism and implications of this trait on students under stress begs the question of the commonality of facets like depression and anxiety in females when compared to male dental students. Differences in male and female traits could also reflect measurement bias in male self-reporting, which may cause an underestimation of neuroticism in this student population.<sup>17</sup> Male and female students may have the same trait but express it in opposing ways. For example, when men express neuroticism, their variance is more likely volatility instead of withdrawal.<sup>17</sup> Future studies to examine within-gender differences, instead of gender-related differences, may yield insight into the potentially under-reported expression of neuroticism in male students.

As faculty and administrators, awareness of these traits and how they contribute to students' learning experiences help in the implementation of appropriate interventions that contribute to a more inclusive environment. Acknowledging that student personality traits and subsequent behaviour

may have an influence on how they react to coursework and clinical training allows for appropriate faculty response, and aids in the creation of perceived safer learning environments, in which pedagogy can be most effective.

## Conclusions

The results of the survey reflect that a majority of dental students demonstrated extraversion and agreeableness strongly, and that emotional stability was strongly correlated with male students. Although limited in respondents, this offers insight into the similarities and differences in predominant personality traits in dental students in one dental programme in the US; hopefully, future studies will add to this new evidence.

### Conflict of interest

No funding or other remuneration has been received or offered in relation to this study.

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