

Medical students' Big Five Personality scores and the effects on the "selection process"

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SUMMARY

Assessment of the personalities of medical students not only aids the formulation of strategies for the best development of academic and clinical competencies but can also inform the process of selecting medical practitioners. The hypothesis tested was that medical students have distinct personality profiles that reflect the nature of the selection process.

Two groups of French medical students were compared using the Big Five Inventory (BFI) to measure personality: an unselected group of Year 1 medical students ($n = 1332$; mean age $19.4 \text{ years} \pm 1.4$; 68% females) and a group of academically successful Year 3 students ($n = 403$; mean age 21.3 ± 1.6 ; 65% female). The data collected further enabled comparisons in an international context where medical students were selected using different procedures.

Year 3 French medical students, who represent only the top 15% of students initially admitted into the medical course, scored lower on two personality dimensions than the unselected Year 1 students: on Agreeableness and Openness to new experience ($p < 0.001$). In keeping with the findings in non-medical populations, both groups of female medical students scored higher on Agreeableness than did males. Nevertheless, the selection effect on

Agreeableness and Openness held for both males and females. These findings contrast with medical student personality profiles in other countries that use less overtly competitive procedures to select medical students.

Key words: Five Factors of personality –Big Five Inventory– Selection effects

INTRODUCTION

It has been reported that "exemplary" or "model" medical practitioners should have the characteristics of empathy, warmth, cooperativeness, honesty, and self-control (Hojat et al., 2001; 2002a, b; Roh et al., 2010). These characteristics all belong to a broad personality dimension labelled Agreeableness in modern research into the psychology of personality (John and Srivastava, 1999; John et al., 2008). Accordingly, it might be argued that students who score high on personality traits related to Agreeableness should be selected to study medicine⁷. However, there is no general agreement about the methodologies appropriate for selecting such students, and internationally many different selection approaches are evident.

The five-factor model (defined by the five broad dimensions of Extraversion vs. Introver-

sion, Agreeableness vs. Antagonism, Conscientiousness vs. Irresponsibility, Neuroticism vs. Emotional Stability, and Openness to New Experience vs. Closed-mindedness) is increasingly gaining acceptance for assessing personality (e.g., John et al., 2008). However, it has been little used for medical students. One study investigated the personalities of Flemish medical students in Belgium, students that are selected from school pupils by “an admission examination organised by the Flemish Provincial Government that includes cognitive ability measures (e.g., reasoning tests) and video-based situational tests (e.g., video-taped interaction between doctor and patient)”, thus taking into account not only intellectual performance but also personality in terms of interpersonal skills. Indeed, the medical students thus selected scored higher on Agreeableness and on Extraversion than a range of other university students. With regard to Conscientiousness, Openness, and Neuroticism, these medical students were located in the middle of the range compared with students of other subjects (Lievens et al., 2002).

In another study, the medical school at Saint Louis, USA, enrolled older, graduate students who had already successfully completed university (college) education. Here, the mean scores of the students on personality traits related to Agreeableness were close to the average of the general population. Thus, the students were not particularly high (or low) on this personality dimension. However, they were above average on Extraversion and on Openness, and average for Neuroticism and Conscientiousness (Chibnall et al., 2009). A study using the Big Five has been undertaken in the United Kingdom where students are selected by assessment of performance at high (secondary) schools in scientific subjects and subsequently on the basis of personal statements, teachers’ reports, and interview performance (it being expected that the medical students selected would not subsequently fail to qualify as medical practitioners). It was reported that medical students who scored high on Conscientiousness performed better at their preclinical medical examination. However, the reports did not characterise the personality profiles of the selected or most successful students, including the mean scores on Agreeableness, in terms of population norms (Ferguson et al., 2003).

To date, there have been no assessments of the personalities of medical students in France. In light of the different procedures employed to

recruit students to medical schools, and the apparently different personality profiles of the students in Belgium, the United States, and the United Kingdom, this is unfortunate because the French medical-selection system provides a unique cohort of students who are admitted to first-year medical school after completing their baccalaureate (high school diploma) without further selection procedures (e.g., such as the Flemish, who take personality predispositions into account), and who, at the end of their first year of medical study, are selected rigorously only on the basis of the results of their written medical examinations to continue into fully-fledged medical training. Only the top 15% of high scorers can advance and 85% are rejected. Anecdotal descriptions suggest that the need for such exceptional exam scores leads to an environment of intense, if not fierce, competition, rather than prosocial collaboration; an environment in which only certain personalities would be expected to thrive. This environment also requires a narrow focus on academic success over broader intellectual and artistic interests common at this young age, certainly producing a lower Openness effect. Consequently, the aim of this paper is to test the hypothesis that French students admitted into full medical training show a personality profile that reflects the particular admission procedures. Specifically, we hypothesized that the single and highly competitive examination-based selection criterion would be reflected in lower Agreeableness scores in the students successful in this selection environment, as compared to a group of unselected first-year students. We also tested whether gender differences in personality previously found in the general population (e.g., Srivastava et al., 2003) are also found in these two groups of French medical students. Previous research has shown that practicing women doctors score higher on empathy (a trait related to the broader personality dimension of Agreeableness) than male doctors (Hojat et al., 2001, 2002b).

METHODS

Subjects

The Big Five personality dimensions were assessed in two groups of medical students, recruited at the same French medical school (University of Paris Descartes). One group ($n = 403$) had passed the first-year examinations

and were now in their third year of medical studies, representing the top 15% of medical students selected for fully-fledged medical training. In this sample, 65% of the students were female and 35% male; the mean age was 21.5 years ($SD = 1.8$). The comparison group ($n=1332$) consisted of unselected medical students in their first year of medical training, prior to any elimination due to first-year examinations. There were 68% females and 32% males, with a mean age of 19.4 years ($SD = 1.4$).

Instruments

To indicate the broad nature of the Big Five personality factors, McCrae and John (1992) have labelled them as E (Extraversion, Energy, Enthusiasm), A (Agreeableness, Altruism, Affection), C (Conscientiousness, Constraint, Control of impulse), N (Neuroticism, Negative affectivity, Nervousness), and O (Openness, Originality, Open-mindedness) (John et al., 2008). To measure these five broad dimensions in medical students, we used the Big Five Inventory (BFI), developed by John et al. (1991) and adapted for use in French by Plaisant et al. (2005, 2010). The 45-item French adaptation is hereafter referred to as the BFI-Fr.

The BFI items consist of short phrases that are easy to understand and were designed to assess the prototypical traits defining both the high pole and the low pole of each of the Big Five dimensions. For example, "Is helpful and unselfish with others" is an item measuring the high (agreeable) pole of the Agreeableness dimension, whereas "Can be cold and aloof" measures the low (antagonistic) pole of Agreeableness. Respondents are asked to rate their agreement with each BFI item on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Because the BFI takes only 10 to 15 minutes to complete, it is particularly useful for large-survey studies where respondents can only spend a limited amount of time on the personality assessment. In studies in the U.S., Benet-Martinez and John (1998), John and Srivastava (1999), John et al. (2008), and Soto and John (2009) have reported that the BFI scales have high levels of internal consistency and retest reliability, a clear five-factor structure, and substantial convergent and discriminant validity with longer Big Five measures and independent peer

ratings. In terms of gender differences, the women showed higher mean scores than men on Agreeableness, Conscientiousness, and Neuroticism.

In several samples of French students and adults, the BFI-Fr replicated the expected five-factor structure, and the scales showed similar psychometric characteristics, with satisfactory reliability, low interscale correlations, and substantial convergent correlations with Costa and McCrae's (1992) NEO-PI-R (the revised NEO personality inventory) domain scales; similar gender differences were also found by Plaisant et al. (2005, 2010). The full English BFI is reprinted in John and Srivastava (1999), John et al. (2008), Benet-Martinez and John (1998), and the BFI-Fr is reprinted in Plaisant et al. (2010).

In the two groups of medical students studied in this research, the alpha reliability coefficients for the BFI scales (indexing the internal-consistency reliability of multi-item questionnaire scales) were similar to those in previous research. In the group of selected third-year medical students, alpha reliability coefficients were 0.84 for Extraversion; 0.75 for Agreeableness; 0.80 for Conscientiousness; 0.80 for Neuroticism, and 0.75 for Openness. In the comparison group of unselected first-year medical students, the alpha coefficients were 0.80, 0.75, 0.80, 0.81, and 0.73, respectively. All alpha coefficients were above 0.70, which is considered satisfactory reliability for brief psychological measures (John and Soto, 2007).

Procedure and analyses

Participation in the study was voluntary and confidentiality was guaranteed by having the participants complete the BFI anonymously, a common procedure which also eliminates concerns about individual differences in socially desirable self-presentation. Participants only reported their sex and age and could thus not be identified from the material they completed; the survey received ethical approval at University of Paris Descartes.

Statistical analysis was accomplished using the SPSS (Statistical Package for the Social Sciences) package (version 16). In addition to a descriptive analysis of the data, correlation analysis (Bravais-Pearson) and group comparison (ANOVA) were employed to make statistical comparisons.

RESULTS

Comparisons of selected third-year medical students with unselected first-year medical students from the same university

Overall, 85% of the students in the first-year French medical class are rejected from full-time medical training and thus represent students that enter other majors, such as the physical or social sciences. Thus, the effect of the procedure used to select students from the first year into the fully-fledged medical training program should be apparent in differences in personality between the unselected first-year student group and the smaller group of selected medical students. The means and standard deviations (SD) for the two groups of students are shown in Table 1 and illustrated in Figures 1, 2, 3.

As expected, the selected third-year medical students had lower Agreeableness scores than the unselected first-year students, $F(1, 1729) = 44.1, p < 0.001$). In addition, they scored lower on Openness, $F(1, 1729) = 12.9, p < 0.001$.

Importantly, these two effects held for both sexes: the women showed the same difference in A “agreeableness” ($F(1, 1150) = 31.5, p < 0.0001$) and in O “openness” ($F(1, 1150) = 9.9, p < 0.005$), and so did the men on A “agreeableness” ($F(1, 555) = 12.7, p < 0.0005$), and O “openness” ($F(1, 555) = 4.1, p < 0.05$). In addition, the men showed a group difference for N “negative affectivity” ($F(1, 555) = 4.3, p < 0.05$), with third-year male medical students scoring higher.

Table 1. Comparison of Selected Third-Year Medical Students (n=403) with Unselected First-year Medical Students (n=1332). E (Extraversion, Energy, Enthusiasm), A (Agreeableness, Altruism, Affection), C (Conscientiousness, Constraint, Control of impulse), N (Neuroticism, Negative affectivity, Nervousness), and O (Openness, Originality, Open-mindedness)

		Total sample		Male students		Female students	
		3rd year	1st year	3rd year	1st year	3rd year	1st year
E	Mean	3.2	3.1	3.2	3.2	3.2	3.2
	SD	.67	.76	.64	.77	.69	.76
A	Mean	3.6	3.8*	3.5	3.7**	3.7	3.9*
	SD	.51	.61	.55	.64	.48	.58
C	Mean	3.4	3.4	3.2	3.2	3.5	3.5
	SD	.60	.71	.56	.68	.59	.70
N	Mean	3.0	3.0	2.8*	2.6	3.0	3.1
	SD	.66	.84	.62	.81	.67	.81
O	Mean	3.4	3.6*	3.5	3.6*	3.4	3.6*
	SD	.54	.62	.56	.63	.53	.61

Note: Asterisks refer to the results of tests comparing the means of the selected students with the unselected students and appear next to the higher of the two means. (* $p < 0.05$; ** $p < 0.01$)

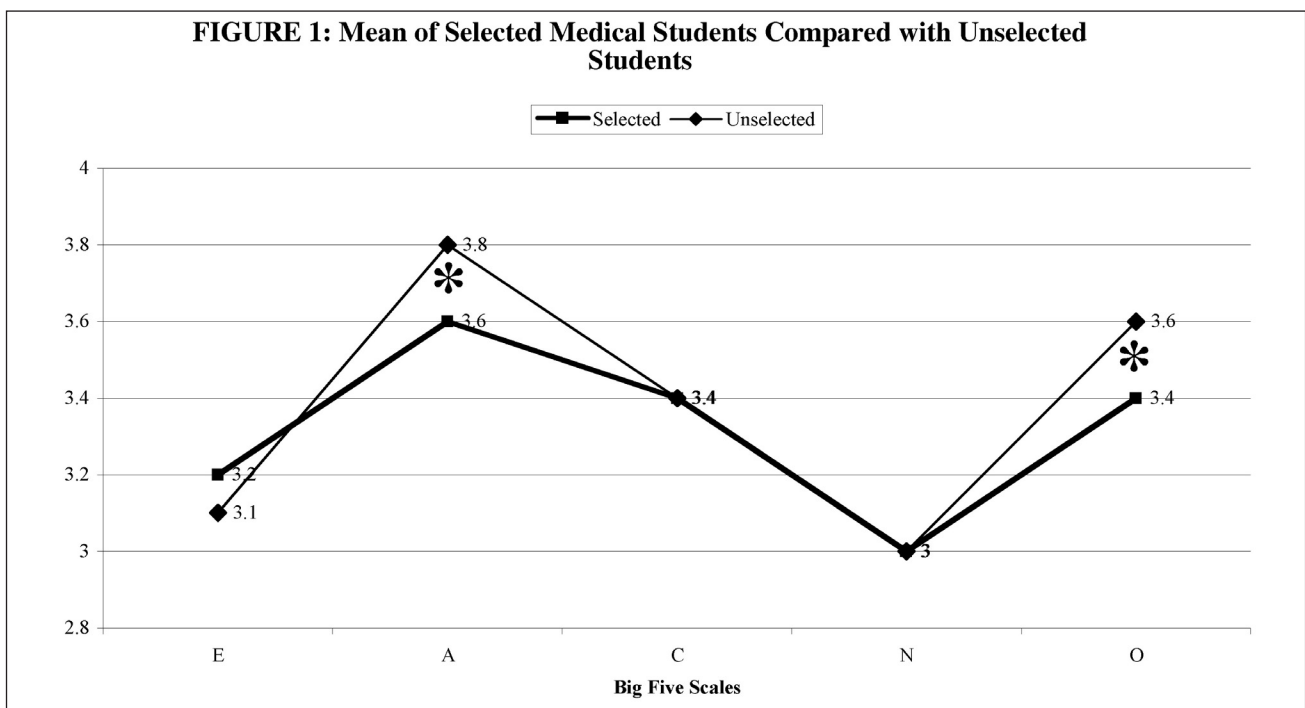


FIGURE 2: Replication of A (Agreeableness, Altruism, Affection) Effect in Male and Female Medical Students

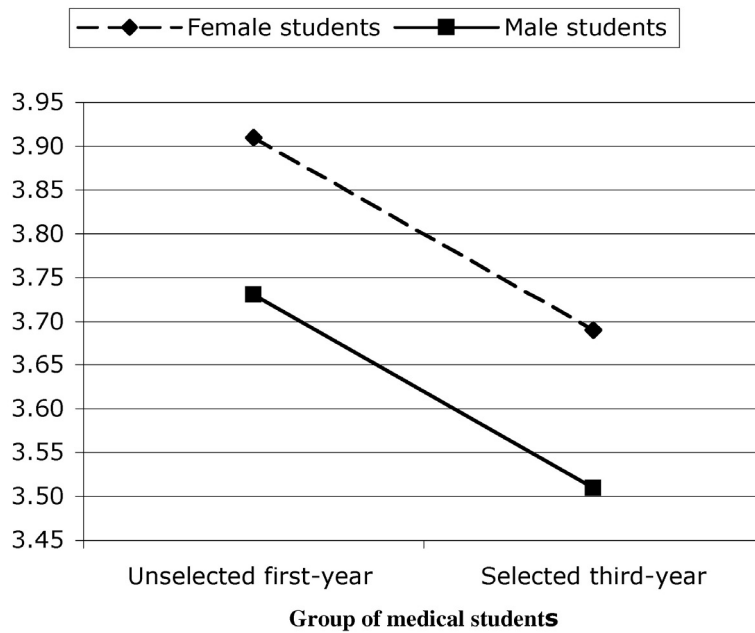
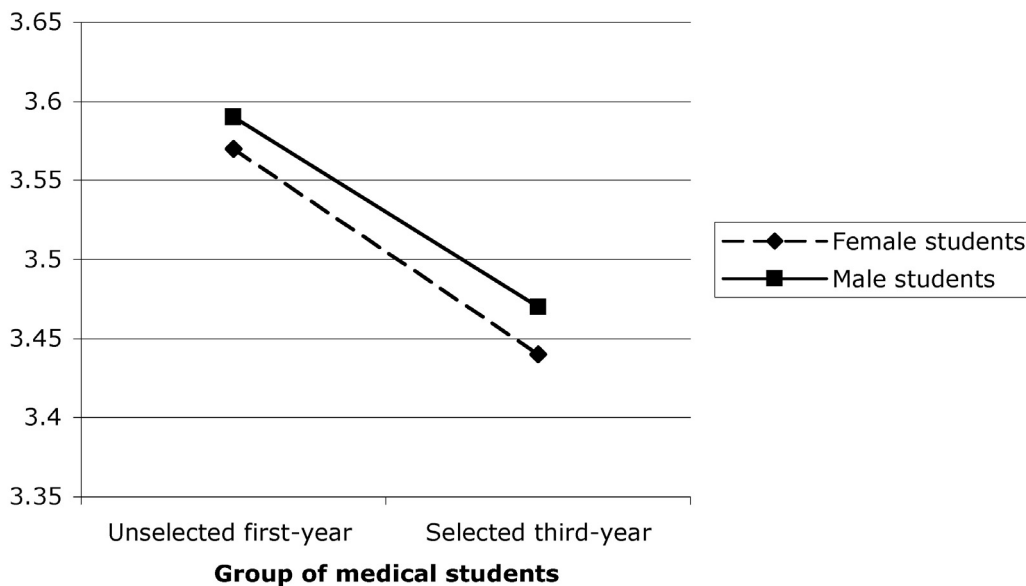


FIGURE 3: Replication of O (Openness, Originality, Open-mindedness) Effect in Male and Female Medical Students



Sex differences in the two groups of medical students

Table 1 also shows the means for males and females in the two groups of French medical students separately. The sex differences in the medical students were very similar to those reported for other populations and countries. In the selected third-year students, the women scored significantly higher than the men on

three Big Five dimensions: Agreeableness, $F(1, 391) = 10.7, p < 0.01$; Conscientiousness, $F(1, 391) = 25.9, p < 0.01$; and Neuroticism, $F(1, 391) = 12.3, p < 0.01$. The same pattern of sex differences held in the unselected group of first-year medical students: Agreeableness, $F(1, 1314) = 24.1, p < 0.001$; Conscientiousness, $F(1, 1314) = 55.3, p < 0.001$; and Neuroticism, $F(1, 1314) = 105.2, p < 0.001$.

DISCUSSION

Our survey shows that, for a cohort of third-year medical students (i.e., at “advanced stages of their medical education and training”) scored low on “Agreeableness” and on “Openness”. Differences were found in comparison with a cohort of first-year students and between the sexes. Our findings are thus consistent with our hypothesis that highly competitive selection criteria are reflected in lower “agreeableness”.

Evidently, the third-year students had attended university two years longer and were therefore on average two years older (21.5 vs. 19.4 years). However, the findings that the selected third-year medical students scored lower on Agreeableness and lower in Openness cannot be explained in terms of general *age* changes in personality. Extensive research (e.g., Srivastava et al., 2003; Roberts and Mroczek, 2008; Soto et al., 2008) has documented (a) that individual differences in personality traits are quite stable over time and (b) that the small changes that do occur from age 19 to age 22 consist of *increases* in Conscientiousness and Agreeableness, not the *decreases* in Agreeableness and O “openness” we observed during the selection from first-year status to advanced medical student in the third year. In sum, as observed in the preliminary (unpublished, comparing first year and second year) data, we found two significant differences that replicated across the men and women when third-year medical students were compared to the heterogeneous population of the first year, with the selected medical students in the third year scoring consistently lower in A “agreeableness” and O “openness”.

Concerning gender differences, for the medical students across all three cohorts studied in this survey the women scored higher in “agreeableness”, “conscientiousness”, and “negative affectivity” than the men. Nonetheless, the differences in “agreeableness” (and “openness”) found by us in the “advanced” medical students held across both sexes, the women who had progressed into the third year of medical studies being less agreeable than the females in the first-year cohort. The gender differences reported here are consistent with our own previous research using French samples (Plaisant et al., 2005, 2010) and with research in the U.S. (Srivastava et al., 2003; Benet-Martinez and John, 1998), as well as with another recent study of universi-

ty students Rubinstein (2005). Furthermore, these gender differences in personality have been found across a wide range of different cultures (Costa et al., 2001). It has also been found that gender differences are most marked among industrialized European and American cultures and relatively attenuated among African and Asian cultures. The question remains unresolved as to whether the gender issues that have been reported relate primarily to biological factors (i.e., sex as defined by WHO) or to socially constructed roles (i.e., gender as defined by WHO).

Our findings for medical students appear to differ from an earlier survey, where it was reported that Flemish students at a medical school in Ghent scored high on “agreeableness” (Lievens et al., 2002). This might reflect cultural differences between Belgium and France in the way that medical students are selected. However, an investigation of medical students’ personalities at Saint Louis, USA, also revealed that the students were not inordinately “agreeable” and this was considered a difficulty in terms of building clinical teams where there needs to be conflict resolution and alliance-forging (Chibnall et al., 2009). The personality differences that we recorded between year-one and year-three medical students may well reflect the highly competitive nature of those in year three that had succeeded in progressing beyond year one. The exact mechanisms underlying this selection effect await further investigation. Overall, however, the data support our hypothesis that medical students, both men and women, are relatively low in “agreeableness”. Moreover, it is noteworthy that fewer students high on “openness” (the tendency to be open to, and interested in, new experiences, opinions, and perspectives) remained in the medical school as far as the third year of training.

That there are personality differences within the cohort of medical students has implications for the way in which students are admitted to medical school. The admission of medical students does not usually rely upon a measured assessment of personality, and it is usually assumed that there are no important differences, or that the differences “balance out” across the whole cohort of students, or that a “good personality mix” is desirable. However, admission to medical school should be based on choosing those students whose attributes (academically, attitudinally, and in terms of behaviour) are best suited for patient

care. Indeed, the question should be raised: what actually *are* the personality traits best suited for practising medicine? In this context, is it indeed in society's best interest for students who are low in "agreeableness" and "openness", however academically capable they may be, to be admitted to medical school? It could be argued that the best medical practitioners are those who, regardless of personality, arrive at correct diagnoses and treatment plans. However, others would argue that medical practitioners must additionally have good communication and social skills. Regrettably, these assumptions have not, as yet, been properly assessed, and medical authorities, even in the most democratically orientated societies, have not deemed it worthy of considering lay-persons' opinions in this regard! That this is an important issue is shown by an investigation that found that medical practitioners scoring high on "Agreeableness" and "Extraversion" (both dimensions defining interpersonal dynamics) are better at developing the skills required for collaboration and communication in professional practice (Lievens et al., 2002). Furthermore, because "conscientiousness" affects examination results, and can be reliably assessed at the start of medical studies, it was further recommended that personality assessments be employed for guiding students as to their suitability for entering medical school. While there may be a lack in political will to change medical admissions policies, in France (as indeed in many other countries worldwide) there are presently important debates taking place about structural modifications to the first year of medical school and about the integration of the medical curricula into the Bologna process. Therefore, now might be the ideal time for reconsidering matters relating to the admission of students to the medical profession.

This issue can be considered further by noting that individual differences in the Big Five personality dimensions remain quite stable over time (Roberts and Del Vecchio, 2000). Nonetheless, systematic changes in personality do take place with age. The development of the Big Five personality traits has been studied throughout adult life (Srivastava et al., 2003). "Conscientiousness" appears to increase with age (most strongly during the 20s), whereas "Agreeableness" increases most during the 30s. In contrast, "Neuroticism or negative affectivity" declines with age for women,

but not as much for men, and "Openness" and "Extraversion" show only minor changes with age. In another report, increases in "Conscientiousness" and "Agreeableness" and decreases in "Negative affectivity" in adulthood were interpreted as indicating increasing maturity (persons becoming, on average, better adapted to adult tasks in work and relationships as they get older) (Roberts and Mroczek, 2008; Roberts and Farrell, 2003). Such changes predominate in young adulthood (age range 20-40 years) but can continue into middle, and even old, age. Thus, if it is not possible (or, in the view of some, desirable) to select medical students according to their "Agreeableness" or "Openness" (however beneficial this might be to patients or even to their teachers), at the very least attempts should be made to encourage students to develop these characteristics. Accordingly, while greater "Agreeableness" may come to the fore with age, it would be necessary to see early signs of desirable personality development, perhaps by personality profiling as the students (or early practitioners) begin their careers. Indeed, in some countries "fitness to practise" issues are treated most seriously. For example, in the United Kingdom, the General Medical Council's guidelines, "Tomorrow's Doctors", places important stress on attitudes and behavioural development.

It could be argued that since medicine is multidisciplinary different specialties require different personalities. Thus, it has been reported that general surgeons are more tough-minded, resolute, and less empathetic than general practitioners and anaesthetists (Borges and Osmon, 2001). This characterization of surgeons seems to pervade the literature and also the medical community. Surgery is perceived as one of the most stressful medical specialties (Linn and Zeppa, 1984), and students who choose surgery are described as being more resistant to stress and as having high self-esteem; to quote an oft used saying - surgeons are required to be "bloody, bold, and resolute". As yet, there is no evidence to show that these are the personality traits required for a surgeon to be clinically efficient. Gender differences relating to specialty interest can also be attributed to personality traits. For example, among first-year medical students (as well as physicians), consistent with the "Agreeableness" differences reported here, women consistently score significantly higher than men on empathy (Hojat et al., 2001; 2002a, b). This person-

ality difference can lead women to choose primary care, or a “people-oriented” specialty, more than men (Roh et al., 2010). Clearly, much future work is required to assess the attributes required of practitioners in different specialties, but until such research is undertaken it is perhaps expedient to maintain attitudes and personality traits that are empathetic and show “Agreeableness” and “Openness”.

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