

The Way They Were: Medical Specialties

by

Gerald D. Otis, PhD

August, 2018

Abstract

Half a century ago a wide-ranging longitudinal study of medical students was initiated at a southwestern state university. After funding for the project was lost in its ninth year, its data lay dormant for decades. Recently it became possible to trace 86% of the participants in the original study and determine their eventual specialty, work-setting and community choices. This paper deals with medical student features associated with eventual specialty choice. Subsequent papers will examine features associated with work-setting and community choices and with the degree to which choices in these three career areas can be predicted from entry-level career dispositions.

Medical specialties were grouped into specialty clusters based on psychological similarity, as revealed by factor analysis of students ratings on bi-polar preference scales. When looking back at the way medical students were at the time of their admission to medical school, from the point of view of eventual membership in those specialty clusters, it was found that many features in the domains of background characteristics, career dispositions, personality characteristics, attitudes toward medical education, notions of the ideal physician, and academic performance “stood out,” i. e., were significantly different for each group compared to the total sample. For the most part, these differences in salient features seemed to “make sense” in terms of the specialty cluster chosen. It was observed that specialty groups differed in their responses to different assessment methods, some revealing their differences more on one assessment device rather than another, suggesting they had an affinity toward some methods rather than others. The possibility of “method factors” playing a role in the results was suggested, although the exact nature of that role cannot be determined from the data.

Choice of medical specialty has been a subject of empirical inquiry for decades and continues to be of interest to researchers, developers of medical school curricula and health care planners^{1,2}. Bowman³ has looked at the relationship between career choice and health policy initiatives over the last four decades and found that, in spite of a substantial increase in numbers of primary care physicians, there has been a decrease in “standard primary care years per graduate” in both physicians and physician extenders. The “institutional types” of medical schools that produce physicians⁴ as well as various exposure⁵ programs for primary care have been studied. Personality factors have been extensively studied and have produced a number of characteristics somewhat inconsistently associated with different medical specialties^{6,7}.

Medical students can be considered as possessing “nascent images” of their future medical careers, with some features of the image tentatively decided, some still unspecified, and all of them subject to modification with the advent of new experience. The degree to which medical students' nascent images are able to anticipate their eventual specialty choice has become a topic of debate because of proposals to shorten the length of medical education by developing tracks for students headed in different directions^{8,9,10,11,12,13}.

Employing some of the same instruments used in previous studies as well as new ones, the present study continues these earlier lines of inquiry by looking at various features of medical students in different domains assessed at the time of entry to medical school and their eventual specialty choice at the end of their careers, some 40 – 50 years later.

Methods

Subjects for the study were 465 physicians who graduated from the University of New Mexico School of Medicine between 1968 and 1979. They were traced on the internet using Bing and Google searches which usually resulted in several “hits” to a professional web site, a repository of physician information (Healthgrades, Vitals, Doximity, etc.) or some other location (e. g., medical school). Their identities were confirmed by locating the date of graduation from UNM listed on the web site. If the identity could not be confirmed, the case was dropped from the sample. From one or more web sites, the physician's specialty was determined as well as her/his work-setting and location of practice.

Participants self-identified into one of 18 specialties: Otolaryngology (1%), Orthopedics (3%), Internal Medicine (15%), Pathology (6%), Obstetrics-gynecology (6%), Pediatrics (7%), Cardiology (2%), Psychiatry (7%), Allergy (1%), Family Medicine/General Practice (20%), Ophthalmology (3%), Preventive Medicine (2%), Surgery (7%), Dermatology (4%), Radiology (4%), Emergency Medicine (7%), Anesthesiology (4%) and Neurology (5%). Compared to the percentages from the *AAMC 2012 Physician Specialty Data Book*¹⁴, the only figures that stand out are for Internal Medicine (3.5% higher than the national group) and Family Medicine (7.7% higher than the national group).

In order to reduce the number of specialty categories and therefore increase the number of cases within categories, specialties were combined into clusters of “similar” specialties. The categories of specialties and sub-specialties formally claimed by internal medicine and surgery professional associations did not appear to be psychologically meaningful. Instead, specialties were grouped on the basis of a factor analysis of ratings of specialty inclination made by these students in their final year of medical school. One cluster was dropped because it was an empty class when cases with missing data were excluded. (It should be noted that the factor analysis was just used to establish what specialties belonged together; the objects being classified were the practicing physicians). The seven categories which ended up being used were:

- Cluster 1 IM: general internal medicine, pulmonology, cardiology and gastroenterology (n = 80, 17%).
- Cluster 2 SURG: general surgery, orthopedic surgery, plastic surgery, thoracic surgery, urology, neurosurgery (n = 49, 11%).
- Cluster 3 FM: family practice, pediatrics, general practice, emergency medicine, public health (n = 153, 33%).
- Cluster 4 T&I: ophthalmology, allergy, otorhinlaryngology, dermatology, anesthesiology and pain medicine (n = 63, 14%).
- Cluster 5 PSY: psychiatry, physical medicine and rehabilitation, preventive medicine and neurology (n = 45, 10%).
- Cluster 6 DIAG: pathology, radiology, basic medical science, hematology, neuropathology (n = 48, 10%).
- Cluster 7 OBGYN: obstetrics and gynecology (n = 27, 6%).

Data for each physician, collected at the time of admission to medical school (before beginning classes), was obtained from the Longitudinal Study Database. Staff members of the Longitudinal Study developed, refined and introduced new data collection instruments throughout the course of the project. The first instruments to be administered were the Myers-Briggs Type Indicator (MBTI)^{15, 16} and the 16 Personality Factor Questionnaire (16PF)^{17, 18} along with an initial version of a background questionnaire. At the same time, researchers collected MCAT scores, National Boards Parts I and II scores, measures of first and second year success and clerkship grades. In 1969 we introduced the Physician Ideology Questionnaire (PIQ) and the Student-Faculty Role Questionnaire (SFRQ) and in 1971 we introduced the Career Rating and Preference Inventory (CRAPI). Because different measures were introduced at different times, there were many cases with missing data at different time periods. Consequently, the number of cases suitable for analysis differed for the different instruments and different scales. The number of cases used in the analyses were as follows: background information (n = 409), personality test scores (n = 344-430); PIQ (n = 339); SFRQ (n = 337); performance measures (n = 345-349); and career ratings (n = 168-210).

The first set of analyses that were run on the data were what I term “salience analyses” since it determines if the scores for a subgroup “stand out” when compared to the distribution of scores of the total group. It compares the dependent continuous variable scores for a single category within a set of categories to the scores on that continuous variable for the total set of categories by drawing independent random samples from the total set of scores. My version of this Monte Carlo technique is manifested in a computer program called *Random Sampler*¹⁹. For each category, the program draws 100 or more random samples, of a size determined by the sample size of the particular category, from the full set of scores (over all categories) on the dependent variable. It computes the mean, variance, median and mode of each random sample and then calculates the percentages of those measures that fall above or below the comparable measures obtained for the particular category. (The values for means are the only ones reported in this document). The probability that the category mean is different from the mean of the full sample is given by the proportion of sampled means smaller or larger than that observed for the category. Thus, if 95% of the randomly obtained means fall above that obtained for the category of interest and 5% fall below that value, the difference is considered significant at the 0.05 probability level. No assumptions about the form of the score distribution of the dependent variable are necessary.

For the Myers-Briggs Type Indicator, Psychological Types and combinations of Type sub-categories, the prediction situation is that of categorical-to-categorical prediction. This was accomplished by

computing Chi Square values and their probabilities using another computer program I wrote specifically to generate Selection Ratio Type Tables for the MBTI²⁰. The total sample was compared to two national samples in order to test for any bias in personality representativeness. For individual specialty clusters, the type table for the specialty cluster was compared to the type table for the remainder of the sample.

Results

Note: probability levels (or percent of random sample means over or under that of the target category) are shown in parentheses following the finding.

The results of the Selection Ratio Type Table Analyses indicated that significantly more INTJ (.000), INFP (.004), INTP (.000), ENTP (.001) and ENTJ (.000) Psychological Types applied to and/or were selected into UNM than would be expected on the basis of McCaulley's sample²¹. These are the types of students that typically "look good on paper" and present themselves well in interviews. Also, UNM received significantly fewer applications from and/or selected fewer ISTJ (.047), ISFJ (.003), ESFP (.005) and ESFJ (.000) Psychological Types. These are the types of students who may present themselves as humble and less sophisticated, are more practical than theoretical, and prefer hands-on, experiential learning over "book-learning." Results were the same for the CAPT sample²² with the exception that UNM selected fewer INFJs than appeared in that sample (.005).

Internal Medicine Cluster

Physicians who eventually chose Internal Medicine or one of its sub-specialties as their medical specialty, upon entry to medical school rated as less desirable than their peers the specialties of General Practice (.02), Family Medicine (.00), Obstetrics-gynecology (.03) and Physical Medicine and Rehabilitation (.02). Their inclinations toward Internal Medicine (.01) and two sub-specialties, Allergy (.02) and Pulmonary Medicine (.01), were significantly stronger than that of their peers. Their academic interests were evident in higher levels of preference for working in a research facility (.00) and an educational institution (.00), the percent of professional time they wished to devote to research (.05), the importance of having a part-time affiliation with a medical school (.00) (and not living too far away from one (.03)), and being close to prominent persons in their field (.03). They wanted to work with other physicians (.02), and be free to try out their own ideas (.00) and mold their own roles (.01). Both personal characteristics (.00) and professional abilities (.04) of co-workers were important to them. They preferred working in a non-governmental facility (.01) and being able to control both their income (.04) and patient load (.03).

Choosers of the Internal Medicine Cluster did not distinguish themselves by their grade point average or their scores on any of the scales of the Medical College Admissions Test (MCAT). They were less likely than their peers to have had any prior work experience in a medical setting (.00).

On the 16PF, members of the Internal Medicine Cluster scored significantly higher on the Ego Strength Scale (.00), i. e., they tended to be less easily upset and more emotionally stable than their peers. On the Myers-Briggs Type Indicator, they were more likely to fall into the ESTJ Psychological Type (.038). According to the manual, ESTJs "live by a set of clear standards and beliefs, make a systematic effort to follow these, and expect the same of others. They value competence, efficiency, and results..." ESTJs are described as logical, analytical, and objectively critical, decisive, clear, well organized, and assertive. If they neglect their intuitive and feeling sides too much, they run the risk of becoming inflexible and dogmatic, running roughshod over others and refusing to listen. Consistent with the over-selection of this type for members of the Internal Medicine Cluster, these medical students were less

likely to have IS (.004), IF (.020) or SP (.021) two-point codes on the MBTI.

On the Student-Faculty Role Questionnaire (SFRQ), the members of the Internal Medicine Cluster also revealed their academic orientation and, possibly, their identification with medical school faculty. They scored higher on the Ideal Student Role Scale (.03), believing students should really invest themselves in course work, be enthusiastic about learning, show academic scholarship, and be orderly and productive. Their higher scores on the Academic vs Clinical Orientation Scale (.04) indicated they felt it was important to become good teachers, develop research skills and be theoretically oriented. They scored higher on the Faculty Professional Activity Scale (.04), believing faculty should be involved in research and various kinds of non-teaching professional affairs. As students, Internists scored higher on the Camaraderie Scale (.05), wanting faculty members to get to know them well, and include them in social and unofficial affairs. Scoring higher on the Student-Faculty Cooperation Scale (.02), they wanted faculty to be friendly, encouraging and supportive while also giving feedback about their performance and, for their part, they would seriously consider what faculty had to say and seek them out for informal discussions. Higher scores on the Psycho-social Orientation Scale (.00) showed their desire to learn about psychological, social, and cultural factors in so far as they play a role in medical practice but they also wanted to find purpose and meaning in their professional roles and learn to understand themselves as reflected in their scores on the Personal Development Scale (.00).

Consistent with these attitudes, the members of the Internal Medicine Cluster were hard-working and achieved results from their efforts in medical school, earning significantly higher scores on almost all sections of the National Boards Examinations, both Part 1 (Anatomy (, Physiology, Biochemistry, Pathology, Microbiology and Pharmacology) (all at .00) and Part 2 (Medicine (.00), Surgery (.01), OBGYN (.05), Pediatrics (.01) and Physical Medicine (.04)). They had higher Success Indexes for both year one (.01) and year two (.01) and higher ratings on Basic Science for both years one (.01) and two (.02). They achieved significantly higher clerkship ratings for Medicine (.00), Surgery (.00), Pediatrics (.00), Obstetrics-gynecology (.02), and Psychiatry (.00). With respect to academic performance, members of this cluster stood out from all the other specialty clusters.

Surgery Cluster

At the time they entered medical school, doctors who eventually chose Surgery as a medical specialty showed a greater inclination than their peers toward nearly all of the surgery sub-specialties: Neurosurgery (.03), Orthopedic Surgery (.00), Plastic Surgery (.04), Thoracic Surgery (.01) and Otolaryngology (.00) as well as Gastroenterology (.01), and Physical Medicine and Rehabilitation (.00). While they did not want a highly specialized practice, they were less inclined than their peers toward the practice of Family Medicine (.02) and did not care to work for the Public Health Service (.02). Community size was of greater importance to them than to their peers in choosing where to practice (.01) and they did not want to do so in a small town or rural area (.02) nor did they want to live in a community with a "mixed" political climate (.01). It was not important to them how far they lived from a metropolitan area (.02), perhaps because they planned on living in a larger community. Consistent with surgeons' reputed valuing of "endurance," they discounted the importance of being able to control patient load (.04), number of work hours (.05) or of being able to mold one's own role in one's work-setting (.02). It was more important for them to work with other physicians (.03) but they were unconcerned about the personal characteristics of those with whom they worked (.00). For some reason, they did not show as much of an inclination to work with adults (.01) as did their peers but they wanted to devote a greater portion of their work time to research (.00).

Members of this cluster tended to have a greater number of siblings than their peers (.01) and they ranked UNM higher than other medical schools to which they applied (.01). They did not distinguish

themselves by their scores on the MCAT scales or their GPA.

On the 16PF, surgery choosers scored higher on the Self-sentiment Scale (.04) (more controlled, self-disciplined and socially precise) and the Imaginative Scale (.05) (imaginative, wrapped up in inner desires, as opposed to practical, conventional). They tended to score lower on the Shrewdness Scale (.03) (more unpretentious, less socially aware) . On the Myers-Briggs Type Indicator, they scored significantly lower on the TF Scale (.02) (more toward the tough-minded thinking or analytical end of the scale).

On the Student-Faculty Role Questionnaire, members of the Surgery Cluster scored higher on the Academic Orientation Scale (.01), considering it important to be theoretically oriented, develop their research skills and learn how to be good teachers. Scores on the Psycho-social Orientation Scale (.01) and the Personal Development Scale (.00) indicated they did not consider it important to learn about psycho-socio-cultural aspects of medicine nor to learn about themselves, find purpose and meaning in their professional roles or appreciate the beauty in life. On the Faculty Respectfulness Scale (.04), they did not find it important for faculty to be considerate of patients or students or to be a “good example” to students. Their lower scores on the Faculty Accommodation Scale (.03) the Faculty Openness Scale (.01) and the Recognition Scale (.02) suggested they were less inclined to want faculty to accommodate to student needs, to be open with students about what was happening behind the scenes in the medical school, or for students to receive recognition for their accomplishments or to be understood and appreciated as individuals. Overall, they appear to be highly self-reliant and deny needs for any kind of nurturance from faculty. On the Physician Ideology Questionnaire, the surgeons scored higher on the Disease Orientation Scale than did their peers (.00) viewing it as important for the physician to focus his efforts on the treatment of biological disease rather than becoming involved in preventive and psycho-social medicine.

The surgeons scored lower on the first year Success Index (.01) and Basic Science rating (.00). They also achieved lower scores on the National Boards, Part 1, Pharmacology Section (.05). Otherwise, their performance scores were not significantly different from random samples of scores.

Family Medicine Cluster

Upon entry to medical school, doctors who eventually chose to practice in the Family Medicine Cluster gave higher ratings than their peers to their inclinations toward Family Practice (.00), General Practice (.00) or Pediatrics (.01) as specialties. They were more drawn to Public Health (.00) and work for the Public Health Service (.01) than their peers. They were relatively less inclined toward Neurology (.00), Neurosurgery (.00), Pathology (.03), Psychiatry (.02) or Surgery in general (.00). They wanted to devote more work-time to administrative duties (.02) and a smaller portion to research (.02), being also less inclined to want to work in a research facility (.05). They indicated a greater desire to work in a county, state or city health department (.02), a greater desire to work in a government health program (.03) and less desire to work in an educational environment (.03) or a non-governmental agency (.00). They had a greater desire to work with the neonate population (.03), to practice alone (.05) in a moderately specialized practice (.00) (but not a truly generalized practice (.00)). Their practice community preferences were relatively well-defined: they wanted to practice in a small town (.02) or rural area (.00) and distance from a metropolitan area was not of concern to them (.01) nor was the desire to control type of patients (.04). They did not want to live in a “fast-paced” community (.00) nor one that boasted a wealthy (.02) or moderate (.00) average income. The ethnic distribution of the community they chose was important to them (.01) and they desired a community with a mixed political climate (.00). They had less inclination to live in the Mid-West (.00) and more inclination to live in the Rocky Mountain region (.03).

Twenty four percent of Family Medicine Cluster members were from small towns while 45% of students from small towns became members of the Family Medicine Cluster. They had lower average GPA scores (.01) than their peers and scored lower on the Verbal (.02) and Quantitative (.04) MCAT Scales.

Members of this cluster were over-selected (compared to the overall distribution of students who entered this medical school) into the INFJ (.030), ESTP (.017), and ESFP (.017) Psychological Types and the ES_P Jungian Type (.001). INFJs are a “counseling” type gifted with insight into human relationships and empathic understanding of the feelings and motivations of others. ESTPs focus on the here-and-now and take a pragmatic and action-oriented, energetic approach to problem solving, focusing on immediate results. At their best, they develop easy methods to do difficult things, are flexible, inventive, and resourceful, and are good team members. ESFPs are pragmatic and action-oriented, like the ESTPs, but they focus on meeting human needs in creative ways. They are described as warm, sympathetic, and tactful. Thus, this specialty cluster draws on several different types of people who can wield their respective talents with differing styles, all within the domain of Family Medicine. Members of this cluster were also more likely to have higher IS (.016) and ES (.009) two-point MBTI codes.

As might be expected from their specialty choice, members of this cluster averaged higher scores on the Psychosocial Orientation Scale (.00) of the Student-Faculty Role Questionnaire (i. e., the value placed upon learning about psychological, social, and cultural factors in so far as they are relevant to patient care and augment clinical ability). However, they had significantly lower scores on the Academic Orientation (.00), Faculty Accommodation (.01), Student-Faculty Cooperation (.04) and Faculty Openness Scales (.00), i. e., they did not subscribe to the idea that students should be extra hard-working and scholarly as opposed to developing clinical skills and experience; they did not want to develop informal relations with faculty nor have them accommodate to student desires or have them share issues of conflict in the medical school with them. They also preferred a more relaxed approach to medical education. On the Physician Ideology Questionnaire, Family Medicine Cluster subjects scored significantly higher on the Physician Authority Scale (.05) (importance for the physician to have control over his work setting and all aspects of patient care).

On the performance measures, members of this cluster scored less well than their peers on many criteria: Lower scores on the second year Success Index (.02) and Basic Science rating (.00); Lower scores on National Boards, Part 1 Physiology (.02), Biochemistry (.02) and Pathology (.04) Scales; Lower clerkship ratings for Medicine (.00) and Obstetrics-gynecology (.01); and lower scores on National Boards, Part 2 Medicine (.00), Surgery (.01), Obstetrics (.00) and Physical Medicine (.02) Sections.

Technique & Instrument Oriented Specialties

When looking ahead toward their future career in medicine, members of the T&I Cluster had fairly definite ideas about what features they wanted (or didn't want) in their practice. They were significantly less inclined than their peers toward Family Medicine (.03), General Practice (.00), Internal Medicine (.03), Gastroenterology (.02), Psychiatry (.04) and Public Health (.03) as specialty choices and more inclined toward Ophthalmology (.00) and Otolaryngology (.05). They did not want to work in a city, county or state hospital (.02) or health department (.00) or in a government health program (.01) or government agency (.00) (including the military (.01), the Public Health Service (.00) or the VA (.01)). They did not want to work in a research facility (.01) but were more inclined than their peers to want to work in a hospital (.02) or large group practice (.01) setting. In constructing their careers they placed

greater importance on the need to meet emergencies (.02), the type of patients they would work with (.05), and their opportunity to work with a treatment team (.01). They placed less importance on working in a highly specialized specialty (.00) (sub-specialty) or being close to prominent persons in their field of medicine (.02), did not want to work with neonates (.02) or geriatric (.02) patients as much as did their peers and did not want to live in a community where the population was skewed toward older age groups (.00). They placed greater importance on pace of life (.04) when contemplating their practice community and wanted to work in a larger metropolitan area, not a small town (.00) or rural area (.01). They did not go along with the majority in wanting to live in the Rocky Mountain region (.01) and would consider employment in a foreign country (.03).

Members of the T&I Cluster had fewer girls in their family of origin (.01) compared to their peers and had higher Grade Point Averages (.04). However, they did not distinguish themselves in any way on any of the MCAT Scales.

On the MBTI, both ISTP (.000) and ESFJ (.003) Psychological Types were over-selected while ENTP Psychological Types (.035) were under-selected compared to the distribution of students that were accepted into this medical school. ISTPs are interested in how and why things work but find abstract theories uninteresting unless they can quickly apply them. When functioning at their best, ISTPs can sift through large amounts of data and move quickly to get to the core of a problem and solve it with the greatest efficiency and the least effort. ESFJs are described as warm, sympathetic, and helpful. They value security and stability, focus on the present and base their decisions on experience and facts. Though they enjoy variety, they adapt well to routine and don't like work that demands mastery of abstract ideas or impersonal analysis. Both ISTPs and ESFJs are practical and pragmatic. Members of this cluster were more likely to have the EJ two-point code (.039) and less likely to have the IF two-point code (.055), as one might expect from those types that were over-selected. T&I choosers scored lower on the 16PF Ego Strength Scale (.00) (more easily upset).

On the Student-Faculty Role Questionnaire, members of this cluster scored significantly lower on the Ideal Student Role (.03) and Faculty Respectfulness Scales (.04), i. e., they did not subscribe to the notion that students should be hard-working and faculty should respect patient (or student) needs. However, they considered it important, on the Psycho-social Orientation Scale (.00), that students learn about psychological, social, and cultural factors in so far as they are relevant to patient care and augment clinical ability. Their scores on the Personal Development Scale (.00) suggest they believe that students should find purpose and meaning in their professional roles, learn to understand themselves and the complexities of the world, and appreciate the beauty in life. Their scores on the Informal Relations Scale (.03) indicate they would like students to have informal contacts with faculty members, e. g., informal discussions, one-to-one talks, social affairs, office visits. The T&I choosers did not distinguish themselves from their peers on the Physician Ideology Questionnaire.

Members of this cluster achieved higher Success Indexes in both years 1 (.02) and 2 (.01) and higher scores on National Boards, Part 1, Biochemistry (02).

Psychiatry Cluster

Members of this cluster, as entry level medical students, were more inclined than their peers to choose Psychiatry as their specialty (.00) but they were also drawn to Family Medicine (.03), General Practice (.03) and Allergy (.05). They were not inclined to select Thoracic surgery (.02) as a specialty. Other than that, they had few defined features for their future careers. They wanted to work in a non-governmental facility (.01) but had not yet decided upon other characteristics of their desired practice organization. A community's political climate was important to them when choosing a place to practice

(.02) and they wanted to work in a community with a fast pace of life (.00) where their spouse could gain employment or pursue a career (.00).

As children, 62% of the Psychiatry choosers lived in a large community from ages 14 to 18. They were less likely to have majored in a biological science as an undergraduate (.05) and more likely to have majored in a social science, the humanities or fine arts (.00). Their scores on GPA or any of the MCAT Scales did not distinguish them from their peers.

Psychiatrists scored lower on the 16PF Conservatism Scale (.02) (more experimenting, less respecting of traditional ideas), lower on the Ergic Tension Scale (.04) (more relaxed, less tense or driven), and higher on the Tender-minded Scale (.02) (more sensitive, less self-reliant, less tough-minded). On the MBTI this cluster was over-represented by INFJ (.024) and INFP (.001) Psychological Types, and less likely to be designated an E_TJ Jungian Type (.052), as one would expect. INFJs are the traditional “counseling” type personality with a natural bent toward understanding and appreciating human motivations and emotions. They are organized and decisive in implementing their objectives. INFPs are like INFJs in their natural empathic understanding of others but they are more adaptable, flexible and tolerant (unless some core value is threatened). Members of this cluster scored significantly higher on the SN Scale (.004) (more Intuitive), were more likely to have the NF (.003), NP (.002) and IN (.002) two-point codes and less likely to have the EJ (.016), SF (.013), and ES (.020) two-point codes. These results are generally consistent with the results of other studies of psychiatrists⁶⁶.

On the Student-Faculty Role Questionnaire Psychiatrists obtained significantly lower scores on the Personal Development Scale (.01) (the importance for students to find purpose and meaning in their professional roles, to learn to understand themselves and the complexities of the world, and to appreciate the beauty in life). Apparently, they feel that they have already attained those objectives or, at least, know the path to those ends. On the Physician Ideology Questionnaire, they obtained higher scores on the Biological Orientation Scale (.02) (the importance the respondent attaches to the physician's biological knowledge and skill in applying it) and lower scores on the Physician Authority Scale (.04) (the degree to which the respondent considers it important for the physician to have control over his work setting and all aspects of patient care). One would suspect that they have in mind a medication-oriented approach to treating mental illness.

Psychiatrists had higher ratings on their Basic Science performance for year 2 (.00) and they obtained higher scores on National Boards, Part 2, Psychiatry (01). However, their scores on Part 1 of National Boards for Anatomy (.03), Pathology (.02), and Pharmacology (.05) were lower than those for their peers.

Diagnostic Specialties

Members of the Diagnostic Cluster, as entry-level medical students, were more inclined to choose Pathology (.00) as a specialty and were not inclined toward Cardiology (.05). They did not want to have a solo private practice (.03) and preferred working in a structured setting such as the military (.03) or an independent foundation (.03). They had already decided on the type of work they wanted to do (.00), wanted to control their patient load (.02) and work hours (.01), and wanted to be able to try out their own ideas (.00). They were less inclined to want to work with children (.03) and wanted to devote a greater portion of their work time to supervision (.05) than did their peers. While the ethnic distribution of their practice community was important to them (.02), they did not want to practice in a poverty area (03).

Members of this cluster did not distinguish themselves on any background variables. They had significantly higher Grade Point Averages (.01) and scored higher on the MCAT Quantitative Scale (.03).

On the 16PF the diagnostic specialists scored higher on the Guilt Proneness Scale (.00) (more apprehensive, worrying and self-reproaching, less self-assured) and the Ergic Tension Scale (.05) (more tense and driven, less relaxed). They obtained lower scores on the Happy-Go-Lucky Scale (.05) (more serious, prudent, sober and less happy-go-lucky, less enthusiastic) and Venturesome Scale (.00) (more shy, and timid, less socially bold and spontaneous). One might suspect, from these scores, that these physicians chose these specialties that tend to have less direct and sustained patient contact in part to avoid arousing their anxieties and self-doubts. On the MBTI they had higher scores on the EI Scale (.00) (more Introverted).

On the Student-Faculty Role Questionnaire, members of this cluster had a more pronounced need for Structure (.03) in the educational enterprise (prompt feedback, specification of what is required, encouragement to ask questions, getting recognition, evaluation by means of regular tests) and a greater desire for Faculty Openness (.05) about issues of conflict within the school, revisions in school policy, what is expected of them. On the Physician Ideology Scale they obtained higher scores on the Physician Authority Scale (.03) (importance for the physician to have control over his work setting and all aspects of patient care).

Physicians in this cluster obtained higher scores than most of their peers on National Boards, Part 1, Microbiology (.02) and higher scores on National Boards, Part 2, Medicine (.03), Obstetrics-gynecology (.03), Physical Medicine and Rehabilitation (.02) and Psychiatry (.05).

OBGYN Cluster

Medical students who would later become obstetricians, when anticipating their future careers, distinguished themselves from their peers on relatively few features and primarily in terms of what they didn't want rather than in terms of their positive inclinations. They were disinclined toward Allergy (.01) as a specialty choice, disinclined toward group practice (.03) and particularly disliked mixed-specialty group practice (.00). They rated working with adolescents as less desirable than did their peers (.00) and were not drawn toward practicing in a politically liberal community (.04), even though they said that the political climate of their practice community was not important to them (.01).

Students in this cluster were younger in age than other students on admission to medical school (.05), had fewer boys (.02) and fewer siblings (.03) in their families of origin. Their father was less likely to be employed in a medical profession (.02) and had an occupational rank (Hollingshead Index) that was lower than that of their peers (.05). Compared to other schools to which they applied, their preference rank for UNM was higher than that of other students (.01). Their average GPA was lower than for other students (.05).

On the 16PF, future OBGYN physicians scored significantly higher than their peers on Superego Strength (.02) (rule-bound and conscientious as opposed to expedient, unrestrained) and Shrewdness (.00) (calculating, socially aware as opposed to unpretentious). They scored lower on the Openness Scale (.05) (toward the tough-minded rather than the tender-minded side). On the MBTI, OBGYN choosers scored more toward the Judging side of the JP Scale (.05) (more organized and planful). Superego Strength is correlated with Judging in this sample, so the two findings would be expected to

support each other.

In terms of student-faculty roles, members of this cluster placed less emphasis on the importance of Informal Relations with faculty members (.05), e. g., informal discussions, one-to-one' talks, social affairs, office visits. They also scored lower on the Student-Faculty Camaraderie Scale (.01) (the importance of faculty being cheerful and humorous, getting to know students well, being included in social and unofficial affairs). On the Physician Ideology Questionnaire, the obstetricians scored higher on the Biological Orientation Scale (.00) (importance the respondent attaches to the physician's biological knowledge and skill in applying it). In short, they appear to be a no-nonsense group whose members want to focus only on what they consider to be important in medical education.

Members of this cluster had higher Clinical Science ratings than their peers in Year 1 (.02) but scored lower on National Boards, Part 1, Biochemistry (.00) and National Boards, Part 2, Medicine (.03).

Summary and Discussion

The UNM sample is biased more toward the intellectual-academic types than the practical, hands-on types in comparison with two national samples. During those early years of the medical school in New Mexico, some members of the admissions committee were criticized for trying to make the school a "Harvard on the Rio Grande" but they may have just been trying to ensure that a high percentage of their first graduating classes made it through the rigors of medical education by favoring those with good grades and high MCAT scores. While the bias may have implications for the generalization of the findings to other state medical schools, the relationships between specialty choice and antecedent variables found in this study can still be considered valid since all comparisons are between groups within the total sample. It should also be remembered that, when making a large number of comparisons on different variables, a certain proportion of them would be expected to turn out to be "significant" simply by chance (although we have no way of knowing which ones are the "chance results"). However, the number of significant associations identified in this study are orders of magnitude larger than what would be expected to occur simply by chance. If a finding does not seem to "make sense" within the context of the other findings, it may be one of those which occurred by chance. Henceforth, a summary and discussion of the results:

Members of the IM Cluster were aware of their attraction to internal medicine and some of its sub-specialties and avoidance of more general types of practice when they first entered medical school. They seemed to be attracted to the practice of medicine in an educational and research setting and preferred work-setting characteristics that would allow for such activities. They were not outstanding with respect to ability as measured by the MCAT or previous academic performance. However, their ESTJ personalities emphasized toughness, practicality, decisiveness, systemic thought and an orientation toward getting results. Although the over-representation of ESTJs for Internists has been found before²³, they are not the usual "academic types" typically found in studies using the MBTI (those are the INTJs and INTPs). ESTJs are more pragmatic and drawn to administrative and management positions while introverted intuitives, especially INTJs and INTPs are more inclined toward traditional scientific and technical areas, including academic pursuits. Thus, this sample of internists may represent an unusual sub-group of ESTJs. Their attitudes about medical education are consistent with getting things done: being hard-working, academically-oriented students who learn everything they are taught. The results of their efforts are revealed in outstanding performance ratings and scores on both parts of the National Boards.

Students who became surgeons were attracted to nearly all surgical sub-specialties from the very start.

They were not attracted to Family Practice nor living in a small town. Their MCAT scores and GPAs were unremarkable. They were analytical and tough-minded, self-disciplined and unpretentious. Like the internists, they were academically oriented but they did not go for any of the nurturant aspects of medical practice and didn't want to receive any special treatment or accommodation to their own needs. They wanted to narrow their focus to the particular disease they were treating. Performance was mostly unremarkable except for their knowledge of basic science in the first year. The results do not support the claim that surgeons are extraverted or less rule-bound than other specialists but does support the idea that they are tough-minded²⁴.

Most members of the Family Practice Cluster knew their specialty preference from the start and also knew they did not want to become surgeons, pathologists or psychiatrists. They were not attracted to research or educational work but found work in a government facility or public health to be appealing. They found the fast pace of life in large towns to be aversive and wanted to practice in a small town in the Rocky Mountain Region. Many were themselves from small towns. They had no outstanding scores on any of the 16PF Scales, in contrast to the findings of Borges and Osmon²⁵ and Taber et al.²⁶ (who were trying to distinguish between person-oriented and technique-oriented specialties). Three different Psychological Types were over-represented in this cluster: the counseling INFJ type, the practical-helper ESTP type and the warm and tactful ESFPs. Each type found Family Medicine to be compatible with their leanings and, apparently, family medicine had a place for all of them. Myers and Davis²⁷ found ESTJs to be the most common type in general practitioners in the 1950s while Friedman and Slatt, three decades later, found ISFJs to be over-represented. Taylor et al.²⁸ found family practice residents in 30 residency programs to be characterized by high Intuition (N) and Feeling (F) scores. Stilwell et al.²⁹ found physicians who chose primary care had high scores on *either* Introversion *or* Feeling. The present results suggest that at least three different types may be disposed to choose Family Practice and it may be that the proportions of these types differ slightly in the different research samples. The family practitioners in this sample liked the idea of learning about psychological, social and cultural factors in medical practice but were not academically minded. They did not want to fraternize with faculty or have them show them any special treatment. They were likely to have lower GPAs and MCAT Verbal and Quantitative scores and their second year and clerkship ratings were lower than those for their peers. They did less well than their peers on many scales of National Boards, Part 1 and Part 2.

As entering students, members of the Technique and Instrument Cluster were disinclined toward many specialties and attracted toward just two: Ophthalmology and Otolaryngology. They didn't want to work in any kind of government facility but liked hospitals and large group practices. They were attracted to work in large metropolitan areas and not in small towns or rural areas. Their MCAT scores were unremarkable but they had higher GPAs than their peers. The associations of technique-oriented physicians with Dominance, Vigilance and Tenseness on the 16PF found by Taber et al.³⁰ were not found in the current study. The practical ISTPs and ESFJs were over-represented while the more abstract ENTPs were under-represented. They did not subscribe to the notion that students should be studious and hard-working and desired to have informal contacts with faculty. They could see the value in learning about psycho-social medicine and developing their own personalities. Their medical school performance and scores on the National Boards examinations was about the same as their peers.

Members of the Psychiatry Cluster had been attracted to Family Medicine as well as Psychiatry when they entered medical school. Most features of their imagined medical practice were undefined except they wanted to live in a community with a fast pace of life and preferred non-government work settings. Most were from large cities and they were more likely to have majored in social science, the humanities or fine arts rather than a biological science. GPAs and MCAT scores were not significantly

different from those of their peers. On the 16PF they were less conservative, more experimenting and free-thinking than their peers while also being more sensitive and relaxed. INFJ and INFP Psychological Types were over-represented. This is consistent with MBTI folklore and with the findings of Myers and Davis. However, Yang et al.³¹ found no significant differences in the probability of students matching to psychiatry residency programs as a function of differences on the four basic contrasts of the test. They did not do any more sophisticated statistical tests but they did note that most of their psychiatry sample were higher on I, N and J than their opposites. In the present sample, Psychiatry choosers as entering medical students, did not find it necessary to work on their own self-development; they considered the physician's biological knowledge to be important but not his control of all aspects of medical care. Their scores on three sections of the National Boards, Part 1 were lower than that of their peers but they scored higher on the Psychiatry section of Part 2.

As entering students, members of the Diagnostic Specialties Cluster were attracted to Pathology but not Cardiology. They preferred working in a structured setting and wanted to control their work demands and have an opportunity to try out their own ideas. They had higher GPAs than did their fellows and higher MCAT Quantitative scores. They were more introverted, apprehensive, driven, and sober than other students and less spontaneous. In medical school, they wanted more structure and did not want to be kept in the dark about issues of contention in the school. They felt the physician should have control over all aspects of patient care. They did better than most other students on both parts of the National Boards.

Members of the OBGYN Cluster cluster seemed to know what they disliked but not what they liked when entering medical school. They were younger, had fewer siblings and their fathers had a lower occupational index than did the fathers of their classmates. They tended to have lower GPAs. They appeared to be conscientious, organized, socially aware and tough-minded. (The higher MBTI scores of obstetricians on S, T and J found by Friedman and Slatt³² were not found in this sample). Members of this group were averse to fraternizing with faculty and seemed to focus on just what they considered to be important in medical education, i. e., biological knowledge. They obtained higher Clinical Science ratings in their first year but not thereafter and they were below their classmates on one section each of the two parts of the National Boards.

It may not be evident from reading the results for each specialty group but members of the different specialties appear to respond differently to the different data collection methods. That is, obstetricians have 4.4 times as many significant findings than expected by chance for the background information ($p = .000$); psychiatrists have 5.4 times more significant findings in the personality domain ($p = .001$), internists have 1.7 times more significant results in the performance measures ($.001$), and Technique and Instrument Specialists have 1.5 times more significant findings than expected on the Career Rating and Preference Inventory ($p = .016$) and two thirds fewer significant results than expected on the performance measures ($p = .046$). Neither the SFRQ nor PIQ showed any significant differences between groups (although surgeons, with 1.9 times as many significant results than expected on the SFRQ, were close to significance ($p=0.06$)). In a similar vein, Jeffe, et al.³³ observed that their six primary care categories did not share a uniform set of predictors.

What these differences mean cannot be determined from the data themselves. What I suspect is that one or more “method factors” may be influencing the participants. Method factors represent variance common to indicators from the same data source. Some people may have an affinity or an aversion toward one kind of assessment device rather than another. That is, observed scores may be affected by variance stemming from unmeasured response tendencies (e. g., the tendency to cast oneself in a favorable light or to have “test taking anxiety”) and/or the valences of the items themselves (e. g., how

they are phrased) rather than simply the constructs that one intends to assess. The observed relationships between variables of interest might be inflated or deflated by variance due to the assessment method in addition to the underlying variables of interest. The SFRQ and PIQ both have items that are phrased in the least abstract way, compared to personality questionnaires for example, and are most relevant to the students immediate concerns and past experience. Students are experienced at being students and assessing the educational environment, having accumulated more than the required 10,000 hours to be considered an “expert.” Therefore, the SFRQ and PIQ may elicit less negative response bias than the other measures. Psychiatrists may be less defensive about inquiries related to personal matters and therefore be more willing to reveal themselves on personality measures. Whatever it is that is going on here, it is likely to make creating simple linear combinations of variables to predict outcome variables more difficult. In fact, devising linear combinations of variables is probably only a rough means of getting at the true relationships involved.

References

1. Jeffe, DB, Whelan, AJ, and Andriole, DA. Primary Care Specialty Choices of United States Medical Graduates, 1997–2006 . *Acad Med.* 2010; 85:947–958.
2. Muscatello, MRA, Bruno, A, Genovese, G, Gallo, G, Zoccali, RA, Battaglia, F. Personality traits predict a medical student preference to pursue a career in surgery. *Education for Health* • Volume 30 • Issue 3 (September-December 2017), 211-214.
3. Bowman, RC. Five periods of Health Policy and Physician Career Choice. October 30, 2006. http://www.ruralmedicaleducation.org/five_periods_of_health_policy.htm
4. Otis, G, Graham, J, and Thacher, L., Typological analysis of U. S. medical schools. *Journal of Medical Education*, 1975 (Apr), Vol. 50, 328-338.
5. Quenk, N. A retrospective study of past participants in AMSA Foundation programs. A report to The Bureau of Health Manpower, DHEW, Contract No. 231-75-0606, 1976.
6. Borges, NJ, and Savickas, ML. Personality and Medical Specialty Choice: A Literature Review and Integration. *Journal of Career Assessment*, Vol. 10 No. 3, August 2002 362–380.
7. Otis, G, Quenk, N, Weiss, J., Albert, M., Mitchell, W., and Richardson, C., *Medical Specialty Selection: A Review*. Washington: DHEW Publication No. (HRA) 75-8, May, 1974.
8. Zeldow PB, Preston RC, Daugherty SR. The decision to enter a medical specialty: timing and stability. *Med Educ.* 1992;26(4):327–32. <https://doi.org/10.1111/j.1365-2923.1992.tb00177.x>
9. Kassebaum DG, Szenas PL. Medical students' career indecision and specialty rejection: roads not taken. *Acad Med.* 1995;70(10):937–43.
10. Scott I, Gowans M, Wright B and Brenneis F. Stability of medical student career interest: a prospective study. *Acad Med.* 2012;87(9):1260–7
11. Compton MT, Frank E, Elon L, Carrera J. Changes in U.S. medical students' specialty interests over the course of medical school. *J Gen Intern Med.* 2008;23(7):1095–100.
12. Goldacre, MJ, Laxton, L, and Lambert, TW. Medical graduates' early career choices of specialty and their eventual specialty destinations: UK prospective cohort studies. *BMJ* 2010;340:c3199. doi:10.1136/bmj.c3199.
13. Jones, MD, Yamashita, T, Ross, RG and Gong, J. Positive predictive value of medical student specialty choices. *BMC Medical Education* (2018) 18:33 <https://doi.org/10.1186/s12909-018-1138-x>
14. *AAMC 2012 Physician Specialty Data Book*, Table 5, column 2, “Active US M.D.s”, (<https://www.aamc.org/download/313228/data/2012physicianspecialtydatabook.pdf>).
15. Myers, I. B., *The Myers-Briggs Type Indicator*, Manual, (Princeton, N. J.: Educational Testing Service, 1962).
16. Myers, IB, McCaulley, MH, Quenk, N, and Hammer, AL. *MBTI Manual: A guide to the development and use of the Myers-Briggs Type Indicator*, Third Edition. Consulting Psychologists Press: Palo Alto, CA, 1998.
17. Cattell, R. B., Eber H. and Tatsuoka, M., *Handbook for the Sixteen Personality Factor Questionnaire* (Champaign, Ill.:Institute for Personality and Ability Testing, 1970).
18. Cattell, R. B., Cattell, A. K., & Cattell, H. E. (1993). *Sixteen Personality Factor Questionnaire* (5th ed.). Champaign, IL: Institute for Personality and Ability Testing.
19. Otis, G. *Random Sampler* (Database program for conducting Monte Carlo analyses of continuous-categorical data and categorical data between groups, with support routines), Copyright Gerald D. Otis, 1996 – 2001.
20. Otis, G. *SRTT for the MBTI* (Program to compute selection ratio type tables for the Myers-Briggs Type Indicator using observed and expected numbers of cases), Copyright Gerald D. Otis, 2017.
21. McCaulley, M. H. (1978). *Application of the Myers-Briggs Type Indicator to medicine and*

- other health professions. Monograph I, Contract No. 231-76-0051, Health Resources Administration, DHEW. Gainesville, FL: Center for Applications of Psychological Type.
22. Gerald P. Macdaid, Mary H. McCaulley and Richard I. Kainz. Myers-Briggs Type Indicator atlas of type tables. Center for Applications of Psychological Type, Gainesville, FL, 1991. ISBN: 9780935652130.
 23. Myers, IB, and Davis, JA. Relation of medical students' psychological type to their specialties twelve years later: A paper presented at the 1964 annual meeting of the American Psychological Association, Los Angeles, CA, September 4-9, 1964. Educational Testing Service, Princeton, New Jersey, December, 1964.
 24. Borges, NJ, and Savickas, ML. Personality and Medical Specialty Choice, op. cit.
 25. Borges, N. J., & Osmon, W. R. (2001). Personality and medical specialty choice: Technique orientation versus people orientation. *Journal of Vocational Behavior*, 58, 22-35.
 26. Taber, BJ, Hartung, PJ and Borges, NJ. Personality and values as predictors of medical specialty choice. *Journal of Vocational Behavior*, April 2011, 78(2):202-209. Available from: https://www.researchgate.net/publication/232359711_Personality_and_values_as_predictors_of_medical_specialty_choice [accessed Jul 20 2018].
 27. Myers, IB, and Davis, JA. Relation of medical students' psychological type to their specialties twelve years later, op. cit.
 28. Taylor, A. D., Clark, C., & Sinclair, A. E. (1990). Personality types of family practice residents in the 1980's. *Academic Medicine*, 65, 216-218. U.S. Department of Health, Education, and Welfare, Bureau of Health Resources Development, Health Resources Administration, Public Health Service. (1974).
 29. Stilwell, N. A., Wallick, M. M., Thal, S. E., & Burleson, J. A. (2000). Myers-Briggs type and medical specialty choice: A new look at an old question. *Teaching and Learning in Medicine*, 12(1), 14-20.
 30. Taber et al. Personality and values as predictors of medical specialty choice. op. cit.
 31. Chong Yang, George Richard, Martin Durkin. The association between Myers-Briggs Type Indicator and Psychiatry as the specialty choice. *International Journal of Medical Education*. 2016;7:48-51
 32. Friedman, C. P., & Slatt, L. M. (1988). New results relating the Myers-Briggs Type Indicator and medical specialty choice. *Journal of Medical Education*, 63, 325-327.
 33. Jeffe, et al. Primary Care Specialty Choices of United States Medical Graduates, op. cit.