

A Psychological Profile of Surgeons and Surgical Residents

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BACKGROUND: Approximately 20 percent of general surgery residents never complete their original residency programs. The psychological, programmatic, and financial costs for this attrition are substantial for both the residents, who spend valuable time and money pursuing incompatible career paths, and the residency programs, which also lose valuable time and money invested in these residents. There is a large amount of information in the field about the performance dimensions and skill sets of surgeons and surgical residents. To date, however, no research has been conducted on important process and content dimensions, which are critical in determining good person-job fit.

METHODS: A research team from the Department of Psychology at Arizona State University and Maricopa Medical Center conducted descriptive research to determine the work-related personality and interest variables of attending surgeons and surgical residents. Sixty-three surgical residents and 27 attending/teaching surgeons completed 2 sections (interests and personality scales) of the World of Work Inventory Online (WOWI Online). This multidimensional assessment was offered to all attending/teaching surgeons and surgical residents at Maricopa Medical Center.

RESULTS: All members of the Department of Surgery participated in the trial. Based on the attending/teaching and high-performing resident profiles, a stable interest and personality profile emerged, which highlights the unique characteristics necessary to identify those who would be most satisfied with and suitable for work as surgeons. The profiles of the attending/teaching surgeons and the high-performing residents were similar. This contrasted with the interest and personality profiles of low-performing residents. The differences in the 2 groups' profiles provide insight into low performance and possible incompatibility with surgical residency, and possibly with general surgery as a profession choice.

CONCLUSIONS: The WOWI Online assessment tool provides a stable profile of successful surgeons. This tool also demonstrates differences in the interest and personality profiles between high and low performing surgical residents. It may be useful as an indicator of success in surgical residency and in surgery as a profession. (J Surg 67:359-370. © 2010 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgical education, attrition, psychological profile, psychological assessment, personality, residency

COMPETENCY: Professionalism, Interpersonal and Communication Skills, Practice-Based Learning and Improvement

INTRODUCTION

Resident attrition from general surgery training programs is currently estimated to be between 17% and 26%.¹⁻⁴ Interestingly, this attrition rate has remained largely unchanged over the last decade and seems to have been unaffected by duty hour regulations such as the 80-hour work week and in-house call restrictions.⁵⁻⁸ Regardless of the relative stability of the attrition rate, it continues to create a significant problem for many surgery training programs. The departure of a resident disrupts the team structure, and often causes angst among the remaining residents. Program directors and coordinators must devote additional time to recruitment to fill the vacant position. Finally, replacement residents are often perceived as being unable to perform as well as the residents they replaced.⁹

Analysis of resident attrition in training programs has revealed the following 3 characteristics of the individuals who leave: (1) most residents leave surgery programs during postgraduate years 1 and 2; (2) most residents enter specialties or subspecialties other than general surgery; and (3) most cite "lifestyle choices" as the primary reason for leaving their programs.

When considering possible interventions aimed at decreasing resident attrition, 2 general areas of focus become evident: retention of residents already in the program, and recruitment of residents who will complete the program successfully. The first

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area of focus, retention of residents, is particularly problematic given that most residents that fail to complete the program leave because of lifestyle considerations. Surgery training programs are physically, psychologically, cognitively, and emotionally challenging. Successful surgical training requires time and effort, a serious commitment both inside and outside of the hospital that is beyond that required in most other fields of medical training. It is thus unlikely that surgery training programs can be tailored to fit the lifestyle needs of all interested residents. Once a resident recognizes that surgery is unlikely to afford him/her the lifestyle s/he desires, it is unlikely that he/she will successfully complete surgical training. Indeed, if a resident's lifestyle desires override his/her professional commitment to surgery, it is actually preferred that the resident pursue a medical specialty other than surgery.

The second area of potential intervention aimed at decreasing resident attrition is recruitment of residents who will successfully complete training. Current methods of resident selection are mediocre at best. Several studies have suggested that the currently employed measures for resident selection lack reliability and validity.¹⁰ The greatest challenge presently faced in recruitment is the emphasis placed on medical school performance. Although strongly considered in surgical resident recruitment, this measure has been shown to be a poor predictor of successful performance in surgical residency.¹¹⁻¹³ Posthoc analysis has revealed several academic and nonacademic criteria that are associated with better resident outcome.¹³ However, considering the current static nature of surgical resident attrition, resident recruitment methods clearly have not been optimized in most programs.

Multiple studies have analyzed the personality traits of medical students and residents, and the role these traits may have on residency specialty selection, including why medical students choose surgery as a profession. However, there are few studies examining personality as predictor of success in residency, and there are no studies specifically concentrating on surgical residents.

The World of Work Inventory Online (WOWI Online) is published by World of Work, Inc., and authored by Robert E. Ripley, PhD, Gregory P.M. Neidert, PhD, Nancy L. Ortman, MEd, John W. Hudson, PhD, and Karen S. Hudson, BA.¹⁴⁻¹⁵ The assessment was originally released in 1970, has been updated several times and has been available as a web-based, online test since 1998 at <http://www.wowi.com>. It is a multidimensional, psychometric instrument which measures work-related aptitudes, personality, and interest dimensions. The test has been widely used to provide organizations with a measure of job-related fitness for potential employees. It is a well-validated instrument in this regard, although its use in medical fields has been limited.

The purpose of this study was to use the work-related interests and personality assessment sections of the WOWI to develop a surgical profile based on attending surgeon responses and then compare high performing and low performing resident profiles with this benchmark. We hypothesize that a rela-

tively consistent successful surgeon profile can be constructed from attending surgeon responses. We further hypothesize that the profiles of high performing residents will more closely match the attending surgeon profile than the profiles of low performing residents.

MATERIALS AND METHODS

Participants

All full-time faculty members of the Department of Surgery and all surgical residents in the residency training program participated in this study. Twenty-seven attending surgeons and 63 surgical residents participated in the study.

Personality Assessment Tool

The WOWI Online measures work-related aptitudes (career training potentials), personality (job satisfaction indicators [JSI]) and interest (career interest activities [CIA]) dimensions. Only the personality (JSI) and interest (CIA) sections of the assessment were used in this study. Attending/teaching surgeons and surgical residents were asked to go to the <http://www.wowi.com> web site and enter their identifying information. In addition, they answered 136 questions pertaining to task-relevant career interests, organized around 17 career subscales, and 96 job-related personality items, organized around 12 subscales. Participants were asked to answer each item with either a like, dislike, or neutral response. Based upon the participant's responses, a numeric score ranging from -60 (strongly negative) to +60 (strongly positive) was generated for each of the 17 career and 12 personality subscales. A representative profile is shown in Figure 1. The characteristics of each of the 17 CIA and 12 JSI subscales are listed in Tables 1 and 2, respectively.

Assessment Procedure

Research team members from the Arizona State University Department of Psychology followed a uniform protocol to describe the nature of the study as well as instruction on how to complete the assessment. Groups of up to 15 attending surgeons and surgical residents completed the WOWI Online with either live or over-the-phone orientations. Typically taking no longer than 17 minutes, test takers reported to the research team members after completing the WOWI Online to be debriefed. Test takers were assured that only aggregated, group level findings would be shared with others during Grand Rounds presentations.

Attending and Resident Ranking

Two separate ranking lists were generated: 1 for attending/teaching surgeons and 1 for surgical residents. Each attending/teaching surgeon and surgical resident was given a unique 2-digit score (0.0-9.9) by the program director based on a num-

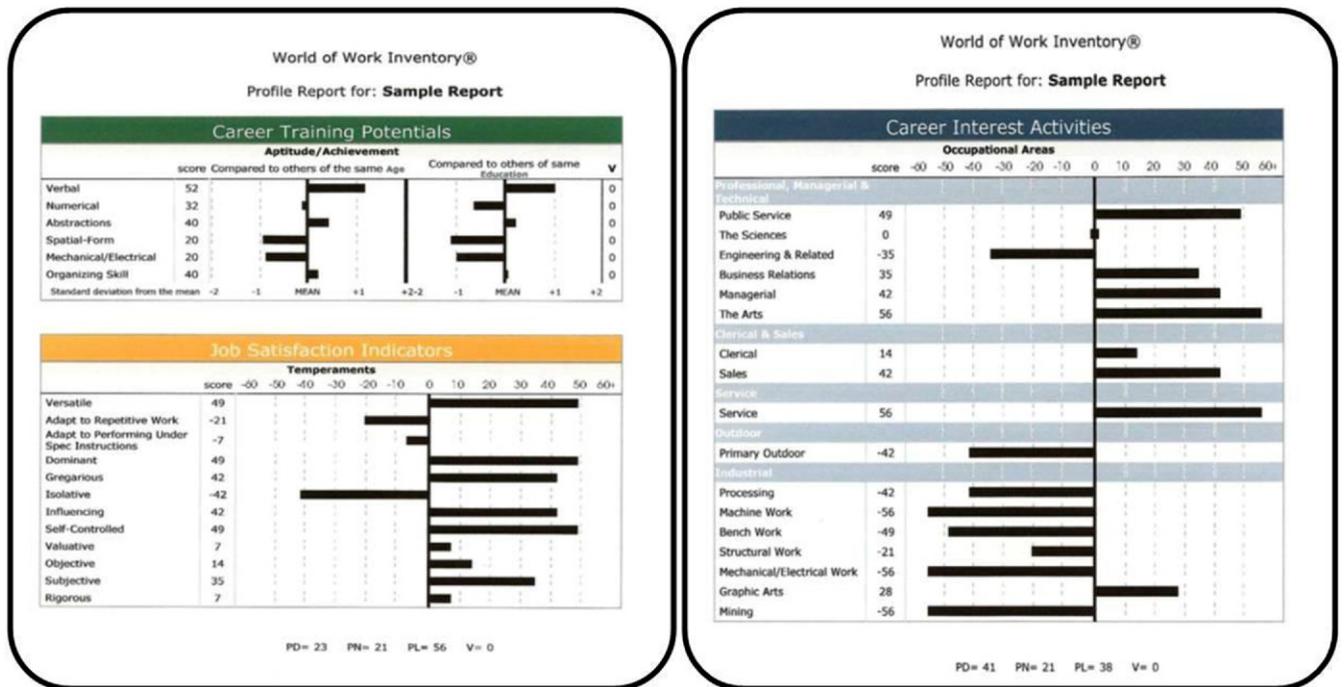


FIGURE 1. Example of a World of Work Inventory (WOWI) profile.

ber of different criteria. Attending/teaching surgeons were ranked based on clinical, teaching, and research production, and based on previous confidential resident evaluations. Residents were ranked based on a global assessment by the program

director incorporating all 6 Accreditation Council for Graduate Medical Education (ACGME) competencies, and based on previous global assessments by residents and attending/teaching surgeons, performance on academic assessments, including

TABLE 1. Characteristics of the 17 Career Interest Activities (CIA) Subscales

CIA Subscale	Subscale Characteristics
Public Service	Helping others by providing specialized information and services. Includes occupations in medicine, law, education, religion, library work, counseling, the social sciences, etc.
The Sciences	Applying research methods and statistics to solve theoretical and applied problems in the physical, life, and social sciences.
Engineering and Related	Using the principles of engineering and physics for the design of machines, materials, instruments, structures, processes, and services.
Business Relations	Collecting, analyzing, advising, and making decisions based on a variety of data sources. Includes occupations in accounting, insurance, finance, purchasing, personnel, human resources, etc.
Managerial	Controlling, directing, and organizing the work of others in a wide range of settings. Requires knowledge of business principles, business operations, and human behavior.
The Arts	Integrating personal expression and art concepts, techniques, and processes to develop works which elicit an emotional or esthetic response. Includes acting, sculpting, painting, etc.
Clerical	Compiling, recording, communicating, computing, copying, and otherwise organizing information for others.
Sales	Interacting with and influencing others in favor of certain products, services, or ideas.
Service	Helping individuals with their personal wants and needs. Includes occupations in cosmetology, day care, recreation, hospitality, food-and-beverage preparation and service, etc.
Outdoor	Working out-of-doors which may include contact with plant or animal life. Includes fishing, farming, forestry, agriculture, aquaculture, horticulture, etc.
Processing	Working with tools, equipment, materials, products, structures, structural parts, or operating machinery. Includes mechanical, electrical, masonry, and tool and die work, carpentry, plumbing, mining, drafting, factory work, etc.
Machine Work	
Bench Work	
Structural Work	
Mechanical Work	
Graphic Arts	
Mining	

TABLE 2. Characteristics of Job Satisfaction Indicators (JSI) Subscales

JSI Subscale		Positive (+) and Negative (–) Subscale Characteristics
Versatile	+	Likes variety and change; several things going on at once.
	–	Likes to concentrate on 1 task at a time; a linear approach to work.
Adaptable to Repetitive Work	+	Enjoys predictability; activities in a set order.
	–	Likes spontaneity; uncomfortable with tasks that repeat in a short time frame.
Adaptable to Performing Under Specific Instructions	+	Adjusts to being monitored; likes to follow set policies, procedures, recipes, instructions, blueprints, etc.
	–	Likes general direction/instruction; uncomfortable with close supervision.
Dominant	+	Likes to lead; be responsible for decisions; is self-directed.
	–	Prefers to be in a support role; dislikes being responsible for others.
Gregarious Isolative	+/+	Likes to work with others, but also likes to be alone to focus on work and get it done.
	+/-	Likes people and does not like being alone; likes being a team player.
	-/+	Dislikes spontaneous interruption and likes being in control of when others see them.
	-/-	Not motivated by a traditional work environment.
Influencing	+	Likes to sell products, services or ideas; enjoys persuading, impressing, and motivating others.
	–	Likes to be in situations where there is no conflict; is uncomfortable having to persuade, motivate, or sell to others.
Self-controlled	+	Likes to work under pressure, deadlines, and in crisis situations; tends to procrastinate.
	–	Prefers calm atmosphere; dislikes constantly working under pressure, against tight deadlines, and meeting demanding quotas.
Valuative	+	Likes to make value judgments; has an intuitive approach to making decisions and solving problems.
Objective	–	Dislikes making decisions using intuition or hunches.
	+	Likes to problem-solve in a rational way; relies on facts and data.
Subjective	–	Does not like to rely on facts to make decisions.
	+	Enjoys being self expressive; likes to be creative; is uncomfortable conforming to others' standards of style.
Rigorous	–	Does not have a strong drive to be self-expressive or creative.
	+	Has integrity of workmanship; tendency toward perfectionism; likes to be detail-oriented.
	–	No need for exacting results, likes the big picture, the bottom line; dislikes focusing on details.

quizzes and American Board of Surgery in Training examination (ABSITE) scores, performance in conferences proctored by the program director, and multisource evaluations from other healthcare professionals. The accumulated score was utilized to assign a ranking to each participant according to their surgical title. These rankings served to segment participants into thirds consistent with their ranking order. The upper third rank was labeled “high performing,” the middle third was labeled “average performing,” and the lower third was labeled “low performing.”

Variables and Statistical Analysis

All participant data were entered into and analyzed using the Statistical Package for the Social Sciences software (SPSS 14.0 for Windows, SPSS Inc., Chicago, IL). Multivariate and univariate analysis of variance (ANOVA), as well as planned con-

trasts, were employed to explore the relationships between the ratings/ranking levels of the attending/teaching surgeons and surgical residents (by thirds) as factors, and the 17 subscales of the WOWI Online CIA profile and the 12 subscales of the JSI profile as dependent variables.

RESULTS

Overview

Twenty-seven attending surgeons (25 male and 2 female, mean age 49.3 yrs) and 63 surgical residents (47 male and 16 female, mean age 31.2 yrs) participated in this study. The surgical resident group included 36 categorical residents and 27 preliminary surgical residents. The distribution of categorical and preliminary residents is shown in Table 3. All attending surgeons

TABLE 3. Post Graduate Year (PGY) Levels of Categorical and Preliminary Residents

	Categorical Residents (n = 36)	Preliminary Residents (n = 27)
PGY 1	20	23
PGY 2	4	4
PGY 3	4	0
PGY 4	4	0
PGY 5	4	0

and surgical residents were rated and ranked on their overall performance by the surgical director who was blind to their test results on the WOWI Online. Using these ratings/rankings participants were then categorized into thirds: Top third = high performing; middle third = average performing; and lower third = low performing. A number of significant differences between attending surgeons and residents were revealed. In addition, attending/teaching surgeons and high performing residents differed significantly from low performing residents in their psychological profiles for both the interest and personality scales of the WOWI Online. Finally, no significant differences were found between attending/teaching surgeons and high performing residents on any scale of the test. Mean scores of attending surgeons on the CIA and JSI subscales are shown in Tables 4 and 5, respectively.

Career Interest Activities Scales

Mean CIA subscale scores of high versus low performing residents are shown in Table 6. Overall tests, shown in Table 7, of between subjects effects for type of participant (attending/teaching surgeon vs surgical resident) and performance (high performing vs average performing vs low performing) for the

TABLE 4. Attending Surgeon Scores on Career Interest Activity (CIA) Subscales

Subscale Indicator	Mean Score ± SD (n = 27)*
Public Service	37.85 ± 15.32
The Sciences	19.44 ± 21.21
Engineering	-0.26 ± 27.69
Business Relations	6.48 ± 27.45
Managerial	37.07 ± 20.53
The Arts	25.04 ± 21.68
Clerical	-2.59 ± 26.13
Sales	13.74 ± 27.21
Service	6.23 ± 21.56
Primary Outdoor	7.52 ± 25.38
Processing	-17.63 ± 28.95
Machine Work	-9.33 ± 31.06
Bench Work	-1.56 ± 31.45
Structural Work	11.15 ± 26.43
Mechanical Work	-0.78 ± 35.07
Graphic Arts	-4.15 ± 29.13
Mining	-10.63 ± 32.91

*Scale: Score of -60 indicates most strongly negative response; score of 0 indicates neutral response; score of + 60 indicates most strongly positive response.

TABLE 5. Attending Surgeon Scores on Job Satisfaction Indicators (JSI) Subscales

Subscale Indicator	Mean Score ± SD (n = 27)
Versatile	25.15 ± 19.05
Repetitive Work	13.51 ± 22.62
Specific Instructions	-17.10 ± 20.86
Dominant	35.78 ± 16.85
Gregarious	10.11 ± 17.40
Isolative	14.89 ± 29.08
Influencing	16.07 ± 22.37
Self-controlled	30.85 ± 16.16
Valuative	18.15 ± 18.34
Objective	25.67 ± 20.36
Subjective	36.04 ± 15.25
Rigorous	33.44 ± 15.57

Scale: Score of -60 indicates most strongly negative response; score of 0 indicates neutral response; score of +60 indicates most strongly positive response.

CIA scales obtained significance for public service ($F[5, 84] = 4.768, p = 0.001$), the sciences ($F[5, 84] = 2.862, p = 0.020$), business relations ($F[5, 84] = 5.261, p < 0.001$), managerial ($F[5, 84] = 3.342, p = 0.008$), and the arts ($F[5, 84] = 2.552, p = 0.034$). These results are shown in Table 7. There were no significant differences on the remaining interest subscales. In addition, univariate tests for type of participant (attending/teaching surgeon vs surgical resident) yielded significance on 4 of the same 5 CIA subscales: public service ($F[1, 84] = 3.730, p = 0.057$), the sciences ($F[1, 84] = 5.587, p = 0.020$), business relations ($F[1, 84] = 5.927, p = 0.017$), and managerial ($F[1, 84] = 5.352, p = 0.023$). Similarly, these same scales differentiated high performers from average and low performers: public service ($F[2, 84] = 3.548, p = 0.033$), the sciences ($F[2, 84] = 3.152, p = 0.048$), business relations ($F[2, 84] = 8.738, p < 0.001$), and managerial ($F[2, 84] = 2.797, p = 0.067$). These data are shown in Figures 2-6.

Job Satisfaction Indicators Scales

Mean JSI subscale scores of high versus low performing residents are shown in Table 8. Overall tests, shown in Table 9, of between subjects effects for type of participant (attending/teaching surgeon vs surgical resident) and performance (high performing vs average performing vs low performing) for the JSI scales obtained significance for versatile ($F[5, 84] = 4.276, p = 0.002$), gregarious ($F[5, 84] = 2.882, p = 0.019$), influencing ($F[5, 84] = 4.467, p = 0.001$), self-controlled ($F[5, 84] = 2.598, p = 0.031$), and rigorous ($F[5, 84] = 5.777, p < 0.001$). These results are shown in Table 9. There were no significant differences on the remaining subscales. Univariate tests for type of participant (attending/teaching surgeon vs surgical resident) yielded significance for the gregarious ($F[1, 84] = 5.190, p = 0.025$) and self-controlled ($F[1, 84] = 5.720, p = 0.019$) subscales. Finally, significant univariate test results were obtained for the versatile ($F[2, 84] = 7.083, p = 0.001$) and rigorous ($F[2, 84] = 3.405, p = 0.038$) scales, which differentiated high performers from average and low performers. These data are shown in Figures 7 and 8.

TABLE 6. Mean Scores of High and Low Performing Residents on Career Interest Activities (CIA) Subscales

Subscale Indicator	Mean Score High Performers ± SD (n = 21)	Mean Score Low Performers ± SD (n = 21)	p-Value
Public Service	38.50 ± 10.18	20.1 ± 26.05	0.003
The Sciences	18.50 ± 16.38	7.44 ± 21.76	0.036
Engineering	6.50 ± 31.60	8.31 ± 25.46	0.536
Business Relations	20.50 ± 18.51	-5.75 ± 37.84	0.001
Managerial	34.50 ± 18.31	7.44 ± 32.18	0.053
The Arts	18.51 ± 19.13	8.31 ± 27.08	0.162
Clerical	0.50 ± 24.93	-14.44 ± 17.98	0.235
Sales	1.00 ± 30.68	17.06 ± 28.00	0.205
Service	4.50 ± 16.61	-6.56 ± 21.46	0.250
Primary Outdoor	1.50 ± 28.82	-1.31 ± 27.44	0.630
Processing	-10.00 ± 31.99	-14.44 ± 24.71	0.941
Machine Work	-3.50 ± 32.46	-0.88 ± 31.91	0.790
Bench Work	-1.50 ± 33.87	-7.44 ± 28.97	0.762
Structural Work	14.00 ± 26.76	12.69 ± 26.84	0.625
Mechanical Work	4.50 ± 42.5	5.69 ± 26.71	0.716
Graphic Arts	-3.50 ± 35.56	-11.81 ± 23.67	0.705
Mining	-2.50 ± 31.50	6.56 ± 37.69	0.456

DISCUSSION

The results of this study demonstrate that a relatively consistent and predictable profile of attending/teaching surgeon characteristics can be generated by the results of the WOWI Online. In addition, the WOWI Online profile for surgical residents demonstrated significant differences between high performing residents (upper 1-third rank) and low performing residents (lower 1-third rank). High performing resident WOWI Online profiles largely mirrored the profiles of the attending/teaching surgeons. In contrast, low performing residents had profiles that were significantly different from the profiles of both the attending/teaching surgeons and the high performing residents.

Of the 17 interest activities subscales in the CIA section, attending/teaching surgeons and high performing surgical residents consistently scored in a significantly and substantially

more positive direction than average and low performing surgical residents on the following 4 subscales: public service, the sciences, business relations, and managerial. Public service assesses how much one likes helping others by providing highly specialized information and services to them through occupations in medicine, law, and education. The sciences measures the extent to which one prefers to apply research methods and statistics to solve theoretical and applied problems in the physical, life, and social sciences. Business relations evaluates how much a person wants to collect, analyze, advise, and make business decisions based on a variety of data sources. Finally, managerial is characterized by a preference to control, direct, and organize the work of others in a wide range of settings, and requires the knowledge of business principles, business operations, and human behavior.

TABLE 7. Comparison of Residents (Thirds, n = 63)* and Attendings (All, n = 27) on CIA

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Public Service	9471.676	5	1894.335	4.768	.001
The Sciences	7503.031	5	1500.606	2.862	.020
Engineering and Related	823.580	5	164.716	0.222	.952
Business Relations	18631.938	5	3726.388	5.261	.000
Managerial	11560.809	5	2312.162	3.342	.008
The Arts	6788.742	5	1357.748	2.552	.034
Clerical	2982.959	5	596.592	1.050	.394
Sales	3272.012	5	654.402	0.850	.518
Service	3450.363	5	690.073	1.531	.189
Primary Outdoor	416.978	5	83.396	0.107	.991
Processing	2465.547	5	493.109	0.566	.726
Machine Work	1429.304	5	285.861	0.276	.925
Bench Work	2552.143	5	510.429	0.559	.731
Structural Work	2868.152	5	573.630	0.755	.585
Mechanical/Electrical Work	2114.097	5	422.819	0.385	.858
Graphic Arts	3351.676	5	670.335	0.809	.546
Mining	9119.070	5	1823.814	1.596	.170

*Residents are divided into low, middle, and high performing thirds for comparison.

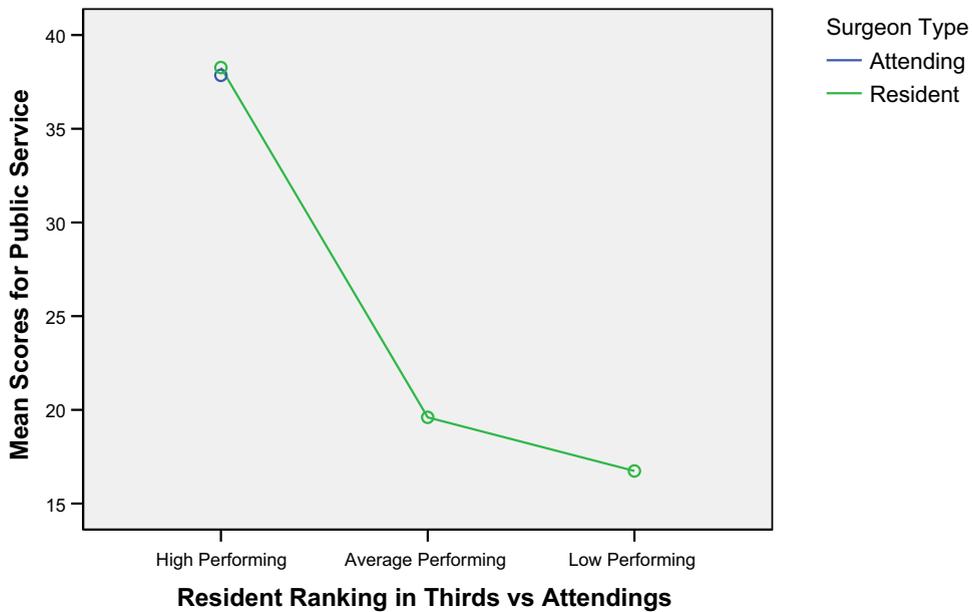


FIGURE 2. Mean scores for attendings (all) and residents (thirds) on the public service subscale.

One way to interpret this pattern of results is that attending surgeons and high performing surgical residents have greater interest, than their lower performing counterparts, in learning about and advancing themselves on a range of topics outside of medicine (which specifically falls under the public service subscale). This penchant is likely to translate into these higher performing surgeons genuinely being more attentive when listening to their patients talk about issues outside of, but concomitant with, their medical condition. As a consequence, these surgeons are more likely than their lower performing colleagues

to interact with patients more fully as “human beings” and less likely to objectify the patient as a set of physical symptoms.

Of the 12 temperament subscales in the JSI section, attending/teaching surgeons and high performing surgical residents scored in a significantly more positive direction than average and low performing surgical residents on the following 5 subscales: versatile, gregarious, influencing, self-controlled, and rigorous. The 2 most consistently significant subscales differentiating these groups were versatile and rigorous. Persons who score highly on versatile like variety and change and prefer work

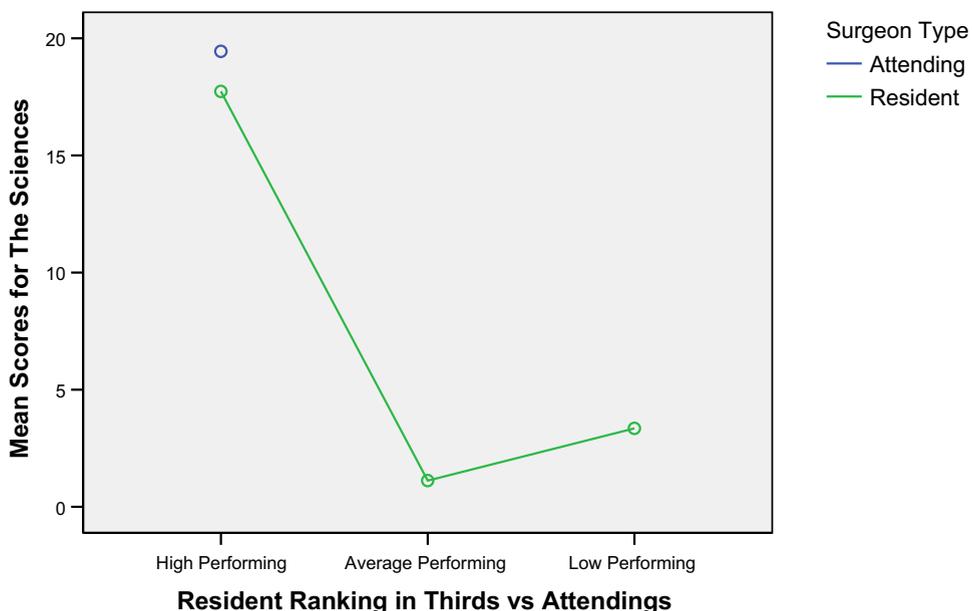


FIGURE 3. Mean scores for attendings (all) and residents (thirds) on the sciences subscale.

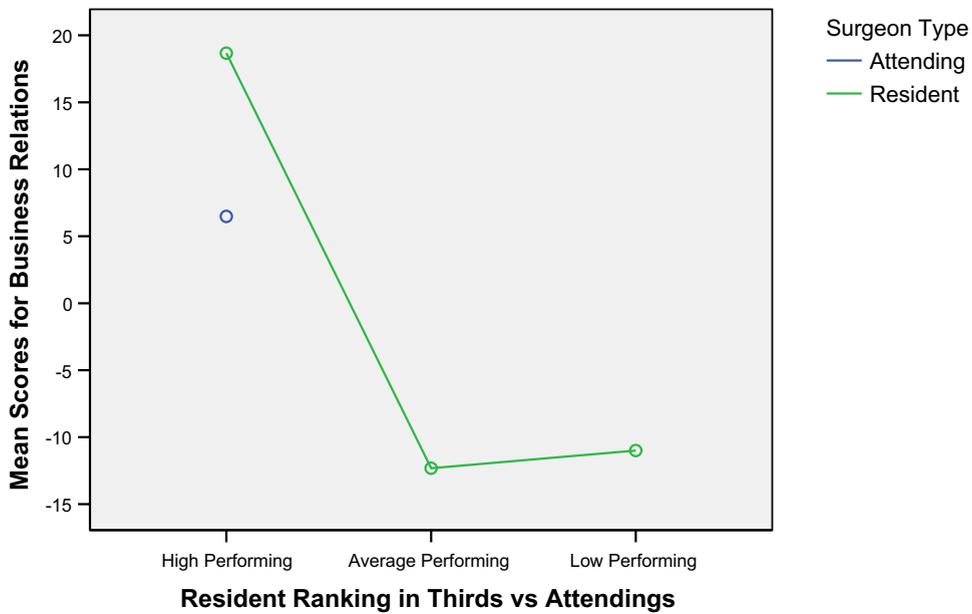


FIGURE 4. Mean scores for attendings (all) and residents (thirds) on the business relations subscale.

where they have to deal with multiple tasks at 1 time. These persons do not like to concentrate on 1 task at a time, and tend not to have a linear approach to work. Persons who score highly on rigorous have a strong desire to exhibit integrity of workmanship and a tendency toward perfectionism. They tend to be detail-oriented.

This pattern of findings suggests that attending surgeons and high performing surgical residents like the challenging, ever-changing, and exacting work environment of a busy hospital. Their work regularly calls on them to move from 1 task to the next, constantly adapting to variable and changing demands

throughout the day. In addition, they need to make sure they keep track of and act effectively on the numerous critical details pertinent to each patient’s condition. Attending surgeons and high performing surgical residents generally find these demands positively challenging, energizing, and even invigorating. Their lower performing counterparts, on the other hand, are likely to find this ongoing need to adapt, yet maintain their focus on all of the many “minute details” very unpleasant and stressful.

A number of studies have related the personality qualities of medical students to choice of medical specialty.¹⁶⁻¹⁹ A recent study examining the use of the Myers-Briggs Type Indicator

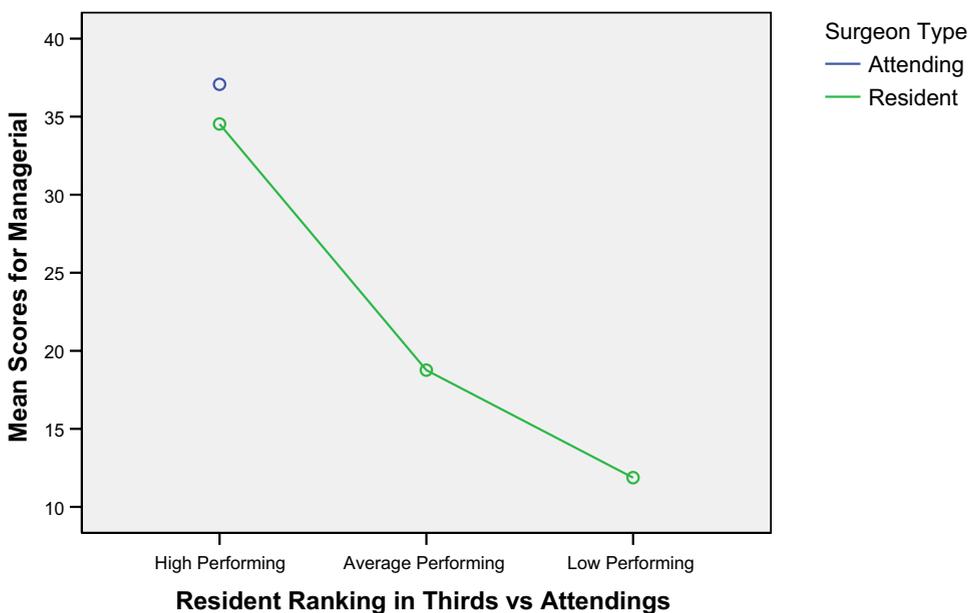


FIGURE 5. Mean scores for attendings (all) and residents (thirds) on the managerial subscale.

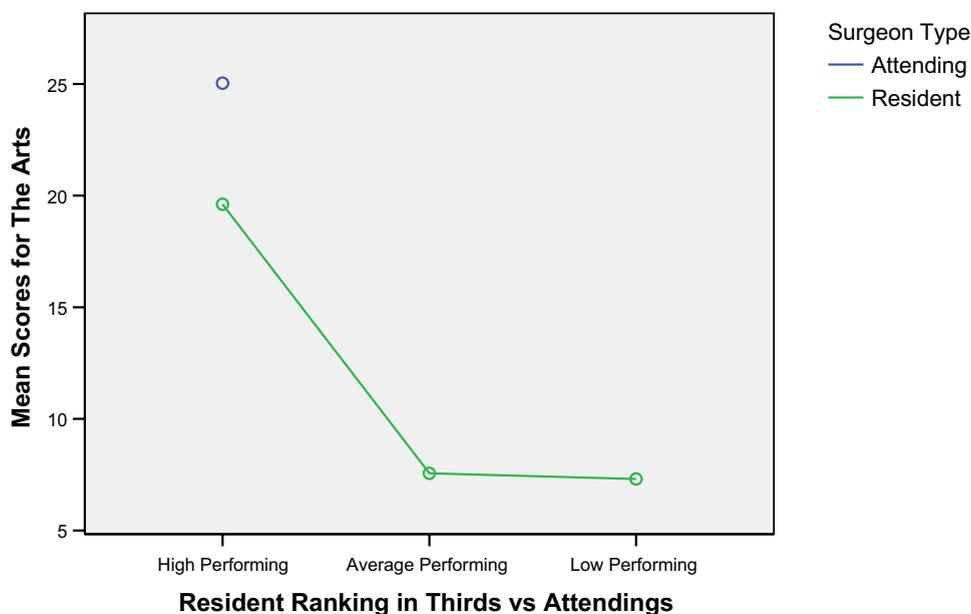


FIGURE 6. Mean scores for attendings (all) and residents (thirds) on the arts subscale.

(MBTI) found that a significantly greater proportion of medical students choosing obstetrics-gynecology as a specialty choice exhibited the extroverted, sensing, feeling, and perceiving (ESFP) personality preference than the medical student population as a whole. The researchers stated that noncognitive variables may be useful in predicting medical specialty choice.²⁰

Similarly, other studies have attempted to identify unique personality characteristics of residents already in particular specialties, such as dentistry, internal medicine, anesthesiology, urology, and orthopedic surgery.²¹⁻²⁶ Studies attempting to define the surgical personality or identify personality traits unique to surgeons have varied results and conclusions. One of the earliest studies in surgery polled surgeons themselves on which traits were most important for surgeons.²⁷ A later study compared surgeons' personality profiles with those of primary care physicians.²⁸ Several studies aimed specifically at medical students who chose surgery and surgical residents described vari-

ous personality traits and trends, especially when compared with nonsurgical physicians.²⁹⁻³¹ McGreevy and Wiebe³² measured personality traits in 39 surgical residents using the Revised NEO Personality Inventory (NEO PI-R, an evaluation tool widely used in clinical and research, and used by the United States Air Force in pilot selection). The NEO PI-R generates a personality profile with 5 dimensions: neuroticism (N), extraversion (E), openness, (O), agreeableness (A), and conscientiousness (C). Surgical residents had personality scores that were significantly different than the general population. Male and female residents had somewhat different profiles; however, they differed from the general population in the same traits and in the same direction. The researchers felt that these results would be helpful in resident selection, counseling, and evaluation.

However, these studies which analyzed surgeons and surgical residents, and most other studies of other medical disciplines

TABLE 8. Mean Scores of High and Low Performing Residents on Job Satisfaction Indicators (JSI) Subscales

Subscale Indicator	Mean Score \pm SD		p-Value
	High Performers (n = 21)	Low Performers (n = 21)	
Versatile	37.50 \pm 8.51	7.00 \pm 25.17	0.001
Repetitive Work	11.00 \pm 20.49	18.81 \pm 19.59	0.140
Specific Instructions	-10.00 \pm 19.16	-11.26 \pm 22.71	0.917
Dominant	31.50 \pm 17.52	31.35 \pm 14.60	0.695
Gregarious	22.00 \pm 19.19	28.61 \pm 17.01	0.346
Isolative	18.50 \pm 24.03	-2.43 \pm 23.65	0.124
Influencing	5.50 \pm 20.76	22.83 \pm 21.02	0.064
Self-Controlled	37.50 \pm 9.75	40.48 \pm 10.33	0.468
Valuative	10.00 \pm 13.37	11.87 \pm 17.84	0.827
Objective	30.50 \pm 16.38	32.26 \pm 22.31	0.843
Subjective	29.00 \pm 10.58	34.39 \pm 14.61	0.278
Rigorous	41.50 \pm 8.45	10.35 \pm 27.35	0.001

TABLE 9. Comparison of Residents (Thirds, * n = 63) and Attendings (All, n = 27) on Job Satisfaction Indicators (JSI)

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Versatile	7990.830	5	1598.166	4.276	.002
Adapt to repetitive work	834.551	5	166.910	0.436	.822
Adapt to performing under specific instructions	1151.310	5	230.262	0.515	.764
Dominant	1950.678	5	390.136	1.410	.229
Gregarious	5288.326	5	1057.665	2.882	.019
Isolative	5815.210	5	1163.042	1.539	.186
Influencing	10771.000	5	2154.200	4.467	.001
Self-controlled	2560.101	5	512.020	2.598	.031
Valuative	2051.651	5	410.330	1.268	.285
Objective	1476.836	5	295.367	0.708	.619
Subjective	1650.240	5	330.048	1.419	.226
Rigorous	10467.531	5	2093.506	5.777	.000

*Residents are divided into low, middle, and high performing thirds for comparison.

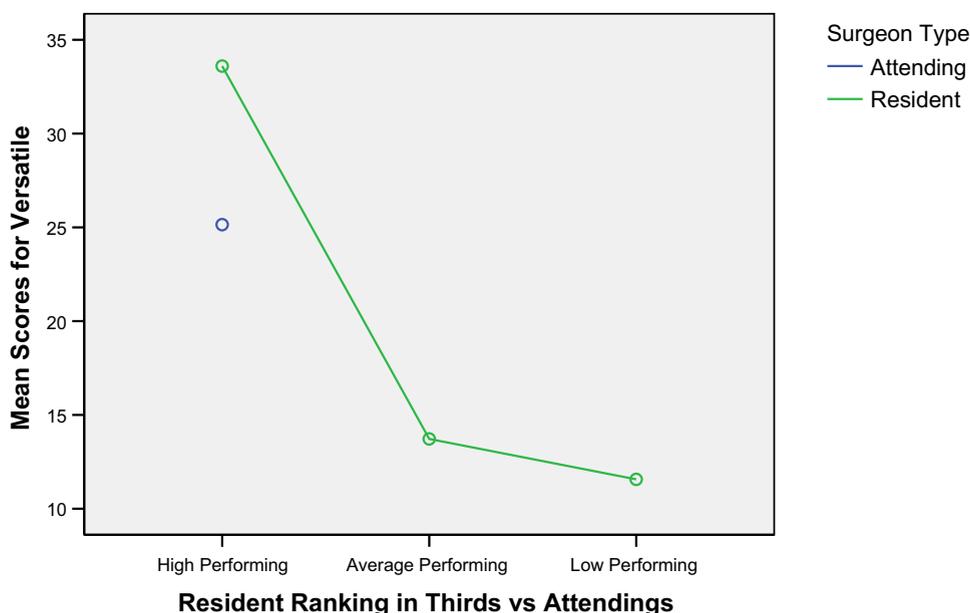
were descriptive in nature. They did not associate personality traits and/or profiles with residency outcome (for instance, successful completion of residency and subsequent board certification in that specialty).

Reich and colleagues evaluated clinical performance of 67 anesthesiology residents over a 3-year period of time.²⁴ Resident clinical performance was related to cognitive skills, personality factors, and standardized academic test performance. Personality was assessed using the California Personality Inventory (CPI), a validated tool. Out of 46 potential variables, 7 were statistically associated with poor clinical performance. Of these, 2 were personality traits. Introversion and flexibility were both predictive of poor clinical performance.

Similarly, Merlo and Matveevski studied 25 anesthesiology residents in a single institution study.³³ They divided the residents into 2 groups: high competency and low competency.

Measures of cognitive functioning such as fine motor dexterity, executive functioning, processing speed, and attention did not differ between the 2 groups. However, measures of personality did differ between the groups. High competency residents scored higher on measures of cooperation, self-efficacy, and adventurousness, and lower on measures of neuroticism, anxiety, anger, and vulnerability. Thus, personality testing was the best tool at differentiating high and low competency residents in this program.

This study has several limitations. It was conducted in a single Department of Surgery at a single institution. Thus, the population studied may not be representative of surgeons and surgical residents across the United States. A larger and more diverse population of attending/teaching surgeons is required to more precisely define the personality profile of a successful surgeon. The attending and resident ranking was performed by a single individual, the program director,

**FIGURE 7.** Mean scores for attendings (all) and residents (thirds) on the versatile subscale.

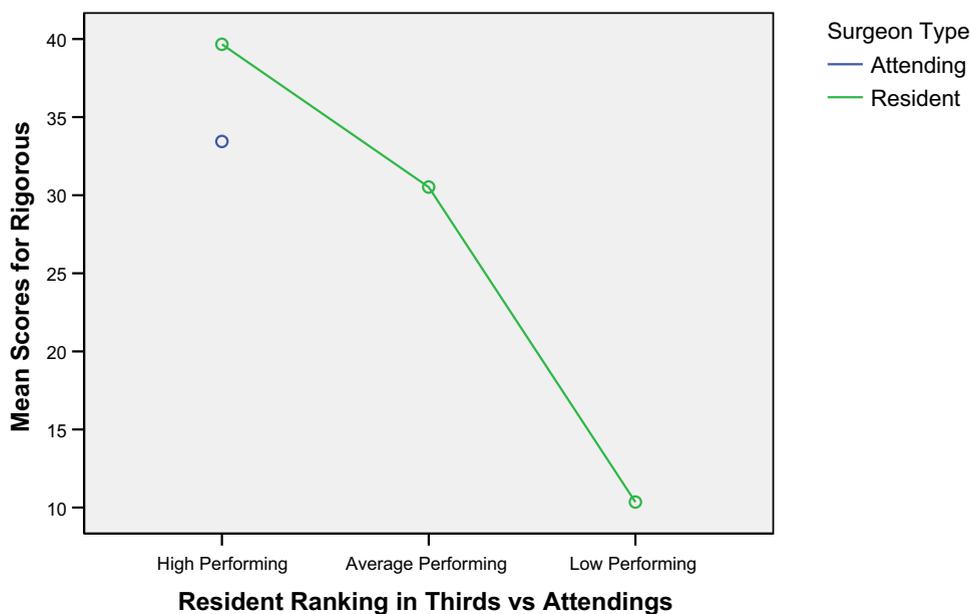


FIGURE 8. Mean scores for attendings (all) and residents (thirds) on the rigorous subscale.

blind to the WOWI Online test results. An attempt was made to incorporate the written and verbal assessments of each individual into this ranking, however, there is undoubtedly bias due to ranking by 1 individual. On the other hand, the program director is truly the only individual in this training program with knowledge of all aspects of resident performance, and is thus the best person to perform the ranking. An initial attempt was made to incorporate rankings from other key teaching faculty, but it was clear that these faculty did not have all of the necessary information to provide an effective ranking. One possible improvement in future studies would be to include both program director ranking and a consensus ranking from a panel of key faculty.

Future studies should include a more in-depth analysis of these data and continued tracking of current residents and future residents in order to determine how well their WOWI Online profiles predict ultimate successful completion of surgical residency. Additional studies incorporating other surgery training programs are warranted. The examination of WOWI Online profiles of attending and resident physicians in specialties other than surgery would also be interesting and useful. Finally, this study was retrospective in nature. A more definitive study would be to profile a large cross section of medical students and follow them as they progress through residency training programs.

In conclusion, the WOWI online assessment tool provides a stable profile of successful surgeons. This tool also demonstrates differences in the interest and personality profiles between high and low performing surgical residents. It may be useful as an indicator of success in surgical residency and in surgery as a profession.

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