

Research Articles

Career Factors Valued by Medical Students Interested in a Surgical Career

Margaret Sun, Bright Huo, Todd Dow^a, Kelly Brennan, Sebastian Haupt, Michael Smyth, Margaret Wheelock

Keywords: medical students, surgery career, work-life integration

International Journal of Surgical Education

Background

Studies suggest that early specialty exposure positively influences medical student career interest in that given field. Residency programs should consider implementing programs that focus on optimizing factors that have been identified to increase student interest to attract the best applicants. The purpose of this study is to identify factors associated with student interest in surgical and non-surgical specialties at the pre-clerkship level.

Methods

Online surveys were distributed to all first and second-year medical students at Dalhousie Medical School. The survey assessed demographics, current career interest, and career-influencing factors. Multivariate logistic regression was conducted incorporating variables with $p \leq 0.20$ on univariate analysis to identify factors associated with student interest of surgical disciplines, non-surgical disciplines, or undecided.

Results

Of the 107/219 (49%) students that completed the survey, 20 (18.7%) and 30 (28.0%) listed surgical and non-surgical disciplines as their current career interest, respectively. Multivariate analysis revealed lower prioritization of lifestyle-related career factors to be associated with interest in surgical disciplines ($p=0.032$), while older age ($p=0.001$) and decreased interest in research ($p=0.001$) were associated with interest in medical disciplines.

Conclusion

Our study identified low prioritization of lifestyle-related career factors among students with surgical career interests, while those with undecided career interests were correlated with prioritizing lifestyle-related factors. Our findings suggest that medical students still consider surgery as a specialty with a culture of poor work-life balance. Students who value work-life balance may rule out surgery early on or delay their career decisions.

INTRODUCTION

There is a decline in medical student interest in surgical careers in Canada.¹⁻³ Recent data from the Canadian Resident Matching Service (CaRMS) shows a decline in applicants ranking surgical programs as first choice from 28% in 2008 (589/2110) to 21% in 2019 (621/2934).⁴ This reduction in new trainees may result in an inability to meet the surgical demands of an aging population.^{5,6}

Numerous factors are known to influence students' career decision-making including gender, perception of lifestyle, prestige, mentorship, and role models, among others. Specifically, gender discrimination and limited early surgical exposure are core factors that negatively influence a student's interest in a surgical career.⁷ Student "fit" into the culture of surgery is an additional deterrent to surgical career interest. The culture of surgery has traditionally been described as prolonged work hours, negative impacts on work-life balance and unique patient-interactions in

^a **Corresponding author:**

Address:
Dalhousie Faculty of Medicine
5849 University Ave
Halifax, NS V3H 4R2

Contact:
902-830-6045
Todd.Dow@dal.ca

surgery.⁷ In contrast, early surgical interest, having family or friends practicing in surgery, previous experiences volunteering in sports, and interest in medical over social problems, have been identified as predictors of choosing a career in surgery.^{8,9}

The primary objective of this study was to identify factors associated with pre-clerkship student interest in surgery versus non-surgical specialties. In addition to demographic variables and career-influencing factors as identified by Scott et al., research interest, and residency factors were included to provide a more holistic assessment of medical students interested in surgical disciplines, medical disciplines, or undecided.

METHODS

QUESTIONNAIRE DEVELOPMENT & VARIABLES

Career factors for the survey were derived from a thorough literature review, with reference to the factor analysis performed by Scott et al. (2011). The survey was revised to ensure clarity and feasibility by three medical students (T.D, S.H, and M.S) prior to survey dissemination. The survey was composed of four sections. The first section of the survey assessed demographics such as gender, age, education level prior to medical school, current marital status, highest level of parental education, parental status, whether the participant had immediate family in medicine, and varsity sport participation. The second section of the survey assessed current career interests (medicine, surgery or undecided) and top-three career choices. The third section allowed participants to rate the importance of career factors using a Likert scale (1-Not Very important, 5-Extremely Important). Thirty-two previously identified career factors were grouped under the following themes: lifestyle, community orientation, prestige, hospital orientation, scope of practice, role model and other (Table 2). A mean score was obtained for each group. New factors to be explored and factors with low internal consistency were kept separate in further analyses.

DISSEMINATION

Using a cross-sectional approach, electronic surveys were distributed to medical students in their first and second year of training at Dalhousie University. At our institute the first two years of teaching are mainly classroom based and are prior to students receiving significant clinical first-hand experience. *Opinio* (Object Plant, Oslo, Norway) was used to collect anonymous responses over a four-week period. Students were only able to complete the survey once. Informed consent was submitted with survey completion.

DATA ANALYSIS

All results of the questionnaire were blinded during data analysis using participant specific identifiers. Comparisons between study groups were made using the chi-square test and Fishers exact test when cells were ≤ 5 . Factors associated with current career interests (surgery, medicine or undecided) were evaluated using logistic regression. Multivariate logistic regression was conducted using the enter

method, incorporating variables and factors which were significant or near-significant ($p \leq 0.20$) on univariate analysis. Based on previous research demonstrating their association with career interests, age and gender were also included in the models.⁹ Results were considered statistically significant at p -value < 0.05 . Analyses were conducted using SAS version 9.4.

ETHICS

This study conformed to the guidelines outlined by Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). Study approval was obtained through the Nova Scotia Health Authority Research Ethics Board (No. 1023325 & 1023087 for the first-year and second-year class, respectively).

RESULTS

DEMOGRAPHICS

Participant demographics are listed in Table 1. Overall, 107/219 (48.9%) students responded and 66/107 (61.7%) were female, 62/107 (57.9%) were between 20 and 24 years of age and 59/107 (55.1%) were first year medical students. There were 57/107 (52.3%) students that were undecided in their career path. Eighteen students (16.8%) had participated in varsity sports.

When assessing the seven career-influencing factor themes, several trends were identified. Factors allocated to the "Lifestyle" theme were important (mean = $3.7 \pm SD = 0.7$) influences on student decisions, which included flexibility, acceptable hours of practice and on-call schedules (Appendix 1). Students also rated "Community Orientation" (3.3 ± 0.7) as an important theme, which included health promotion, long-term relationship with patients, focus on patients in the community, social commitment, and interesting patient population (Appendix 1). "Hospital Orientation" (3.0 ± 0.7) was further rated as an important theme, including a focus on urgent care, a focus on in-hospital care, results of interventions being immediately available, and a preference of medical to social problems. "Prestige" (3.4 ± 0.7) included students' preferences for careers in which they would have adequate income to eliminate debt and have a stable future. "Role model" (2.7 ± 0.9) appeared to be a factor of a lower significance for most students. Of the other survey items, students were interested in finding a good match career choice for themselves (4.1 ± 0.8) and being well supported in their residency program (3.9 ± 0.9 ; Figure 1).

On multivariate analysis (Table 2), lower prioritization of an acceptable lifestyle was independently associated with an interest in pursuing a surgical career (OR 0.32 95%CI (0.11-0.91)). Male gender (0.086) was noted to be approaching significance. Older age (OR 10.14 95%CI (2.27-45.28)) and a decreased interest in research (OR 0.27 95%CI (0.13-0.60)) were associated with an interest in medical specialties, while controlling for other factors. A community orientation (interest in health promotion, outpatient medicine and longer-term relationships with patients) demonstrated a trend towards significance ($p = 0.071$) of association with the career choice of medical disciplines.

Table 1. Demographics and residency choice N=107

	Total no. (%)	Surgery no. (%)	Medicine no. (%)	Undecided no. (%)	p
Gender					0.362
Male	41 (38)	10 (24)	9 (22)	22 (54)	
Female	66 (62)	10 (15)	21 (32)	35 (53)	
Age					0.002
20-24	62 (58)	13 (21)	9 (15)	40 (65)	
25-26	24 (22)	6 (25)	10 (42)	8 (33)	
27+	21 (20)	1 (5)	11 (52)	9 (43)	
Pre-medical education					0.639
Bachelors	72 (67)	12 (17)	19 (26)	41 (57)	
Masters	33 (31)	8 (24)	10 (30)	15 (45)	
PhD	2 (2)	0 (0)	1 (50)	1 (50)	
Year of medicine					<0.001
1	59 (55)	16 (27)	2 (3)	41 (69)	
2	48 (45)	4 (8)	28 (58)	16 (33)	
Relationship status					0.477
Single	85 (79)	17 (20)	24 (28)	44 (52)	
Common law	13 (12)	3 (23)	2 (15)	8 (62)	
Married	9 (8)	0 (0)	4 (44)	5 (56)	
Children					1.000
Yes	2 (2)	20 (19)	29 (28)	56 (53)	
No	105 (98)	0 (0)	1 (50)	1 (50)	
Parental education					0.702
Highschool	15 (14)	3 (20)	6 (40)	6 (40)	
Professional	24 (22)	3 (13)	8 (33)	13 (54)	
University	40 (37)	10 (25)	10 (25)	20 (50)	
Graduate	20 (19)	2 (10)	4 (20)	14 (70)	
Other	8 (7)	2 (25)	2 (25)	4 (50)	
Family member in medicine					0.262
Yes	26 (24)	2 (8)	9 (35)	15 (58)	
No	81 (76)	18 (22)	21 (26)	42 (52)	
Varsity sports					1.000
Yes	18 (17)	3 (17)	5 (28)	10 (56)	
No	89 (83)	17 (19)	25 (28)	47 (53)	
GRIT Scores					0.129
2.5-2.9	16 (15)	2 (13)	9 (56)	5 (31)	
3.0-3.4	66 (62)	12 (18)	16 (24)	38 (58)	
3.5-3.9	25 (23)	6 (24)	5 (20)	14 (56)	

>>p from a chi-square. If cells ≤5 a fisher's exact test was used

Older students (OR 0.2095%CI (0.06-0.65)) and students in their second year (OR 0.1895%CI ((0.06-0.54)) were less likely to be undecided in their career choices. Higher scores for lifestyle (valuing acceptable hours of practice, job flexibility and acceptable on-call schedules) closely correlated with reporting an undecided career choice (p=0.055). The factors and demographic variables included in the multivariate models account for the variance in the undecided (34%), surgery (45%) and medicine (50%) models.

DISCUSSION

In our cohort of medical students who have not yet received clinical hands-on teaching, students valued career factors such as lifestyle, prestige, and being well supported in residency. Recruitment strategies for residency programs to attract medical students may be improved using this data. Specifically, residency programs can utilize this data in career discussions with medical students and elaborate on the

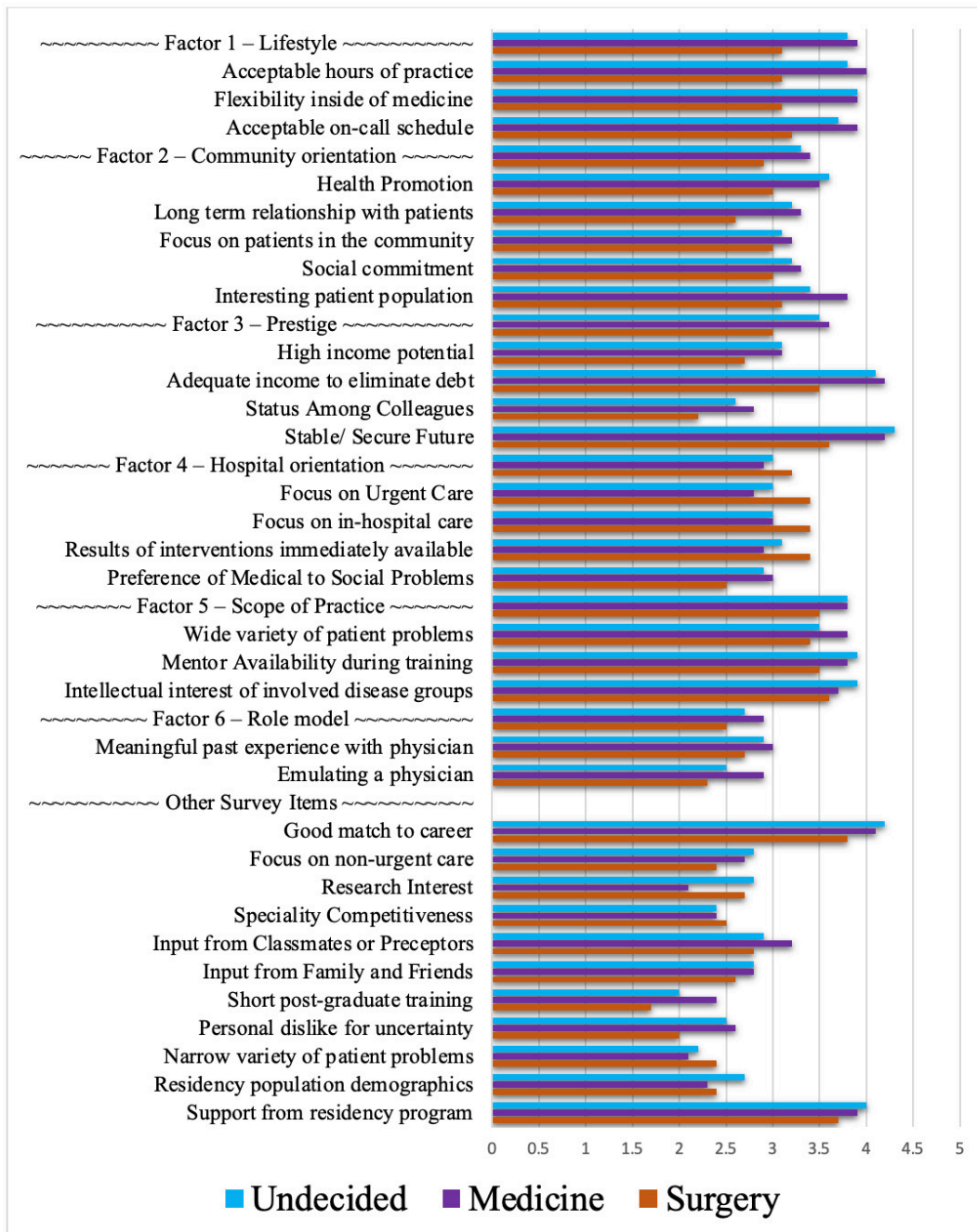


Figure 1. Career factor rating of importance based on student career interest

career factors deemed most valuable by students interested in the specialty.

MEDICAL SPECIALTY INTEREST

Both age and decreased interest in research were associated with medical specialty interest, which is reflected in other studies.^{10,11} Interestingly, student interest in academic medicine has historically been associated with older age.¹² It is possible that the students are still attracted to other aspects of an academic career such as teaching, which was not captured here. Additionally, previous research has demonstrated that interest in a career in a medical specialty has been linked with high prioritization of specialty lifestyle,^{10,13} but this was not evident among our students.

The traditional belief that medical specialties carry a good lifestyle may be changing. For instance, one study found that the prevalence of burnout among second-year internal medicine residents is 42.6%.¹⁴ This may be due to an increasing prevalence of major chronic disease in Canada,¹⁵ but this was not assessed in this study.

SURGICAL SPECIALTY INTEREST

Lifestyle is a significant factor in medical student career navigation,^{16,17} which is reported by our students. However, surgical interest was associated with low prioritization of a lifestyle-related career factors. Other studies have found similar results.^{7,8,18} Peel and colleagues found that students interested in surgery tend to consider lifestyle as

Table 2. Univariate and Multivariate Logistic regression with surgery

	No. (%)	Univariate Surgery OR (95%CI)	p	Multivariate Surgery OR (95%CI)	p
Demographic characteristics					
Gender			0.237		0.086
Male	10 (24)	1.81 (0.68-4.81)		3.49 (0.84-14.55)	
Female	10 (15)	Ref		Ref	
Age			0.239		0.261
20-24	13 (21)	Ref		Ref	
25-26	6 (25)	1.26 (0.42-3.81)		1.40 (0.29-6.69)	
27+	1 (5)	0.19 (0.02-1.54)		0.15 (0.01-1.74)	
Pre-medical education			0.443		
Bachelor	12 (17)	Ref			
Masters/PhD	8 (23)	1.48 (0.54-4.04)			
Relationship status			0.498		
Single	17 (20)	Ref			
Married/Common law	3 (14)	0.63 (0.17-2.39)			
Parental education			0.889		
High School	3 (20)	Ref			
Others	17 (20)	0.91 (0.23-3.57)			
Family member in medicine			0.116		0.128
Yes	2 (8)	Ref		Ref	
No	18 (22)	3.43 (0.74-15.90)		4.33 (0.66-28.58)	
Varsity sports			0.809		
Yes	3 (17)	Ref			
No	17 (19)	1.18 (0.31-4.54)			
GRIT Scores			0.179		0.096
Unit = 1 score point (mean)	3.3	4.16 (0.52-33.35)		13.39 (0.63-284.74)	
Medical Student Factors					
Factor 1 - Lifestyle			<0.001		0.032
Unit = 1 score point (mean)	3.1	0.22 (0.10-0.49)		0.32 (0.11-0.91)	
Factor 2 - Community orientation			0.019		0.151
Unit = 1 score point (mean)	2.9	0.39 (0.18-0.86)		0.37 (0.10-1.43)	
Factor 3 - Prestige			0.002		0.173
Unit = 1 score point (mean)	3.0	0.30 (0.14-0.65)		0.44 (0.14-1.43)	
Factor 4 - Hospital orientation			0.246		
Unit = 1 score point (mean)	3.2	1.56 (0.74-3.28)			
Factor 5 - Scope of Practice			0.064		0.988
Unit = 1 score point (mean)	3.5	0.48 (0.23-1.04)		1.01 (0.26-3.87)	
Factor 6 - Role model			0.218		
Unit = 1 score point (mean)	2.5	0.72 (0.42-1.22)			
Other Survey Items					
Good match to career			0.034		0.506
Unit = 1 score point (mean)	3.8	0.52 (0.28-0.95)		0.73 (0.29-1.86)	
Focus on non-urgent care			0.054		0.699
Unit = 1 score point (mean)	2.4	0.56 (0.31-1.01)		0.82 (0.29-2.29)	

	No. (%)	Univariate Surgery OR (95%CI)	p	Multivariate Surgery OR (95%CI)	p
Research Interest			0.714		
Unit = 1 score point (mean)	2.7	1.08 (0.72-1.61)			
Speciality Competitiveness			0.681		
Unit = 1 score point (mean)	2.5	1.11 (0.67-1.85)			
Input from Classmates or Preceptors			0.381		
Unit = 1 score point (mean)	2.8	0.81 (0.50-1.30)			
Input from Family and Friends			0.381		
Unit = 1 score point (mean)	2.6	0.81 (0.50-1.31)			
Short post-graduate training			0.044		0.521
Unit = 1 score point (mean)	1.7	0.52 (0.28-0.98)		1.35 (0.54-3.41)	
Personal dislike for uncertainty			0.059		0.428
Unit = 1 score point (mean)	2.0	0.61 (0.37-1.02)		0.74 (0.34-1.57)	
Narrow variety of patient problems			0.320		
Unit = 1 score point (mean)	2.4	1.31 (0.77-2.23)			
Residency population demographics			0.467		
Unit = 1 score point (mean)	2.4	0.85 (0.54-1.32)			
Support from residency program			0.148		0.373
Unit = 1 score point (mean)	3.7	0.68 (0.41-1.15)		1.62 (0.56-4.69)	

>> multivariate method age and gender plus all vars p<0.20 w/ enter method (highlighted pvalues in univariate analysis)

less important when making career decisions, while students not interested in surgery highly valued lifestyle.⁷ Our study may demonstrate that these beliefs are still prevalent, even in medical students in their pre-clinical years. Furthermore, it may indicate that students who value life-style related career factors are ruling out a career in surgery early on in their teachings, prior to clinical exposure to surgical specialties. This may contribute to a perpetual culture where surgical disciplines are perceived as having a poor lifestyle. While lifestyle can vary across disciplines, pre-clinical medical student perceptions may not accurately represent the demands of a certain specialty or the variety of ways to practice within it. The narrow focus on lifestyle within surgery does not account for other factors of surgical practice and may lead medical students to rule out surgical careers prematurely. To overturn this culture, surgical residency programs should take this into consideration and ensure that accurate, honest work-life balance discussions are held with medical students. Such information sessions are often held in later years of schooling, aimed at attracting medical students with surgical interest to a specific field of surgery. Our findings suggest that information sessions should be held at an earlier stage to better assist pre-clinical medical students plan their careers. Additionally, medical students must ensure that they carefully self-examine each of their career options and determine how their own unique values fit into the work culture prior to ruling them out prematurely.

UNDECIDED SPECIALTY INTEREST

Half of our students were undecided in their career plans and were closely correlated with a preference for a good lifestyle. To our knowledge, this has yet to be reported and may indicate that students who specifically value a strong work-life balance are delaying choosing a career path in order to closely examine each specialty for the one which best meets their value in this area. This also suggests that a significant portion of medical students value a good “work-life balance”, which is “the ability to balance work commitments with personal time in which you are able to relax, socialise and pursue extra-curricular interest.”¹⁹ This demographic is understudied compared to their counterparts with defined career interests, and more research must be conducted on this population. Residency programs should use this information and not “shy away” from honest work-life balance discussions with medical students.

There are several limitations inherent to this study. Firstly, the data stems from a single institution and conclusions drawn may be affected by inter-institutional variabilities in medical education curricula, research milieu, and level of exposure to various specialties. However, Canadian medical schools are routinely assessed by the Association of Faculties of Medicine of Canada (AFMC) and must meet accreditation expectations set out by the Committee on Accreditation of Canadian Medical Schools (CACMS), therefore a degree of standardisation exists, and these findings can likely be extrapolated to other institutions to some degree. Additionally, career interest was grouped into “medicine,” “surgery,” and “undecided.” The nuances of choosing specialties and sub-specialties that do not fall directly into

these categories may not be well reflected. Nonetheless, our findings do provide meaningful data that can be considered when optimizing career exposure and interest in medical students.

CONCLUSIONS

This study provides an in-depth analysis of career-related factors of medical students in their pre-clinical years. Our analysis demonstrates that lifestyle-related career factors were less valued in students interested in surgery. Furthermore, students with undecided career interests were highly correlated with a high value of lifestyle-related career factors. This indicates that students may delay career decisions to identify a specialty that matches their ideal work-life balance. Furthermore, it may indicate that students who highly

value lifestyle-related career factors are ruling out a career in surgery in their pre-clinical years.

.....

CONFLICTS OF INTEREST

None to report.

FUNDING

No funding to report.

Submitted: September 01, 2022 EDT, Accepted: September 04, 2022 EDT

REFERENCES

1. Marshall JG, Karimuddin AA. Decline in Popularity of General Surgery as a Career Choice in North America: Review of Postgraduate Residency Training Selection in Canada, 1996-2001. *World Journal of Surgery*. 2003;27(3):249-252. doi:10.1007/s00268-002-6642-8
2. Austin RE, Wanzel KR. Supply versus demand: a review of application trends to Canadian surgical training programs. *Canadian journal of surgery Journal canadien de chirurgie*. 2015;58(2):143-144. doi:10.1503/cjs.006614
3. Minor S, Poenaru D, Park J. A study of career choice patterns among Canadian medical students. *American Journal of Surgery*. 2003;186(2):182-188. doi:10.1016/s0002-9610(03)00181-8
4. *R-1 Match Interactive Data.*; 2019.
5. Slade S, Shrichand A, DiMillo S. Health Care for an Aging Population: A Study of how Physicians Care for Seniors in Canada. *The Royal College of Physicians and Surgeons of Canada*. Published online 2019.
6. Etzioni DA, Liu JH, Maggard MA, Ko CY. The Aging Population and Its Impact on the Surgery Workforce. *Annals of Surgery*. 2003;238(2):170-177. doi:10.1097/01.sla.0000081085.98792.3d
7. Peel JK, Schlachta CM, Alkhamesi NA. A systematic review of the factors affecting choice of surgery as a career. *Canadian Journal of Surgery*. 2018;61(1):58-67. doi:10.1503/cjs.008217
8. Scott IM, Matejcek AN, Gowans MC, Wright BJ, Brenneis FR. Choosing a career in surgery: factors that influence Canadian medical students' interest in pursuing a surgical career. *Canadian journal of surgery Journal canadien de chirurgie*. 2008;51(5):371-377.
9. Scott I, Gowans M, Wright B, Brenneis F. Determinants of choosing a career in surgery. *Medical Teacher*. 2011;33(12):1011-1017. doi:10.3109/0142159x.2011.558533
10. Hauer KE, Durning SJ, Kernan WN, et al. Factors Associated With Medical Students' Career Choices Regarding Internal Medicine. *JAMA*. 2008;300(10):1154. doi:10.1001/jama.300.10.1154
11. Durning SJ, Elnicki DM, Cruess DF, et al. Almost Internists: Analysis of Students Who Considered Internal Medicine but Chose Other Fields. *Academic Medicine*. 2011;86(2):194-200. doi:10.1097/acm.0b013e3182045ee5
12. Greenberg RB, Ziegler CH, Borges NJ, Elam CL, Stratton TD, Woods S. Medical student interest in academic medical careers: a multi-institutional study. *Perspect Med Educ*. 2013;2(5-6):298-316. doi:10.1007/s40037-013-0051-6
13. Osborn HA, Glicksman JT, Brandt MG, Doyle PC, Fung K. Primary care specialty career choice among Canadian medical students: Understanding the factors that influence their decisions. *Canadian family physician Medecin de famille canadien*. 2017;63(2):e107-e113.
14. Dyrbye LN, Burke SE, Hardeman RR, et al. Association of clinical specialty with symptoms of burnout and career choice regret among US resident physicians. *JAMA*. 2018;320(11):1114-1130. doi:10.1001/jama.2018.12615
15. Steffler M, Yin L, Weir S, et al. Trends in prevalence of chronic disease and multimorbidity in Ontario, Canada. *Canadian Medical Association Journal*. 2021;193:E70-77. doi:10.1503/cmaj.201473/ta-b-related-content
16. Yang Y, Li J, Wu X, et al. Factors influencing subspecialty choice among medical students: a systematic review and meta-analysis. *BMJ Open*. 2019;9(3):e022097. doi:10.1136/bmjopen-2018-022097
17. Sud S, Wong JP, Premji L, Punnett A. Career decision making in undergraduate medical education. *Can Med Ed J*. 2020;11(3):e56-e66. doi:10.36834/cmeej.69220
18. Schmidt LE, Cooper CA, Guo WA. Factors influencing US medical students' decision to pursue surgery. *Journal of Surgical Research*. 2016;203(1):64-74. doi:10.1016/j.jss.2016.03.054
19. Picton A. Work-life balance in medical students: self-care in a culture of self-sacrifice. *BMC Med Educ*. 2021;21(1). doi:10.1186/s12909-020-02434-5

APPENDICES

Appendix 1. Distribution of Medical Student Factors N=107

	Mean (SD)	1 = Not very Important no. (%)	2 = Somewhat Important no. (%)	3 = Moderately Important no. (%)	4 = Important no. (%)	5 = Extremely Important no. (%)
Factor 1 - Lifestyle	3.7 (0.7)					
Acceptable hours of practice	3.7 (0.8)	2 (2)	4 (4)	29 (27)	57 (53)	15 (14)
Flexibility inside of medicine	3.7 (0.9)	0 (0)	11 (10)	23 (22)	55 (51)	18 (17)
Acceptable on-call schedule	3.7 (0.8)	1 (1)	8 (7)	29 (27)	56 (52)	13 (12)
Factor 2 - Community orientation	3.3 (0.7)					
Health Promotion	3.4 (1.0)	3 (3)	14 (13)	38 (36)	38 (36)	14 (13)
Long term relationship with patients	3.1 (1.1)	7 (7)	27 (25)	30 (28)	34 (32)	9 (8)
Focus on patients in the community	3.1 (0.9)	4 (4)	22 (21)	42 (39)	34 (32)	5 (5)
Social commitment	3.2 (0.9)	3 (3)	18 (17)	49 (46)	30 (28)	7 (7)
Interesting patient population	3.4 (0.9)	4 (4)	9 (8)	40 (37)	44 (41)	10 (9)
Factor 3 - Prestige	3.4 (0.7)					
High income potential	3.0 (0.9)	8 (7)	20 (19)	44 (41)	34 (32)	1 (1)
Adequate income to eliminate debt	4.0 (1.0)	1 (1)	9 (8)	17 (16)	43 (40)	37 (35)
Status Among Colleagues	2.5 (1.0)	19 (18)	28 (26)	44 (41)	15 (14)	1 (1)
Stable/ Secure Future	4.1 (0.9)	1 (1)	4 (4)	15 (14)	49 (46)	38 (36)
Factor 4 - Hospital orientation	3.0 (0.7)					
Focus on Urgent Care	3.0 (1.0)	9 (8)	22 (21)	44 (41)	24 (22)	8 (7)
Focus on in-hospital care	3.1 (1.0)	6 (6)	25 (23)	38 (36)	32 (30)	6 (6)
Results of interventions immediately available	3.1 (1.0)	8 (7)	21 (20)	40 (37)	32 (30)	6 (6)
Preference of Medical to Social Problems	2.9 (1.0)	11 (10)	22 (21)	49 (46)	18 (17)	7 (7)
Factor 5 - Scope of Practice	3.7 (0.7)					
Wide variety of patient problems	3.6 (0.9)	1 (1)	12 (11)	35 (33)	41 (38)	18 (17)
Mentor Availability during training	3.8 (0.9)	1 (1)	10 (9)	25 (23)	47 (44)	24 (22)
Intellectual interest of involved disease groups	3.8 (1.0)	2 (2)	7 (7)	29 (27)	42 (39)	27 (25)
Factor 6 - Role model	2.7 (0.9)					
Meaningful past experience with physician	2.9 (1.2)	17 (16)	20 (19)	38 (36)	23 (22)	9 (8)
Emulating a physician	2.6 (1.0)	19 (18)	30 (28)	35 (33)	23 (22)	0 (0)
Other Survey Items						
Good match to career	4.1 (0.8)	0 (0)	4 (4)	16 (15)	53 (50)	34 (32)
Focus on non-urgent care	2.7 (0.8)	11 (10)	25 (23)	60 (56)	10 (9)	1 (1)

	Mean (SD)	1 = Not very Important no. (%)	2 = Somewhat Important no. (%)	3 = Moderately Important no. (%)	4 = Important no. (%)	5 = Extremely Important no. (%)
Research Interest	2.6 (1.2)	25 (23)	30 (28)	26 (24)	19 (18)	7 (7)
Speciality Competitiveness	2.4 (1.0)	20 (19)	37 (35)	36 (34)	13 (12)	1 (1)
Input from Classmates or Preceptors	3.0 (1.0)	9 (8)	25 (23)	37 (35)	31 (29)	5 (5)
Input from Family and Friends	2.7 (1.0)	14 (13)	29 (27)	38 (36)	24 (22)	2 (2)
Short post-graduate training	2.1 (0.9)	32 (30)	42 (39)	27 (25)	6 (6)	0 (0)
Personal dislike for uncertainty	2.4 (1.1)	24 (22)	36 (34)	28 (26)	17 (16)	2 (2)
Narrow variety of patient problems	2.2 (0.9)	27 (25)	43 (40)	30 (28)	6 (6)	1 (1)
Residency population demographics	2.5 (1.1)	24 (22)	29 (27)	33 (31)	17 (16)	4 (4)
Support from residency program	3.9 (0.9)	2 (2)	4 (4)	24 (22)	48 (45)	29 (27)

Appendix 2. Univariate and Multivariate Logistic regression with Students Interested in Medical Specialities

	No. (%)	Univariate Medicine OR (95%CI)	p	Multivariate Medicine OR (95%CI)	p
Demographic characteristics					
Gender			0.272		0.421
Male	9 (22)	0.60 (0.24-1.49)		0.62 (0.19-1.99)	
Female	21 (32)	Ref		Ref	
Age			0.002		0.001
20-24	9 (30)	Ref		Ref	
25-26	10 (42)	4.21 (1.43-12.34)		10.14 (2.27-45.28)	
27+	11 (52)	6.48 (2.13-19.66)		34.00 (4.78-241.81)	
Pre-medical education			0.587		
Bachelor	19 (26)	Ref			
Masters/PhD	11 (31)	1.28 (0.53-3.10)			
Relationship status			0.929		
Single	24 (28)	Ref			
Married/Common law	6 (27)	0.95 (0.33-2.73)			
Children			0.501		
Yes	1 (50)	2.62 (0.16-43.27)			
No	29 (28)	Ref			
Parental education			0.271		
High School	6 (40)	Ref			
Others	24 (26)	0.53 (0.17-1.64)			
Family member in medicine			0.392		
Yes	9 (35)	Ref			
No	21 (26)	0.66 (0.26-1.71)			
Varsity sports			0.979		
Yes	5 (28)	Ref			
No	25 (28)	1.02 (0.33-3.15)			
GRIT Scores			0.019		0.162
Unit = 1 score point (mean)	3.1	0.12 (0.02-0.70)		0.17 (0.01-2.04)	
Medical Student Factors					
Factor 1 - Lifestyle			0.055		0.743
Unit = 1 score point (mean)	3.9	1.97 (0.99-3.92)		0.82 (0.24-2.76)	
Factor 2 - Community orientation			0.125		0.071
Unit = 1 score point (mean)	3.4	1.66 (0.87-3.16)		2.79 (0.92-8.50)	
Factor 3 - Prestige			0.165		0.341
Unit = 1 score point (mean)	3.6	1.60 (0.83-3.10)		1.66 (0.59-4.71)	
Factor 4 - Hospital orientation			0.444		
Unit = 1 score point (mean)	2.9	0.78 (0.42-1.47)			
Factor 5 - Scope of Practice			0.501		
Unit = 1 score point (mean)	3.8	1.25 (0.66-2.36)			
Factor 6 - Role model			0.153		0.469
Unit = 1 score point (mean)	2.9	1.42 (0.88-2.29)		1.32 (0.62-2.79)	
Other Survey Items					
Good match to career			0.957		

	No. (%)	Univariate Medicine OR (95%CI)	p	Multivariate Medicine OR (95%CI)	p
Unit = 1 score point (mean)	4.1	1.02 (0.59-1.75)			
Focus on non-urgent care			0.634		
Unit = 1 score point (mean)	2.7	1.14 (0.67-1.91)			
Research Interest			0.011		0.001
Unit = 1 score point (mean)	2.1	0.59 (0.40-0.89)		0.27 (0.13-0.60)	
Speciality Competitiveness			0.716		
Unit = 1 score point (mean)	2.4	0.92 (0.59-1.43)			
Input from Classmates or Preceptors			0.171		0.517
Unit = 1 score point (mean)	3.2	1.35 (0.88-2.07)		1.28 (0.61-2.67)	
Input from Family and Friends			0.810		
Unit = 1 score point (mean)	2.8	1.05 (0.69-1.60)			
Short post-graduate training			0.017		0.205
Unit = 1 score point (mean)	2.4	1.84 (1.12-3.03)		1.61 (0.77-3.35)	
Personal dislike for uncertainty			0.252		
Unit = 1 score point (mean)	2.6	1.26 (0.85-1.88)			
Narrow variety of patient problems			0.468		
Unit = 1 score point (mean)	2.1	0.84 (0.52-1.35)			
Residency population demographics			0.297		
Unit = 1 score point (mean)	2.3	0.81 (0.55-1.20)			
Support from residency program			0.909		
Unit = 1 score point (mean)	3.9	0.97 (0.61-1.55)			

>> multivariate method age and gender plus all vars p<0.20 w/ enter method (highlighted pvalues in univariate analysis)

Appendix 3. Univariate and Multivariate Logistic regression with Undecided in Career Interest

	No. (%)	Univariate Undecided OR (95%CI)	p	Univariate Undecided OR (95%CI)	p
Demographic characteristics					
Gender			0.950		0.798
Male	22 (54)	1.03 (0.47-2.24)		0.88 (0.32-2.42)	
Female	35 (53)	Ref		Ref	
Age			0.022		0.028
20-24	40 (65)	Ref		Ref	
25-26	8 (33)	0.28 (0.10-0.75)		0.20 (0.06-0.65)	
27+	9 (43)	0.41 (0.15-1.13)		0.59 (0.17-2.07)	
Pre-medical education			0.276		
Bachelor	41 (57)	Ref			
Masters/PhD	16 (46)	0.64 (0.28-1.44)			
Year of medicine			<0.001		0.002
1	41 (69)	Ref		Ref	
2	16 (33)	0.22 (0.10-0.50)		0.18 (0.06-0.54)	
Relationship status			0.540		
Single	44 (52)	Ref			
Married/Common law	13 (59)	1.35 (0.52-3.48)			
Children			0.925		
Yes	1 (50)	0.88 (0.05-14.36)			
No	56 (53)	Ref			
Parental education			0.272		
High School	6 (40)	Ref			
Others	51 (55)	1.87 (0.61-5.67)			
Family member in medicine			0.604		
Yes	15 (58)	Ref			
No	42 (52)	0.79 (0.32-1.93)			
Varsity sports			0.832		
Yes	10 (56)	Ref			
No	47 (53)	0.90 (0.32-2.48)			
GRIT Scores			0.269		
Unit = 1 score point (mean)	3.3	2.37 (0.51-10.97)			
Medical Student Factors					
Factor 1 - Lifestyle			0.126		0.055
Unit = 1 score point (mean)	3.8	1.55 (0.88-2.71)		2.08 (0.98-4.37)	
Factor 2 - Community orientation			0.626		
Unit = 1 score point (mean)	3.3	1.15 (0.65-2.03)			
Factor 3 - Prestige			0.196		0.799
Unit = 1 score point (mean)	3.5	1.46 (0.82-2.58)		0.90 (0.41-1.98)	
Factor 4 - Hospital orientation			0.825		
Unit = 1 score point (mean)	3.0	0.94 (0.53-1.65)			
Factor 5 - Scope of Practice			0.386		
Unit = 1 score point (mean)	3.8	1.29 (0.73-2.30)			
Factor 6 - Role model			0.743		

	No. (%)	Univariate Undecided OR (95%CI)	p	Univariate Undecided OR (95%CI)	p
Unit = 1 score point (mean)	2.7	0.93 (0.62-1.41)			
Other Survey Items					
Good match to career			0.102		0.197
Unit = 1 score point (mean)	4.2	1.52 (0.92-2.52)		1.52 (0.81-2.86)	
Focus on non-urgent care			0.274		
Unit = 1 score point (mean)	2.8	1.30 (0.81-2.09)			
Research Interest			0.040		0.179
Unit = 1 score point (mean)	2.8	1.41 (1.02-1.97)		1.34 (0.87-2.05)	
Speciality Competitiveness			0.996		
Unit = 1 score point (mean)	2.4	1.00 (0.67-1.49)			
Input from Classmates or Preceptors			0.579		
Unit = 1 score point (mean)	2.9	0.90 (0.62-1.31)			
Input from Family and Friends			0.639		
Unit = 1 score point (mean)	2.8	1.09 (0.75-1.60)			
Short post-graduate training			0.548		
Unit = 1 score point (mean)	2.0	0.88 (0.57-1.35)			
Personal dislike for uncertainty			0.640		
Unit = 1 score point (mean)	2.5	1.09 (0.76-1.56)			
Narrow variety of patient problems			0.899		
Unit = 1 score point (mean)	2.2	0.97 (0.64-1.48)			
Residency population demographics			0.133		0.485
Unit = 1 score point (mean)	2.7	1.31 (0.92-1.86)		1.18 (0.75-1.86)	
Support from residency program			0.215		
Unit = 1 score point (mean)	4.0	0.76 (0.49-1.17)			

>> multivariate method age and gender plus all vars p<0.20 w/ enter method (highlighted pvalues in univariate analysis)