

A systematic review of the factors affecting choice of surgery as a career

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Background: Interest in surgical careers among medical students has declined over the past decade. Multiple explanations have been offered for why top students are deterred or rejected from surgical programs, though no consensus has emerged.

Methods: We conducted a review of the literature to better characterize what factors affect the pursuit of a surgical career. We searched PubMed and EMBASE and performed additional reference checks. Agency for Healthcare Research and Quality (AHRQ) and Newcastle–Ottawa Education scores were used to evaluate the included data.

Results: Our search identified 122 full-text, primary articles. Analysis of this evidence identified 3 core concepts that impact surgical career decision-making: gender, features of surgical education, and student “fit” in the culture of surgery.

Conclusion: Real and perceived gender discrimination has deterred female medical students from entering surgical careers. In addition, limited exposure to surgery during medical school and differences between student and surgeon personality traits and values may deter students from entering surgical careers. We suggest that deliberate and visible effort to include women and early-career medical students in surgical settings may enhance their interest in careers in surgery.

Contexte : On constate que l'intérêt pour une carrière en chirurgie a décliné chez les étudiants en médecine depuis une dizaine d'années. Plusieurs raisons ont été invoquées pour expliquer le désintérêt des étudiants talentueux à l'égard des programmes de chirurgie ou leur rejet de ces programmes, sans qu'on en arrive à un consensus.

Méthodes : Nous avons procédé à une revue de la littérature afin de mieux cerner les facteurs qui influent sur la poursuite d'une carrière de chirurgien. Nous avons interrogé les bases de données PubMed et Embase et procédé à des vérifications additionnelles des références. Nous avons utilisé les scores de l'Agency for Healthcare Research and Quality (AHRQ) et l'échelle Newcastle–Ottawa pour l'éducation afin d'analyser les données retenues.

Résultats : Notre recherche a permis de recenser 122 articles de fond en texte intégral. Leur analyse a mis au jour 3 facteurs clés qui influent sur les prises de décisions concernant une carrière en chirurgie : le sexe, les caractéristiques de la formation chirurgicale et la concordance entre le profil de l'étudiant et la culture du milieu chirurgical.

Conclusion : La discrimination sexuelle réelle et perçue a détourné des étudiantes de la chirurgie comme perspective de carrière. De plus, l'exposition limitée à la chirurgie durant les études de médecine et les différences entre les traits de personnalité et les valeurs des étudiants et des chirurgiens peuvent dissuader les étudiants d'entreprendre une carrière en chirurgie. Selon nous, des efforts délibérés et tangibles d'intégration des femmes et des futurs médecins au domaine chirurgical contribueraient à accroître leur intérêt pour cette spécialité.

Declining interest in surgical careers has been of concern for more than a decade.¹⁻⁴ The Canadian Resident Matching Service (CaRMS) surgical specialties have had a reduction in applications ranking surgical programs as first choice from 24.7% in 1998 to 21.7% in 2006 to 17.2% in 2016, whereas an increasing proportion of applications are to “controlled lifestyle” specialties, such as radiology, emergency medicine and anesthesiology.⁵⁻⁷ This is true even in historically competitive surgical specialties, such as plastic surgery.⁸ With increasing match participation and stable interest in surgical careers, the

quota of surgical residencies continues to be filled, but this should not be equated with increasing interest in the profession. Proportionally fewer Canadian students are applying to surgical residencies, but the rapid decline in the number of available surgical positions over the past 5 years has ensured that programs are filled.⁷ In the United States there has been no change in the number of available surgical positions or in the number of applications to surgical residencies over the past 5 years despite increasing numbers of total participants in the National Resident Matching Program (NRMP) Match; application to surgical residency in the United States has reduced proportionally to the overall increase in match participation.⁹ A 2005 survey of graduating U.S. medical students found that 45% of first-year medical students were interested in a surgical career, whereas only 7% of graduating students were matched to surgical residencies; findings suggested that features yet unknown during the course of medical school made surgery unpopular.³

Effort has been made to respond to the apparent decreased interest in surgical careers among medical students by preferentially selecting high-achieving, resilient and hard-working individuals during the residency selection process. Despite this effort, residency selection is imperfect, and the quality of future surgeons is not reliably predicted by residency applications.^{10,11} One alternative solution to the decreased number of applications to surgical residency programs from strong candidates is to encourage early interest in surgery among medical students. We hypothesize that potentially strong candidates for surgical residency lose interest in a surgical career during medical school and subsequently do not apply for surgical residency positions. A thorough understanding of the features that attract or deter medical students from surgery must be obtained in order to expand the applicant pool for surgical training programs.

We conducted a systematic review of the published literature to clarify which factors deter students from pursuing a surgical career. The goal of this review was to facilitate active recruitment of medical students who may ultimately be interested in a surgical career, especially those who would not otherwise have considered surgery seriously.

METHODS

This study was conducted according to the PRISMA 2009 Checklist recommendations for systematic review.¹² We performed a literature search in December 2016 using PubMed with the search terms “perception of surgical career,” “surgical residency selection,” or “surgery elective undergraduate education.” We conducted a search of EMBASE using the the medical subject headings (MeSH) [focus] “Decision making,” “Surgery,” and [explode] “Medical education.” Manual reference checks of publications were performed to supplement the electronic search. We

selected this strategy in an effort to identify components of the medical education processes as well as the decision-making processes in which we expect career decisions to be made. A broad search strategy was chosen owing to the variation in terminology surrounding this topic.

For the purpose of this study, medical trainees were defined as individuals in medical school or internship years who were not graduated doctors and who required supervision during clinical encounters. We considered surgical career selection to describe the decision of medical students to apply for residency training in a surgical specialty. Published randomized controlled trials and observational studies investigating trainee exposure to and interest in surgery were eligible for inclusion. No language or publication date restrictions were imposed. We included studies from all surgical specialties, including general surgery, general surgical subspecialties, vascular surgery, plastic and reconstructive surgery, neurosurgery, orthopedic surgery, otolaryngology, obstetrics and gynecology, and ophthalmology. Studies describing medical student rationale for specialty selection outside of surgery were also included. Studies that did not address our research question were excluded. Studies identified by the search strategy were initially screened by title and abstract. Full text review of and data collection from all studies meeting our inclusion criteria was performed independently by a single reviewer (J.K.P.) using a standard data extraction form.

We evaluated strength of evidence qualitatively according to the Agency for Healthcare Research and Quality (AHRQ) checklist and using the Newcastle–Ottawa Scale adapted for cross-sectional studies.^{13,14} The AHRQ assessment criteria grade quality of evidence based on study design, directness, precision and consistency; quality is graded as low, moderate, or high according to satisfaction of criteria in each of these categories. Directness describes whether the measured outcomes of included studies correspond to the outcome of interest for the review. Precision is defined as the degree of certainty for the included studies, and is impacted by sample size. Consistency describes whether the included studies find similar or dissimilar results. To meet criteria for high-quality evidence, a body of evidence must be largely prospective, randomized controlled trials with low risk of bias and that satisfy criteria for directness, precision and consistency. Although this tool tends to be used to assess clinical interventions, its application is useful for the evaluation of the impact certain interventions have in health care programs; we consider clinical placements and clinical training interventions among these. The Newcastle–Ottawa Scale awards studies a maximum of 10 points through the evaluation of selection, comparability and outcome criteria. Selection describes the procedures outlined in a paper to study an appropriate population. Comparability refers to how well differences between groups are accounted for. Outcome criteria refer to the risk of bias conferred by the described

qualitative and quantitative assessments used in a study. Typically these scores are presented for each included paper, but for simplicity of presentation we chose to present the mean scores.

RESULTS

Our PubMed search strategy identified 612 studies, the EMBASE search identified 186 studies, and our manual search of reference lists identified 62 studies. Once duplicates were removed, a total of 792 titles were available for screening. Screening excluded 568 studies that were not related to our research question. Full text review of the remaining 224 studies resulted in further exclusion of 104: 87 studies were excluded because they did not address our research question, and 17 reviews were excluded because they did not meet our study design criteria. In total, 120 studies were included in our analysis. Most included studies used a cross-sectional design, with limited evidence coming from prospective studies. These results are summarized in Figure 1.

Impact of gender

Gender discrimination

We chose to discuss “gender” to include the experiences of students identifying and expressing a gender different than their biological sex. Our search identified studies that used either term but that intended to communicate gender identity, and we have included them all using “gender” as the preferred term for this paper. Our search identified 13 cross-sectional studies discussing gender discrimination.^{15–27} An AHRQ grade of moderate strength was awarded to this body of evidence, with a mean Newcastle–Ottawa score of 6.9. The experience of gender discrimination is reported across all medical specialties, and is not unique to surgery.²² However, the perception of gender bias is frequently reported during surgical experiences and has been shown to decrease interest in the pursuit of further surgical training.^{15–27} This perceived culture in surgery has been described as “a gender-specific deterrence to a career in surgery for women.”¹⁶ Six large-scale surveys of medical trainees independently reported that a significant portion of female medical students experienced gender discrimination (68%–96%) and that this experience of bias influenced their career decisions.^{15,17–20,28} Significantly fewer female than male medical students considered surgical careers and ranked surgical residencies.^{20,28} In contrast, male medical students in these studies reported significantly less harassment than female medical students, and this correlated to greater interest in surgical careers.^{18,20,28}

Gender bias was also reported as a barrier for career advancement in 4 surveys of surgeons and surgical residents, and 1 survey of 100 staff cardiothoracic surgeons reported a significant income difference between men and women and

that surgeons of either gender were significantly less likely to encourage women to enter surgical careers.^{21,23,24,27}

Lack of same-gender role models

The lack of female role models is also a frequently reported explanation for reduced interest in surgery among female students. Eleven cross-sectional studies studying the impact of same-gender role models were identified in our search.^{19,22,29–37} An AHRQ grade of moderate strength was awarded to this body of evidence, with a mean Newcastle–Ottawa score of 7.5. It has been shown that residency programs appearing to lack diversity are unappealing to women and other self-reported underrepresented minorities.²² Furthermore, it has been shown that female students are significantly more likely to enter specialties with a higher proportion of women.^{29,37} In 1 survey, as few as 35% of female medical students could identify a mentor during surgical clerkship, and a different study showed that among women who did have a mentor, 90% had a male rather than a female mentor.^{35,36} These findings suggest that female students may be deterred from surgical residency because there has historically been fewer women in surgery and there may be a dearth of female colleagues.

Impact of child care, pregnancy, and lifestyle considerations for women

In the studies we identified, women cited lifestyle among their most important considerations during career decision-making.^{34,38} The opportunity for women to lead a balanced lifestyle was reported by 10 studies to be an influential factor when deciding whether or not to pursue a surgical career.^{17,28,34,38–44} An AHRQ grade of moderate strength was awarded to this body of evidence, with a mean Newcastle–Ottawa score of 6.8. Among these, 4 studies reported that female students perceived general surgery to be incompatible with having children or a rewarding family life, despite 2 studies showing female staff surgeon satisfaction with their capacity to balance work and family life.^{17,40,42–44}

Three studies identified in our search commented explicitly on maternity leave and support for child care, finding that limited or no infrastructure exists for residents who have children during training.^{28,39,41} One of these studies was Canadian and the other 2 were American.

Impact of surgical education

Preclerkship exposure

Exposure to surgery before students enter their clinical years has been shown to influence interest in surgery by 10 of the studies identified by our search strategy, 3 of which were cross-sectional and 7 of which were cohort studies.^{45–54} An AHRQ grade of moderate strength was awarded to this body of evidence, with a mean Newcastle–

Ottawa score of 6.6. The results from these studies were uniformly positive; following exposure to surgery during the preclinical years, students expressed greater confidence that surgery allows for work–life balance and meaningful change in patients’ lives.

Clinical exposure

Our literature search identified 21 studies that assessed the association between clinical exposure and student interest in surgery. An AHRQ grade of moderate strength was awarded to this body of evidence, with a mean

Newcastle–Ottawa score of 7.6. Of these studies, 11 showed that clinical exposure improves student knowledge of and interest in surgery.^{55–65}

Clerkship changed student perception of surgery and the surgical lifestyle in 6 of the studies we identified.^{66–71} This has a variable impact on student interest in a surgical career. Four studies reported that surgical clerkship increases student interest in surgical topics and shows the potential for work–life balance, thus increasing student interest in these careers.^{66,69–71} However, 2 studies reported that clerkship reduced interest in surgery. One survey of

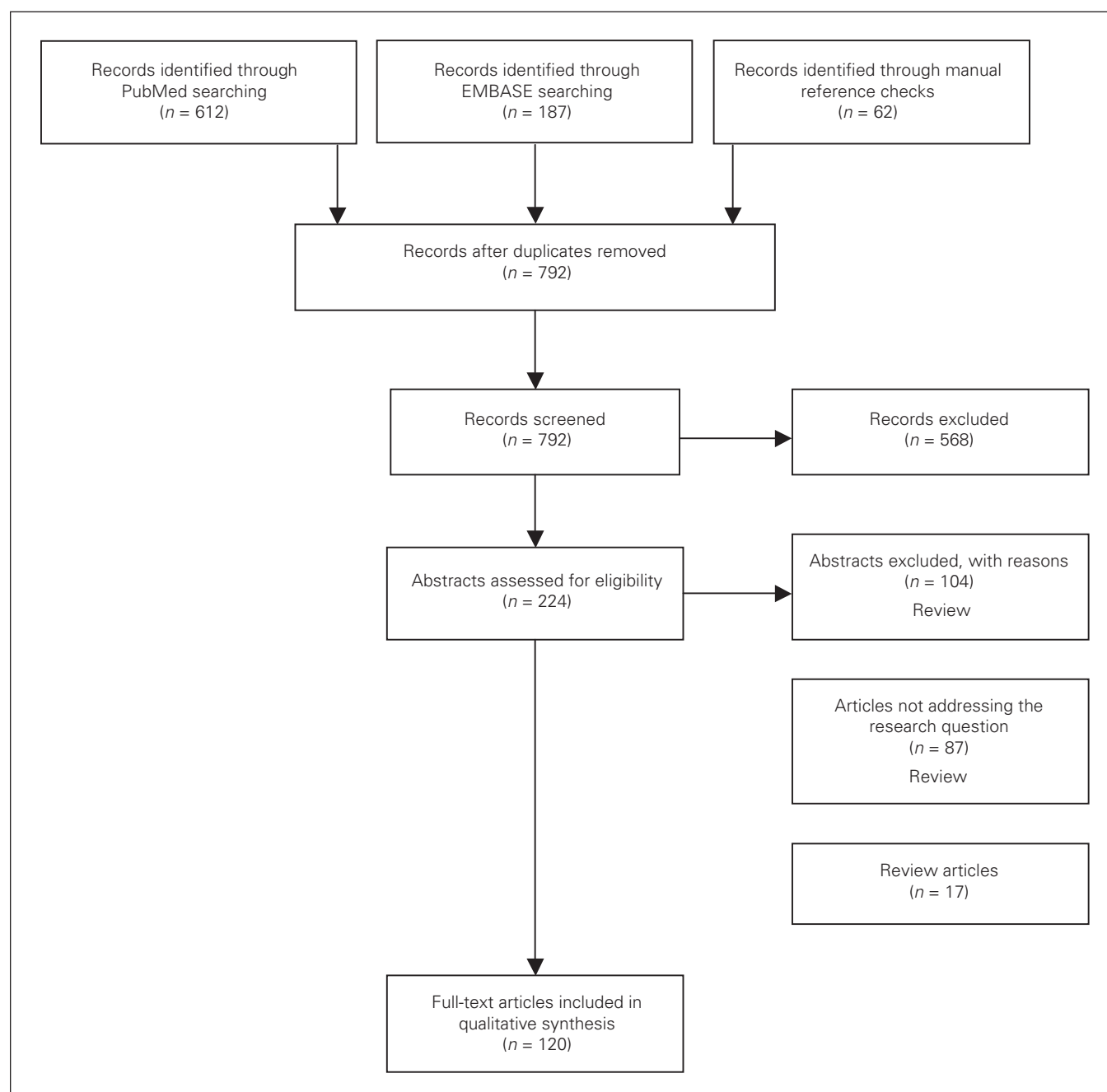


Fig. 1. Study selection process.

African medical students showed that an anesthesiology rotation reduced interest in the career, with students citing that it clarified how this career did not achieve student goals.⁶⁷ The other study by Zuccatto and colleagues⁶⁸ showed that clinical exposure reduced student interest in neurosurgery from 25% to 10%, as students came to appreciate the workload of neurosurgeons.

The impact of surgical simulation training on developing medical student interest in surgery was assessed in 4 studies identified by our search strategy.^{72–75} Surgical simulation training improved student experience of surgical clerkship in all of these studies and improved interest in surgery in 2 studies.^{73,74} Galiñanes and colleagues⁷² found that orientation to basic laparoscopy can benefit a student's clerkship experience, but does not improve student interest in surgery.

Global health exposure

Global health electives in surgery are an opportunity for medical students to develop clinical experience and surgical skills in unique, often resource-limited environments. Our literature search identified 4 papers assessing medical student interest in surgery following international surgery electives.^{76–79} An AHRQ grade of low strength was awarded to this body of evidence, with a mean Newcastle–Ottawa score of 4.8. In these reports, a small group of medical students participated in supervised medical electives and were interviewed about their experiences. It was shown that these unique international experiences did not impair students' ability to meet the same curricular objectives as their peers at a home site.⁷⁶ These experiences were shown to provide a culturally broader experience and greater clinical responsibility than what was afforded to students at their home institution, though no direct comment on the impact this had on student interest in a surgical career was reported.^{76–79}

Impact of student fit in surgical culture

Surgical lifestyle

The surgical lifestyle and its impact on student pursuit of surgical careers was the most heavily studied association, having been discussed in 31 of the studies identified in our search.^{3,35,66,68,71,80–105} An AHRQ grade of moderate strength was awarded to this body of evidence, with a mean Newcastle–Ottawa score of 7.9. Among these, 22 studies commented explicitly on the weight that students place on duration of training and work–life balance when making career decisions.^{3,35,66,68,71,80–87,89,91,98–102,104,105} Lifestyle considerations included prolonged work hours, the perceived barrier to achieving work–life balance and the nature of patient interactions in surgery. These survey data showed that most medical students did not see their lives as compatible with surgery, and therefore considered the career-focused surgical lifestyle their primary deterrent from surgical specialties.

In contrast, medical students interested in surgery tended to consider lifestyle less important when

making career decisions. Nine studies supported the theory that students who identify as surgeons prioritized their interest in surgical topics over value of a controlled lifestyle.^{88,90,92–97,103}

Efforts to enhance student interest in surgery by putting in place lifestyle modifications have had mixed success. Work hour restrictions have been shown to improve students' experience of their surgical rotations and to enhance their interest in surgical careers.^{85,88,104} One study showed that work hour restrictions had an impact on clerkship experience and interest in surgical careers.¹⁰⁴ In 2 studies of medical students completing surgical clerkships, it has been shown that these duty hour limitations produce significantly more favourable impressions of surgical lifestyles, though no statistically significant improvement in student interest in surgery was observed with the implementation of restricted work hours.^{85,88} In contrast, exposing medical students to community and private practice surgery has resulted in improved clerkship experience as well as enhanced interest in surgical careers, as shown by 2 studies included in our review.^{60,71}

Mentorship

The presence of a role model in surgery was reported in 26 studies to be a significant, positive influence on surgical career decision-making.^{3,31,32,36,49,56,61,74,91,96,97,106–120} An AHRQ grade of moderate strength was awarded to this body of evidence, with a mean Newcastle–Ottawa score of 7.8. These studies clearly showed that medical students had significantly greater interest in surgery when they were partnered with a surgical mentor. The absence of such a mentor has been shown to have a deterrent effect on student interest in surgery.

Three studies in our review discussed the role of residents as surgical mentors.^{106,107,115} These studies reported a positive association between exposure to surgical residents and interest in a surgical career. The authors of these studies suggested that residents are particularly effective mentors for medical students because of the extent to which students and residents interact.^{106,107,115}

Our search strategy revealed only 1 study that assessed the impact of mentorship outside of clinical experience. Day and colleagues⁴⁹ reported that a mentorship program for 18 students in preclinical years of medical school was successful at improving student interest in surgical careers.

Personality type

Our search strategy identified 6 studies that sought to identify particular personality traits that predispose an individual to interest in surgery.^{121–126} All of these studies reported that individuals interested in surgery were significantly more extroverted and conscientious than the general population and significantly less impulsive.^{121–126} Inconsistency among studies existed when reporting neuroticism in the surgical personality.^{122,125,126} Emotional intelligence was not

found to be useful in differentiating medical students interested in surgical versus medical specialties.¹²⁷

Our review identified 5 studies that commented on how prestige and financial reward factored into career decisions among medical students.^{96,128–131} These studies reported that medical students who valued prestige, financial gain and academic ambition tended to pursue careers in surgery more frequently than their counterparts, suggesting a personality that is more drawn to surgery. Furthermore, 1 study reported that medical students considered surgery to be the medical career with the greatest potential for prestige, skill and knowledge.¹²⁸

An AHRQ grade of low strength was awarded to these studies, with a mean Newcastle–Ottawa score of 7.8.

DISCUSSION

Gender discrimination among medical students and surgeons has been discussed in the surgical literature for more than 20 years as an explanation for gender imbalances in surgical specialties. During this time, changing gender roles in society and the changing role of surgeons in the health care team has resulted in an increased inclusion of women in surgery. However, many of the studies included in this review are dated and do not reflect these changes. Furthermore, despite this progress, a position statement from the Association of Women Surgeons (AWS) expresses ongoing concern regarding gender bias causing income inequality.¹³² Our interpretation of the literature is consistent with the findings of the AWS that gender discrimination has deterred female interest in surgery. We propose that historical and ongoing gender discrimination has resulted in under-representation of women in surgery, especially in leadership roles and academia. This under-representation may be perceived as a “glass ceiling” hindering career development of women in surgery, thereby discouraging more women from considering careers in surgery. As effort has been made to improve representation of women in surgery, we expect this to change, but based on our findings we recommend that ongoing effort be made to demonstrate inclusion and equal opportunity within surgery.

An important means of demonstrating inclusivity and facilitating recruitment of female medical students is the explicit communication of support to those students interested in having a family; it is important to medical students that the surgical community be perceived as welcoming of diversity, encouraging of women surgeons and supportive of parental leave. Our recommendations therefore echo those of Mayer⁴¹: formal policies regarding diversity and child care support during residency should exist to ensure that students considering a family are not deterred from pursuing a career in surgery.

The perceived inability of surgeons to maintain work–life balance was another frequently reported deterrent to pursuing surgical careers and has been cited as a cause for concern among surgical training programs. Certain non-

modifiable features of surgical careers, such as night call and early morning rounds, can deter students from surgery, but the data in this review suggest that clerkship may improve interest in surgical careers by dispelling the myth that surgery precludes work–life balance.^{68,71,118} Notably, clerkship rotations at a community hospital resulted in medical students feeling reassured that surgeons can maintain work–life balance.^{60,71} We recommend making an effort to ensure that work–life balance is an additional learning objective in surgical clerkship.

The data in our review emphasize the importance of early interest in surgery among medical students, as those students who have built an intellectual interest in surgery are not discouraged by the busy surgical lifestyle or the challenges surgeons face in finding work–life balance.^{45–54,80,82,83,85,88} The importance of exposure to surgery early in training is further supported by a study by Sallee and colleagues,¹²⁸ which showed that medical student impressions of a specialty form before adequate clinical exposure in that specialty is obtained. These findings, together with ours, suggest that decisions about specialties of interest are formed during the preclerkship years. We recommend that medical students be given introductory exposure to surgery before their clerkship years in order to build early interest in surgical careers.

In addition to recruitment of medical students who are not discouraged by the busy surgical lifestyle, recruitment could be further enhanced by wellness initiatives. Surgeon wellness during residency and throughout a surgical career has become a priority, and this may encourage interest in surgery among students who are undecided.^{133,134} One approach to ensuring wellness among surgical trainees is the restriction of duty hours, which was found in our review to have a beneficial impact on student experience of surgery and mixed impact on student pursuit of a career in surgery.^{85,88,104} However, duty hour restriction is controversial, and results from prominent studies, such as the FIRST trial, illuminate the nuanced balance between duty hour policies and surgical trainee well-being.¹³⁵ We cannot make recommendations based on our review regarding duty hour restrictions.

Alternative wellness initiatives and the increasing emphasis on preventing burnout among surgeons reflects a culture shift that may allow for a more balanced perception of surgical careers.¹³³ The Royal College of Physicians and Surgeons of Canada has begun implementation of the Competence By Design (CBD) framework, which emphasizes gradual increases in responsibility as trainees advance in their knowledge and ability. Among the goals of this new curriculum is to provide a more balanced approach to exam preparation and to ensure that trainees are not held to expectations beyond their ability.¹³⁶ We hypothesize that discussion of wellness during clinical training and the introduction of greater balance in training curricula will expose this emphasis on wellness to those clerks who are

yet undecided about a career in surgery and may enhance student interest in surgery.

Our review identified mentorship as having a positive impact on student interest in surgical careers. Some data suggested that resident mentors had a particularly beneficial impact on student clerkship experiences, as residents work more closely with students than staff surgeons do.^{106,107,115} Furthermore, mentorship of female and under-represented minority medical students has been shown to lead to similar increases in student interest in surgical careers.^{19,22,29-37,137} Program diversity is an important consideration for medical students, and we posit that mentorship may allow for honest discussion of diversity in surgery and can also create a more welcoming environment for medical students who see themselves as “outsiders” in surgical settings.^{22,137}

Mentorship in surgery may also be beneficial because it allows students to become familiar with the personalities of potential future colleagues. The concept of a surgical personality was first developed by McGreevy and Wiebe,¹²⁶ who identified similarities in trait variance on personality testing among surgical residents. Students who are extroverted, ambitious and motivated by the prestige of surgical work may be good candidates for surgical training.^{121-126,96,128-131} However, bias may exist in studies of a surgical personality among medical students: students interested in surgery may construct a value system for themselves based on that of the surgeons they know, thereby promoting personality traits unique to certain surgeons that may or may not reflect the value system inherent to surgery.

A common feature of the studies discussing the importance of mentorship is that a mentor relationship was established during clinical rotations.^{3,31,32,36,49,56,61,74,91,96,97,106-120} Clinical experience is known to have a significant impact on career decisions, but the mentorship during exciting clinical opportunities may lead to an especially transformative experience during surgical clerkship. We encourage that mentor relationships be established with medical students whenever possible and that same-gender mentors are more favourable if available.

Limitations

Our outcome of interest — student interest in surgical careers — has not been shown to reliably predict pursuit of a surgical career. Only 1 study captured by our search strategy assessed match rates to surgical residency in students who reported interest in surgery, and this was not the primary outcome of the study.⁶⁰ Student interest in surgery was selected a priori as our outcome of interest because it was thought to best reflect the attitudes of medical students in the process of making career decisions. Other outcomes, such as match rates to surgical residency, would not as readily report the impact that certain factors have on career decision-making and are affected by external factors, such as changes to program funding and the availability of surgical training positions.

Most studies identified in our search were cross-sectional observational studies, and many were dated. Applying these older papers to contemporary surgery is problematic, because the climate of surgery is dynamic and the evolution of culture in surgery may not yet be reflected in the literature. Because these limited-quality data were the best available, as identified by our search strategy, it is clear that there is an absence of recent, high-quality studies assessing surgical interest among medical students. We consider our results in the context of largely dated, survey-based evidence.

Strength of evidence for a heterogeneous body of largely dated, cross-sectional data, such as that assessed in our review, is difficult. Few epidemiologic tools exist to grade the strength of evidence from cross-sectional studies in a review, so we are limited in our ability to objectively grade the quality of evidence included in our review. We have applied 2 literature-validated tools for grading strength of evidence in health care programs, but these are not typically used in the context of career decision-making.^{13,14} Our use of multiple tools validated for different contexts attempts to overcome the limitations of using a single tool on this challenging body of evidence.

The studies that identified an association between clinical exposure to surgery and an interest in a surgical career were limited inasmuch as clerkship experiences are variable, and bias existed in the survey design.⁵⁵⁻⁶⁵ Specifically, students with early interest in surgery were more likely to seek out surgical experiences and were more inclined to report a positive clerkship experience, thereby artificially strengthening the association between exposure and interest.¹³⁸

CONCLUSION

The goal of this review was to clarify which deterrents to entering surgical careers were perceived by medical students. Real and perceived gender discrimination deterred female medical students from entering surgical careers. In addition, limited exposure to surgery and the operating room during medical school and real and perceived differences between student and surgeon personality traits and values may deter students from entering surgical careers. Some evidence identifies a unique surgical personality that could be identified in medical students, but the application of this to recruitment efforts has not yet been validated in the literature. Evidence supports the matching of students with surgical mentors to encourage surgical careers. Those students ambivalent toward careers in surgery may have enhanced interest in surgical careers if they are mentored, included in clinical work from early stages of training, and made to feel part of the surgical team; we suggest that faculty and residents consider these factors when working with medical students.

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Contributors: All authors designed the study. J. Peel acquired and analyzed the data. J. Peel and N. Alkhamesi wrote the article, which all authors reviewed and approved for publication.

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