ORIGINAL REPORTS

The Impact of Same Gender Speed-Mentoring on Women's Perceptions of a Career in Surgery – A Prospective Cohort Study

Maria Georgi, BSc,* Naomi Morka, BSc,*,# Sonam Patel, BSc,* Danny Kazzazi, BSc,* Khimi Karavadra, BSc,* Arjun Nathan, MBBS,† Gillian Hardman, FRCSEd, MBBS, MSc, BSc,‡ and Janice Tsui, MB, BChir, MD, FRCS†

*School of Medicine, University College London, London, United Kingdom; †Division of Surgery and Interventional Science, University College London, London, United Kingdom; and ‡Cardiothoracic Surgery NTN, Health Education England, Manchester, United Kingdom

BACKGROUND: Mentoring is critically important for the personal and professional development of a surgeon. Early career stage mentoring by same-gender role models may help ameliorate the gender imbalance in surgery based on our understanding of barriers for women pursuing surgical careers. A novel method of establishing these relationships is speed mentoring. This study aims to examine the impact of a one-day speed-mentoring session with same gender mentors on a cohort's perceptions of a career in surgery.

DESIGN: This prospective pre-post study compared attitudes and perceptions of a career in surgery before and after a speed-mentoring session with female surgeons. Mentees were assigned into groups of 1 or 2 and were paired with a female surgeon for 8 minutes. Each mentee group then rotated to another mentor for the same amount of time and this process continued for a total of twelve sessions. Mentees completed a 19-point questionnaire before and after the speed mentoring intervention.

Setting: This multicenter study included participants from across the United Kingdom.

PARTICIPANTS: Inclusion criteria were female gender and medical student or foundation year doctor (internship year 1 or 2) status. Three hundred and forty participants participated in the intervention, 191 were included in the analysis.

RESULTS: Following intervention, the percentage of participants who agreed that having a family would negatively impact a woman's surgical career progression significantly decreased from 46.6% to 23.0%. The percentage of participants who agreed that an "old boys' club" attitude exists in surgery also significantly decreased (73.8%-58.1%). The percentage of participants who agreed it was more difficult for a woman to succeed in her surgical career than a man significantly decreased (73.8%-64.9%). One hundred and eighty-three (96%) participants agreed that mentorship is important for career progression and 153 (71.2%) participants stated that they did not have someone who they considered a mentor.

CONCLUSIONS: Conducting a speed mentoring program with same-gender role models significantly changed female medical students' and junior doctors' perceptions of women in surgery. The results suggest that such programs may be effective tools for facilitating mentor-mentee relationships and could be employed by surgical organizations to encourage a diverse uptake into surgery. (J Surg Ed 000:1–11. © 2022 The Author(s). Published by Elsevier Inc. on behalf of Association of Program Directors in Surgery. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/))

KEY WORDS: Women in surgery, Mentoring, Speed-mentoring, Diversity in surgery

COMPETENCIES: Interpersonal and Communication Skills, Practice-Based Learning and Improvement

#Joint first authors, both authors contributed to the manuscript equally.*Correspondence:* Inquiries to Maria Georgi, BSc, School of Medicine, University College London, Gower Street, WC1E 6BT, London, United Kingdom; fax: (020)-7679-2000; e-mail: maria.georgi.17@ucl.ac.uk

  1931-7204/$30.00 https://doi.org/10.1016/j.jsurg.2022.05.014

INTRODUCTION

Scientific Background and Rationale

The underrepresentation of women in the field of surgery has been apparent for many years. Although women make up the majority of medical graduates in the United Kingdom, 2020 figures from the Royal College of Surgeons of England highlighted that 13.2% of consultant surgeons are female.[1] Similar patterns have been identified globally.[2-6] Even after the commencement of a career in surgery, women are considerably more likely to leave surgical training than their male counterparts.[7,8] There has been extensive research into the reasons for the current shortage of women in surgery and barriers to the recruitment of more female surgeons.[5-10] Amongst many factors, unfavorable lifestyle considerations, concerns about the effect of a surgical career on parenting, gender-based workplace discrimination and difficulty in attaining leadership positions have been cited as potential deterrents from a career in surgery.[11-14] One study demonstrated that even prior to the start of their medical education, fewer women than men aspire to become surgeons.[15] During medical school, the same study found that women were more likely than men to lose interest in pursuing a career in surgery. As exposure to a surgical environment increases, students may become increasingly aware of the lack of gender representation in surgery and the potential challenges that may be faced by female surgeons.[16,17] Unfortunately, in some cases, students may have first-hand experience of microaggressions and sexism in the surgical workplace.[18]

Negative perceptions of a career in surgery pose a challenge to the recruitment of more women into the field and numerous approaches to address the potential barriers to entry have been proposed. Mentorship has been highlighted as an important strategy for encouraging interest in surgery amongst medical students, and it has been shown to lead to more favorable perceptions of the career.[4-19] The use of speed mentoring, a method in which participants rotate round a series of mentors for brief time periods, has gained popularity over recent years and is thought to be a quick and effective way to facilitate the initiation of mentor-mentee relationships.[20,21] In the mentorship of women who may be considering a career in surgery, there is evidence to suggest that students may better identify with the experiences of same-gender mentors and may be able to seek specific guidance on issues which are potentially more relevant to women in surgery.[22]

Objectives

The primary objective of this study is to quantify the impact of a novel mentoring intervention, using a speed-mentoring design with same-gender mentor/mentee pairing, on participants' perceptions of a surgical career.

MATERIALS AND METHODS

Study Population

All attendees of the National Women in Surgery (WinS) Conference in 2019 and 2020 were invited to participate in the study. The National WinS Conference is a student-led event, in 2019 and 2020, the event was the largest undergraduate women in surgery conference in the United Kingdom. The delegation included undergraduate female medical students and foundation doctors (internship year 1 or 2). Foundation doctors are yet to select a specialty. The participants' attitudes and perceptions of surgery were assessed using a questionnaire before and after the speed mentoring intervention. Mentees were recruited using online communities and social media, including Facebook, Instagram and Twitter. Mentors were recruited using the Royal College of Surgeons Women in Surgery Directory.[23] Only mentors who had entered a surgical training programme were selected.

Speed-Mentoring Session

The speed-mentoring sessions took place at the National Women in Surgery Conference, University College London, 2019 (in-person event) and 2020 (virtual event). The 2020 mentoring sessions were hosted online via the Zoom Video Communications (Zoom Video Communications Inc., 2016) platform. There were two mentoring circuits with an equal number of mentors allocated to each of them. Mentees were assigned into groups of 1 or 2. Mentors remained in their assigned circuit positions while mentees rotated clockwise through their circuit. Each mentee group interacted with each mentor for eight minutes for a total of twelve sessions.

Mentor Demographics

Mentors were representative of the recognized surgical specialties across deaneries from both the United Kingdom and Northern Ireland, except Oral and Maxillofacial Surgery (Appendix A).

Survey Tool and Dissemination

A voluntary, online, self-reported 19-point feedback questionnaire was disseminated to conference delegates pre- and post-mentoring (Appendix B). The survey was developed following a literature search by an iterative process, by the primary investigators and piloted with medical students to refine the survey. The pre-mentoring survey was disseminated to mentees via email with two reminders before each conference. The post-mentoring

survey was disseminated via email with two reminders following the conference. Five-point Likert scales were used to quantify agreement with 16 statements. A response of one or two indicated a level of "disagreement" with the statement, three indicated a neutral response and four or five indicated a level of 'agreement'.

Ethics

This study is exempt from requiring IRB review according to the National Health Service Health Research Authority and the Medical Research Council. Participants gave informed consent that their feedback from this intervention could be used for research purposes including for analysis, presentation, and publication of data.

Statistical Analysis

Data analysis was conducted using Microsoft Excel (v16.49) with XLSTAT (v2021.1) extension. Descriptive statistics were used to present demographic data and percentage agreement with each domain. Wilcoxon-signed rank test was used to compare non-parametric paired data from pre- and post-intervention questionnaire responses. Responses from mentees who had attended both 2019 and 2020 mentoring sessions were removed from the 2020 data set. Only participants who completed the pre- and post-intervention surveys were included in the paired data analysis. A p-value of <0.05 was used to indicate a statistically significant difference between pre- and post-scores.

RESULTS

Participant Demographics

A total of 340 mentees and 96 mentors participated across both speed-mentoring events.

Of the 340 registered delegates at both conferences, 191 participants formed the final paired cohort from which data were analyzed for this study (Table 1). The pre-intervention response rate was 92.1% (n = 313), the post-intervention survey response rate was 78.5% (n = 267). Reasons for exclusion included incomplete survey data (n = 134) and second responses from participants who attended both the 2019 and 2020 speed mentoring sessions and had previously filled out the questionnaire in 2019 (n = 15). Of the 191 participants, 84 (44.0%) participants were 1- and 2-year medical students (pre-clinical) and 76 (39.8%) participants were third to fifth year medical students (Clinical); 7 (3.7%) were foundation year doctors and 6 (3.1%) were other doctors and students (Table 1). All participants included in the analysis identified as female. All participants expressed an interest in a career in surgery, this interest was maintained following the intervention.

TABLE 1. Participant Demographics

Stage of Training	n (%)
Pre-clinical medical student	84 (44.0%)
Clinical medical student	76 (39.8%)
Intercalated Bachelor of Science	18 (9.4%)
Foundation year doctor	7 (3.7%)
Other	6 (3.1%)
Total:	191

Gender Bias in Surgery

Statistically significant changes were observed across all statements relating to gender bias in surgery (Fig. 1). An increase in the number of participants who agreed that there are equal career opportunities available to men and women ($p < 0.0001$) was observed. A reduction in the number of participants who felt that an "old boys' club" attitude exists in surgery was observed, with a decline from 73.8% (n = 141) to 58.1% (n = 111) ($p < 0.0001$). A reduction in the number of participants who believed that it was more difficult for a woman to succeed in her surgical career than a man ($p = 0.00086$) was observed. A reduction was also seen in the number of participants who agreed that a woman must have a strong personality to succeed in a surgical career ($p = 0.003$) (Table 2).

Motherhood and Surgery

The number of women who felt that having a family would negatively impact a woman's surgical career progression decreased from 89 (46.6%) to 44 (23.0%) ($p < 0.0001$). Participants maintained the belief that rigid training structures are a barrier to mothers pursuing a career in surgery ($p = 0.138$) (Fig. 2).

Representation of Women in Surgery

Statistically significant changes were observed across most statements relating to the representation of women in surgery (Fig. 3). A significant reduction was observed in the number of participants who believed that women are not adequately represented by surgical organizations ($p = 0.003$). An increase was observed in the number of participants who believed that women are well-represented across the surgical specialties ($p < 0.0001$). An increase was also seen in the number of participants who believed that men and women are equally as surgically skilled ($p = 0.007$). Participants maintained the belief that that there are not enough women holding surgical leadership positions ($p = 0.015$) Table 2.

TABLE 2. Pre- and post-mentoring questionnaire results. Data are given as n (%)

	Pre- or post-mentoring	Disagree (1 & 2) (%)	Neutral (3) (%)	Agree (4 & 5) (%)	p-value
Representation of Women in Surgery					
Women are well-represented across all surgical specialities.	Pre	149 (78.0)	40 (20.9)	2 (1.0)	
	Post	107 (56.0)	52 (27.2)	32 (16.8)	<0.0001
Men and women are equally as surgically skilled	Pre	4(2.1)	15(7.9)	172(90.1)	
	Post	4(2.1)	7(3.7)	180(94.2)	0.007
There are enough women holding top surgical leadership positions	Pre	154(80.6)	31(16.2)	6(3.1)	
	Post	141(73.8)	35(18.3)	15(7.9)	0.015
Surgical organisations adequately represent women in surgery	Pre	87(45.5)	86(45.0)	18(9.4)	
	Post	72(37.7)	81(42.4)	38(19.9)	0.003
Gender Bias in Surgery					
It is more difficult for a woman to progress in her surgical career than it is for a man	Pre	8(4.2)	42(22.0)	141(73.8)	
	Post	17(8.9)	50(26.2)		0.00086
There are equal career opportunities available to women in surgery as there are to men	Pre	89(46.6)	72(37.7)	30(15.7)	
	Post	58(30.4)	72(37.7)	61(31.9)	<0.0001
For a female to succeed in a surgical career, she has to have a difficult personality	Pre	85(44.5)	45(23.6)	61(31.9)	
	Post	97(50.8)	39(20.4)	55(28.8)	0.003
An "old boys' club" attitude exists today across many surgical specialties	Pre	5(2.6)	45(23.6)	141(73.8)	
	Post	24(12.6)	56(29.3)	111(58.1)	<0.0001
There is a gender pay gap within the surgical profession	Pre	6(3.1)	86(45.0)	99(51.8)	
	Post	17(8.9)	92(48.2)	82(42.9)	0.003
Motherhood and Surgery					
Choosing to have a family will negatively impact a woman's surgical career progression	Pre	44(23.0)	58(30.4)	89(46.6)	
	Post	79(41.4)	68(35.6)	44(23.0)	<0.0001
A woman is more likely to succeed in her surgical career if she chooses not to have a family	Pre	36(18.8)	56(29.3)	99(51.8)	
	Post	72(37.7)	54(28.3)	65(34.0)	<0.0001
Rigid training structures are a barrier to mothers pursuing a surgical career	Pre	15(7.9)	39(20.4)	137(71.7)	
	Post	23(12.0)	35(18.3)	133(69.6)	0.138

(continued)

TABLE 2 (*continued*)

	Pre- or post-mentoring	Disagree (1 & 2) (%)	Neutral (3) (%)	Agree (4 & 5) (%)	p-value
Mentorship and Surgery					
Mentorship is important for career progression	Pre	0(0)	7(3.7)	184(96.3)	
	Post	0(0)	11(5.8)	180(94.2)	0.173
Lack of female mentorship is a barrier for women pursuing a surgical career	Pre	12(6.3)	47(24.6)	132(69.1)	
	Post	32(16.8)	56(29.3)	103(53.9)	<0.0001
Same gender mentors are more likely to positively influence an individual in pursuing a surgical career	Pre	12(6.3)	49(25.7)	130(68.1)	
	Post	20(10.5)	46(24.1)	125(65.4)	0.194

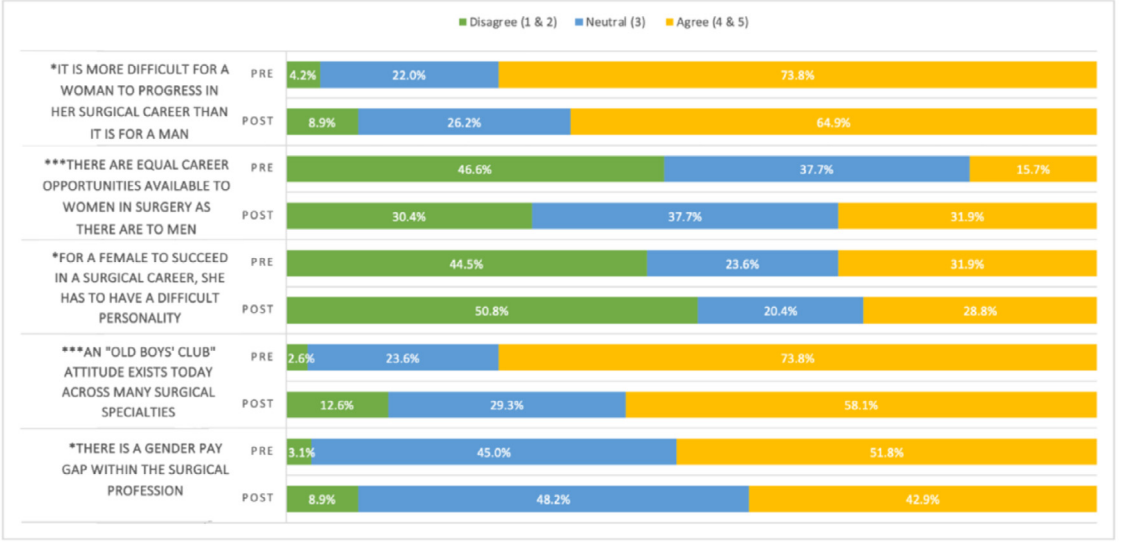

FIGURE 1. Survey response to statements regarding gender bias in surgery. *$p < 0.05$, ***$p < 0.0001$.

Mentorship and Surgery

Prior to the speed-mentoring session, 183 (96%) participants agreed that mentorship is important for career progression and 153 (71.2%) participants stated that they did not have someone who they considered a mentor. Of the participants with previous mentoring experiences, 28 (93.3%) stated that mentoring positively influenced 546 their views on surgery as a career. Prior to the speed mentoring session, 132 (69%) felt that same gender mentors are more likely to positively influence an individual in pursuing a surgical career. No significant change was observed in students who agreed that same gender mentors are more likely to influence an individual in pursuing a surgical career.

DISCUSSION

Main Findings

We present the first quantitative analysis on the impact of same-gender speed mentoring on perceptions of a career in surgery. Our study found that a one-day speed mentoring session with a set of same gender mentors

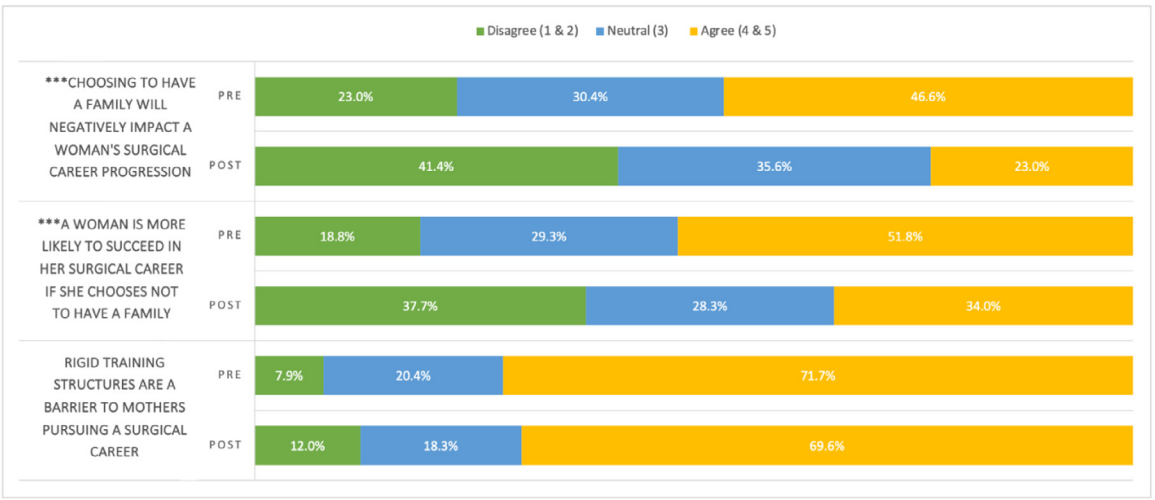

FIGURE 2. Survey response to statements regarding motherhood and surgery. *p < 0.05, ***p < 0.0001.

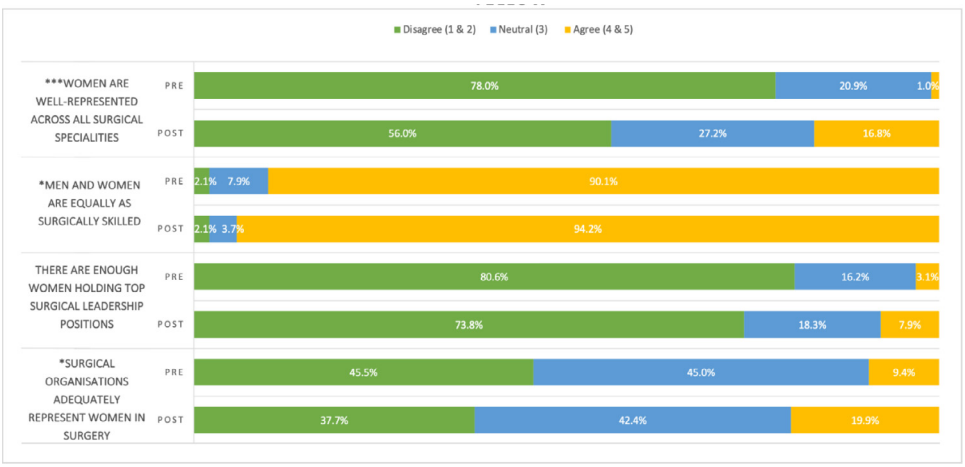

FIGURE 3. Survey response to statements regarding representation of women in surgery. *p < 0.05, ***p < 0.0001.

was successful in decreasing negative perceptions of a career in surgery in a cohort of female medical students and junior doctors. The most notable changes were seen in perceptions of the impact of parenthood on a surgical career and in beliefs about surgery maintaining elements of an "old boys club" culture.

Interpretation of Results

Our findings echo existing literature that supports the importance of role modelling and mentorship in the support and development of surgical careers. The provision of female mentors for female mentees may be a key component in the success of such programmes; a 2018 study[24] highlighted that fewer women have access to organized mentoring schemes than their male colleagues and only 43% of women had a mentor of the same gender, compared to 91% of men. This is striking as there is evidence to suggest that women are more likely to regard having same-gender mentors as an important factor to their career development[4-6] and to express a desire in having role models.[3] Same gender-mentors not only help to reinforce confidence in the ability to succeed in a career in surgery,[25] but may also encourage more women to aim for academic and leadership positions.[6]

Effective mentoring usually requires a significant time investment by the mentor. Given the lower proportion of female surgeons, this demands much of the responsibility to become mentors on a small minority;[1] this is a duty which male colleagues do not have to consider to

the same extent. The one-day speed-mentoring intervention alleviates these barriers by providing mentees with access to a range of women who can address their questions and concerns, whilst demanding minimal time commitment from the surgeons, especially when compared to traditional mentoring programmes. The format of the session also meant that no formal mentor training was required.

Concerns regarding gender imbalance in surgery and the possible concomitant effects of this on the experiences of women in the surgical workplace are consistently highlighted as possible deterrents from a surgical career. In one report, 96% of women were of the opinion that surgery was an unfavorable career for their gender.[26] These results are substantiated by findings which highlight that female medical students were more than twice as likely to identify gender inequality as a disincentive for pursuing a surgical career.[3] Women may also be more likely to feel out of place during surgical rotations,[26] and this could adversely influence their decision to become surgeons. Often, the perception of surgery as an "old boys club" echoes concerns about discrimination, the use of demeaning language by colleagues, the propagation of gender stereotypes and beliefs about having to possess a certain personality type to fit into male dominated fields.[11-27] This study demonstrated that speed-mentoring could effectively address these perceptions through discussions with same-gender mentors.

Similarly, negative perceptions of the interplay between parenthood and a surgical career are important to consider in the understanding of factors which may discourage some women from choosing a career in surgery. Flexibility of surgical training pathways, duration of maternity leave and apprehension regarding the experience of being pregnant during training may be possible considerations.[28-30] In a group of female medical students, a study reported that 72% of participants viewed the choice to have a family as a barrier to a surgical career.[31] This is in line with previous work which suggests that women are more likely to take lifestyle considerations into account when choosing a career in surgery.[3] Our participants shared these concerns prior to the speed-mentoring, but significant changes were observed following the intervention; illustrating how normalizing the choice to become pregnant during surgical training, sustaining mentorship of surgical trainees and providing improved support for surgeons who are parents will likely help in addressing these concerns. Participants maintained beliefs regarding rigid training structures being a barrier to women and that surgical organizations inadequately represent women in surgery. Mentorship alone will not change these perceptions as some are well founded and based on the realities of pursing surgery as a woman, this is a potential area of focus for surgical organizations.

Although there is no doubt that there are several potential challenges that may be faced by women in surgery, it is possible that students may perceive these factors as having a greater effect on career satisfaction than is the case in actuality. It is important to note that women in surgical specialties are thought to have a similar level of career satisfaction to women in non-surgical fields[32] and to their male colleagues.[33] Seeing women who enjoy their surgical careers, are successful and able to pursue a variety of life goals and interests, despite the existence of challenges, has clearly impacted perceptions of surgical careers in this cohort. This is demonstrated by the change in perception of surgery as an "old boys club" and the belief that a family life is a barrier to a surgical career for women.

Limitations

We recognize the potential limitations of the generalizability of this work. Our speed mentoring sessions were conducted as part of a larger "Women in Surgery" conference in the United Kingdom. Although the survey focused on the impact of the speed mentoring sessions, it cannot be determined whether other aspects of the conference contributed to the observed effects of mentoring. In addition, our cohort were, by definition, attending the event due to their preexisting interest in surgery. It is therefore unclear how the mentoring sessions will impact undecided or already deterred individuals from pursuing a career in surgery. We also recognize the potential for attrition bias, with those who did not have a positive mentoring experience being less likely to complete the second survey. Moreover, there is a lack of longitudinal evidence to demonstrate whether mentoring increased uptake into surgery. A further, more detailed, qualitative study is required to better understand how the perceptions of medical students are formed and how they change or develop over time, which could be used to aid the creation of better interventions and the evolution of current approaches including mentoring.

CONCLUSION

This study demonstrated that speed-mentoring by same-gender mentors is an effective intervention for addressing negative perceptions of a surgical career for aspiring female surgeons. This can provide an efficient additional approach for surgical organizations in supporting and developing diversity in surgical practice through mentorship.

APPENDIX A

Mentor Specialties

	n (%)
Breast	8 (8%)
Cardiothoracic	5 (5%)
Ears, Nose and Throat	8(8%)
General	22 (23%)
Neurosurgery	8 (8%)
Plastics	14 (15%)
Paediatrics	4 (4%)
Orthopaedics	16 (17%)
Transplant	2(2%)
Urology	4 (4%)
Vascular	5 (5%)
Total	96

APPENDIX B

The Study Questionnaire

1. Gender:

Female

Male

Prefer not to say

2. Level of training:

Pre-Clinical Medical Student

Clinical Medical Student

Junior Doctor (FY1, 2 or 3)

Core Surgical Trainee (CST)

Registrar

Consultant

Other

3. I am interested in a career in surgery

Yes

No

4. Please rate the follow statements, in your own opinion

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
Women are well-represented across all surgical fields					
There are enough women holding top surgical leadership positions					
It is more difficult for a woman to progress in her surgical career than it is for a man					
There are equal career opportunities available to women in surgery as there are to men					
For a female to succeed in a surgical career, she has to have a strong personality					
Choosing to have a family will negatively impact a woman's surgical career progression					
A woman is more likely to succeed in her surgical career if she chooses not to have a family					
Rigid training structures are a barrier to mothers pursuing a surgical career					
Lack of female mentorship is a barrier for women pursuing a surgical career					
An "old boys' club" attitude exists today across many surgical specialties					
There is a gender pay gap within the surgical profession					
Surgical organisations adequately represent women in surgery					
Mentorship is important for career progression					
Same gender mentors are more likely to positively influence an individual in pursuing a surgical career					

5a. Do you have a mentor?

Yes

No

5b. If yes, has mentorship positively influenced your views on surgery and consideration as a career?

Yes

No

REFERENCES

1. Statistics: women in surgery. royal college of surgeons of england.
2. Kawamoto R, Ninomiya D, Kasai Y, et al. Gender difference in preference of specialty as a career choice among Japanese medical students. *BMC Med Educ*. 2016;16:288. https://doi.org/10.1186/s12909-016-0811-1.
3. Ng CWQ, Syn NL, Hussein RBM, Ng M, Kow AWC. Factors attracting or deterring female medical students in Asia from pursuing a surgical career, and the impact of surgical clerkship, mentorship, and role models: a multicultural Asian perspective from a national prospective cohort study. *J Surg Res*. 2021;260:200–209. https://doi.org/10.1016/j.jss.2020.11.053.
4. Schmidt LE, Cooper CA, Guo WA. Factors influencing US medical students' decision to pursue surgery. *J Surg Res*. 2016;203:64–74. https://doi.org/10.1016/j.jss.2016.03.054.
5. 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. *Can J Surg*. 2008;51:371–377.
6. Faucett EA, McCrary HC, Milinic T, Hassanzadeh T, Roward SG, Neumayer LA. The role of same-sex mentorship and organizational support in encouraging women to pursue surgery. *Am J Surg*. 2017;214:640–644. https://doi.org/10.1016/j.amjsurg.2017.07.005.
7. Liang R, Dornan T, Nestel D. Why do women leave surgical training? a qualitative and feminist study.

Lancet. 2019;393:541–549. https://doi.org/10.1016/S0140-6736(18)32612-6.

8. Khoushhal Z, Hussain MA, Greco E, et al. Prevalence and causes of attrition among surgical residents. *JAMA Surg*. 2017;152:265. https://doi.org/10.1001/jamasurg.2016.4086.

9. Baldwin K, Namdari S, Bowers A, Keenan MA, Levin LS, Ahn J. Factors affecting interest in orthopedics among female medical students: a prospective analysis. *Orthopedics*. 2011. https://doi.org/10.3928/01477447-20111021-17. December.

10. Singh C, Loseth C, Shoqirat N. Women in surgery: a systematic review of 25 years. *BMJ Lead*. 2020. https://doi.org/10.1136/leader-2019-000199. leader-2019-000199.

11. Bellini MI, Graham Y, Hayes C, Zakeri R, Parks R, Papalois V. A woman's place is in theatre: women's perceptions and experiences of working in surgery from the association of surgeons of great Britain and Ireland women in surgery working group. *BMJ Open*. 2019;9:e024349. https://doi.org/10.1136/bmjopen-2018-024349.

12. Lim WH, Wong C, Jain SR, et al. The unspoken reality of gender bias in surgery: a qualitative systematic review. *PLoS One*. 2021;16:e0246420. https://doi.org/10.1371/journal.pone.0246420.

13. Rangel EL, Castillo-Angeles M, Changala M, Haider AH, Doherty GM, Smink DS. Perspectives of pregnancy and motherhood among general surgery residents: a qualitative analysis. *Am J Surg*. 2018;216:754–759. https://doi.org/10.1016/j.amjsurg.2018.07.036.

14. Seemann NM, Webster F, Holden HA, et al. Women in academic surgery: why is the playing field still not level? *Am J Surg*. 2016;211:343–349. https://doi.org/10.1016/j.amjsurg.2015.08.036.

15. Novielli K, Hojat M, Park PK, Gonnella JS, Veloski J. Change of interest in surgery during medical school: a comparison of men and women. *Acad Med*. 2001;76:58–61.

16. Elmore LC, Jeffe DB, Jin L, Awad MM, Turnbull IR. National survey of burnout among US general surgery residents. *J Am Coll Surg*. 2016;223:440–451. https://doi.org/10.1016/j.jamcollsurg.2016.05.014.

17. Stephens EH, Heisler CA, Temkin SM, Miller P. The current status of women in surgery. *JAMA Surg*. 2020;155:876. https://doi.org/10.1001/jamasurg.2020.0312.

18. Sprow HN, Hansen NF, Loeb HE, et al. Gender-based microaggressions in surgery: a scoping review of the global literature. *World J Surg*. 2021. https://doi.org/10.1007/s00268-021-05974-z.

19. Barker JC, Rendon J, Janis JE. Medical student mentorship in plastic surgery. *Plast Reconstr Surg*. 2016;137:1934–1942. https://doi.org/10.1097/PRS.0000000000002186.

20. Britt RC, Hildreth AN, Acker SN, Mouawad NJ, Mammen J, Moalem J. Speed mentoring: an innovative method to meet the needs of the young surgeon. *J Surg Educ*. 2017;74:1007–1011. https://doi.org/10.1016/j.jsurg.2017.05.004.

21. Eubanks AA, MacKinnon RM, Shay KH, Criscione LT, Saunders RD. Speed mentoring: an effective & efficient path to development of mentor relationships in a military obstetrics & gynecology residency. *Mil Med*. 2021;186:219–224. https://doi.org/10.1093/milmed/usaa444.

22. Zhuge Y, Kaufman J, Simeone DM, Chen H, Velazquez OC. Is there still a glass ceiling for women in academic surgery? *Ann Surg*. 2011;253:637–643. https://doi.org/10.1097/SLA.0b013e3182111120.

23. Our Network & Directory — Royal College of Surgeons. https://www.rcseng.ac.uk/careers-in-surgery/women-in-surgery/join-wins-network/. Accessed May 6, 2021.

24. Luc JGY, Stamp NL, Antonoff MB. Social media in the mentorship and networking of physicians: important role for women in surgical specialties. *Am J Surg*. 2018;215:752–760. https://doi.org/10.1016/j.amjsurg.2018.02.011.

25. Bettis J, Thrush CR, Slotcavage RL, Stephenson K, Petersen E, Kimbrough MK. What makes them different? an exploration of mentoring for female faculty, residents, and medical students pursuing a career in surgery. *Am J Surg*. 2019;218:767–771. https://doi.org/10.1016/j.amjsurg.2019.07.029.

26. Lillemoe KD, Ahrendt GM, Yeo CJ, Herlong HF, Cameron JL. Surgery—still an "old boys'' club"?". *Surgery*. 1994;116:255–259. discussion 259-61.

27. Gargiulo DA, Hyman NH, Hebert JC. Women in surgery: do we really understand the deterrents? *Arch Surg*. 2006;141:405–407. https://doi.org/10.1001/archsurg.141.4.405. discussion 407-8.

28. Carty SE, Colson YL, Garvey LS, et al. Maternity policy and practice during surgery residency: how we do it. *Surgery*. 2002;132:682–688. https://doi.org/10.1067/msy.2002.127685.

29. Merchant SJ, Hameed SM, Melck AL. Pregnancy among residents enrolled in general surgery: a nationwide survey of attitudes and experiences. *Am J Surg*. 2013;206:605–610. https://doi.org/10.1016/j.amjsurg.2012.04.005.

30. Garza RM, Weston JS, Furnas HJ. Pregnancy and the plastic surgery resident. *Plast Reconstr Surg*. 2017;139:245–252. https://doi.org/10.1097/PRS.0000000000002861.

31. Harris LM, Chaikof EL, Eidt JF. Altering the career choice: can we attract more women to vascular surgery? *J Vasc Surg*. 2007;45:846–848. https://doi.org/10.1016/j.jvs.2006.12.072.

32. Frank E, Brownstein M, Ephgrave K, Neumayer L. Characteristics of women surgeons in the United States. *Am J Surg*. 1998;176:244–250. https://doi.org/10.1016/S0002-9610(98)00152-4.

33. Ahmadiyeh N, Cho NL, Kellogg KC, et al. Career satisfaction of women in surgery: perceptions, factors, and strategies. *J Am Coll Surg*. 2010;210:23–28. https://doi.org/10.1016/j.jamcollsurg.2009.08.011.