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Motivators and deterrents for early career female doctors applying to surgical training programmes in the UK National Health Service: a mixed-methods study

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ABSTRACT

Objectives To perform a mixed-methods study identifying motivators and deterrents to female doctors interested in core surgical training (CST). To provide tangible implementations based on the findings.

Design This study used quantitative (questionnaires) and qualitative (semistructured interviews (SSIs)) analyses. Participants completed online questionnaires on Qualtrics and SSIs were conducted remotely on Microsoft Teams. Questions were derived from previous studies and a novel term, the gender impact rating (GIR), was coined to assess the impact of gender on opportunities available during CST application.

Setting Participants were working in the UK National Health Service and data collected from December 2020 to January 2021.

Participants A total of 100 female surgical trainees in the UK ranging from Foundation Year 2 to Core Training Year 2.

Main outcome measures Participants ranked factors by their influence on their CST application. Of the 100 trainees, 21 were randomly selected for an SSI to explore their questionnaire responses. Statistical analyses were performed using MATLAB and SPSS, alongside a thematic analysis of the interviews.

Results A total of 44 out of 100 questionnaire respondents ranked early exposure to surgery as the most influential motivator, while 43% selected work-life balance as the greatest deterrent and 33% suggested mentoring schemes to encourage women to apply to CST. The median GIR was 3 out of 5, indicating a moderate perceived impact of gender on opportunities available during CST application. Qualitative analysis found four overarching themes: institutional factors (including mentorship schemes), organisational culture (including active engagement), social factors and personal factors.

Conclusion Thematic analysis suggested that seniors involving women in theatre and a supportive work environment would encourage entry of more female surgeons. Therefore, the proposed implementations are the active engagement of women in theatre and destigmatising less than full-time training. Further research into ethnicity and personality on motivations to enter surgery is advised.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ First mixed-methods study covering motivators and deterrents in the National Health Service.
- ⇒ Most recent study looking at entry-level surgical trainees.
- ⇒ First study to implement ranking system for factors.
- ⇒ Extensive reach across the UK.
- ⇒ Saturation was reached for thematic analysis.
- ⇒ Limited generalisability of statistical analysis due to sample size.
- ⇒ Fifteen-minute interviews may not be enough time to explore entire narrative.
- ⇒ Participants agreeing to be interviewed may have stronger opinions than those who don't, thus skewing results.

BACKGROUND

Currently in the UK, just over half of all medicine graduates identify as female.[1] However, this is not reflected in senior roles (eg, consultant or professor), and neither is the disparity explained by the time lag between the increase in female graduates and their progression through surgical training.[2]

Previous studies have examined factors that affect the career choices of women considering surgical training.[2 3] Hirayama and Fernando[2] conducted a systematic literature review using studies from the UK, USA and Canada and identified seven studies which cited the common organisational barriers as 'career structure, male dominance, and lack of equal opportunities' in hindering career progression. They also identified role models and early exposure to surgery as important decision-making factors. Previous surveys of members of the Royal College of Surgeons (RCS) have found that surgery is perceived by a significant proportion of female trainees

as an 'old boys' club leading to some respondents feeling out of place.[3]

While previous research has focused on female medical students and surgeons completing their training, there are no studies examining the perceptions and attitudes of female trainees who are at a level of training immediately prior to the surgical application process. This a key cohort as it is the juncture at which the decision to pursue a career in surgery is pivotal, and studies that analyse the perceptions of females who are already in core surgical training (CST) using retrospective recall are subject to recall bias.[4]

Aims

To understand the motivators and deterrents for women entering surgical specialties, and provide tangible interventions to overcome these, using a combination of quantitative and qualitative analyses.

METHODS

Setting, study design and participants

This study was motivated by the application of feminist theory to medicine,[5] which promotes that men and women are equal and so gender issues from a feminist perspective need to be addressed to encourage more women into surgery. The approach to qualitative research was guided by the grounded theory which was used to identify influential factors of applying to surgery and produce tangible implementations.[6] From previous studies and these theories, it was sought to perform a convergent parallel mixed-methods study in the UK, encompassing a national approach.

Data was collected during December 2020 to January 2021. Social media adverts promoted the online questionnaire and snowball sampling enabled a wide reach across the UK. Participants were encouraged to share the social media adverts with their friends and colleagues but participants were not known to the investigators. Participants were all NHS doctors with no patient or public involvement.

Questionnaire

Our questionnaire was based on a combination of previous studies, which were further refined following a pilot interview.[2] Questions were tailored to suit females who are applying or just completed application to CST. A self-administered online programme was developed using Qualtrics.[7] The introduction page had information about the rationale of the study and how the answers would be used. Participants would need to click 'consent' before being allowed to continue. The participants were asked to rank the influence of popular identified motivators and deterrents. A Likert scale assessed the impact of gender on opportunities available during surgical training application. This novel concept was termed the gender impact rating (GIR) on a scale of 0–5, where 0=no impact and 5=major impact. A copy of the questionnaire can be found in online supplemental appendix A.

Semistructured interviews

The methodology of this study was concurrent with the Consolidated Criteria for Reporting Qualitative Research checklist.[8] The Trustworthiness, Auditability, Credibility and Transferability (TACT) framework was used to ensure a rigorous approach.[9]

The interviews were recorded, limited to 15 min per participant and were held via Microsoft Teams[10] due to the COVID-19 pandemic restrictions. These questions (online supplemental appendix A) allowed participants to elaborate on and contextualise their answers from the questionnaire. Pilot interviews were carried out to test the quality of data extracted.

All interviews were audio recorded, transcribed and anonymised. The resulting transcripts were then analysed using the Braun and Clarke method of qualitative analysis. No interviews were repeated and interviews were not given back to participants for feedback. Important features from the data set of transcripts were identified and coded. Themes were then inductively and semantically determined from the collated codes. These themes were validated against the data set and the themes that reflected the data were retained, which were further analysed and more fully described. This thematic and analytical narrative was then interwoven with the quantitative data derived from the questionnaire. Twenty interviews were sufficient as data saturation was reached and we gained no new information after 15 interviews.

Inclusion and exclusion criteria

The inclusion criteria were as follows: female, doctor employed by the National Health Service (NHS), Foundation Year 2 (FY2) doctor or Core Trainee Year 1 (CT1) and CT2. Non-surgical trainees and trainees identifying as male or non-female were excluded.

Data analysis

Questionnaire data were collated from the online hosting solution and imported into IBM SPSS V.27.[11] As the data consisted primarily of Likert scales and rankings, non-parametric tests were used in the analysis, which included independent sample median tests. As individuals could select multiple surgical specialties, it was not possible to assess the impact of the subspecialty itself on the dependent factors. Some individuals chose more than one surgical specialty, and therefore existed within multiple groups simultaneously, making a χ^2 test invalid.

Reflexive statement

The researchers acknowledge their biases and influence on the outcomes of this study. The research team consisted of four female and two male medical students, and a male consultant surgeon as the supervisor. The diverse backgrounds and experiences have led to personal aims and impetuses that influence the research process. To minimise this bias, multiple interviewers carried out the

interviews so that the perception of the qualitative data was done with many different perspectives to increase the validity.

RESULTS

Quantitative analysis: overall

A total of 100 participants were questioned of which 35% were FY2, 36% were CT1 and 29% were CT2. The respondents spanned all 24 of the geographically distributed UK deaneries. The median age was 27 (range: 23–40); 55% identified as black, Asian and minority ethnic (BAME), 46% White/British/Other; 19% were married and 4% had dependents. The typical respondent was between 26 and 29 years of age, identified as White/British/Other, was unmarried with no dependent and completing CT1 at a deanery outside of London online supplemental appendix B.

Gender impact rating

Differences in median GIR were noted across training stages and ethnic groups. CT2s had a median GIR of 2, whereas CT1 and FY2s had a higher GIR of 3 (figure 1A). GIR of White/British/Other respondents was skewed towards lower values with the median rating of 2 which was lower than both the BAME and global median of 3 (figure 1B). Both results were not statistically significant (α=0.05) online supplemental appendix C, see online supplemental appendix B tables 1.2 and 2.2.

Motivators, deterrents and interventions

Of the factors that participants regarded as influential to their application to CST programmes, 'early exposure to surgical specialties' and 'professional support' were the highest median ranked motivators (Mdn=4, figure 2A). 'Work-Life Balance' was the deterrent with the highest median ranking (Mdn=3, figure 2B) and 'mentoring schemes' (Mdn=3, figure 2C) had the highest median ranking as the most valuable intervention to CST application suggested by our applicants.

The highest ranked motivator in 'Married/Civil Partnership' participants was 'Professional Support in Specialties', whereas 'Early Exposure to Surgical Specialties' was the highest ranked motivator in 'Unmarried/Divorced/Widowed' participants online supplemental appendix C.

Qualitative analysis

Meta-themes that arose were of deterrents, motivators and implementations. Each of these sections could be further categorised into the following four themes:

1. Institutional factors which included aspects of the RCS.
2. Organisational culture, including the hospital environment.
3. Social factors which included friends/family.
4. Personal factors which were individualistic.

The main deterrents table 1 mentioned in the interviews were career progression, discouragement and discrimination by other staff, difficulties with family planning and finance.

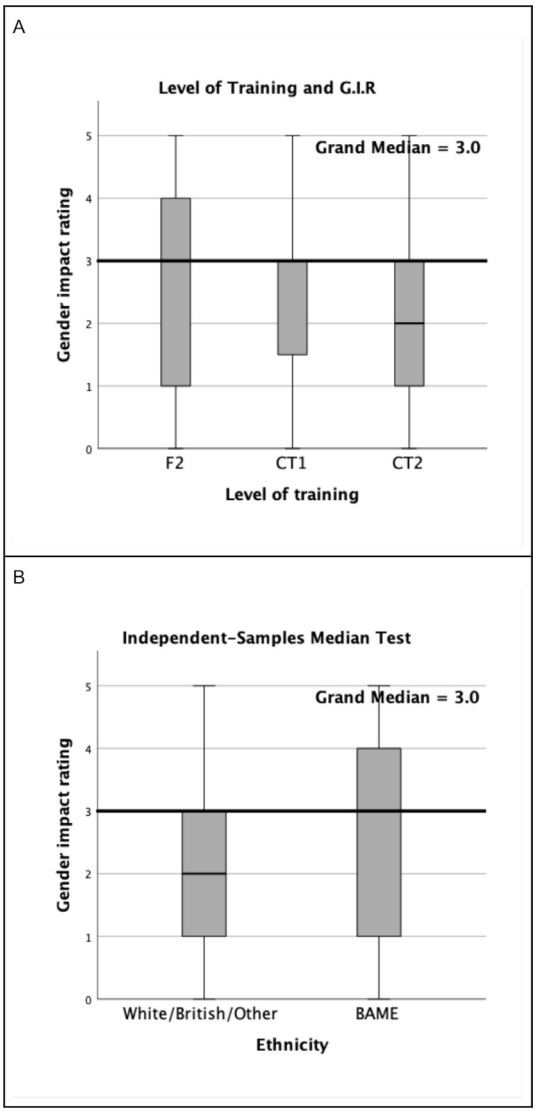

Figure 1 Boxplot showing the range of participant gender impact rating (GIR) at Foundation Year 2 (FY2), Core Trainee Year 1 (CT1) and Core Trainee Year 2 (CT2) of training (A), and GIR in White/British/Other and black, Asian and minority ethnic (BAME) (B).

Positive motivational factors included exposure to surgery throughout medical school, conferences, mentors, positive changes to attitudes towards female surgeons and the varied technical aspect of surgery.

The implementations participants viewed as most valuable were increasing exposure to surgical specialties. Furthermore, improving the work environment by raising awareness of existing stigmas, social and professional support from mentors and allocating time for self-improvement. Run-through programmes were highly praised and encouraged to be more prevalent. These programmes allowed trainees to stay under the same deanery after a single competitive selection process.[12] Currently, there are only three specialties not offering

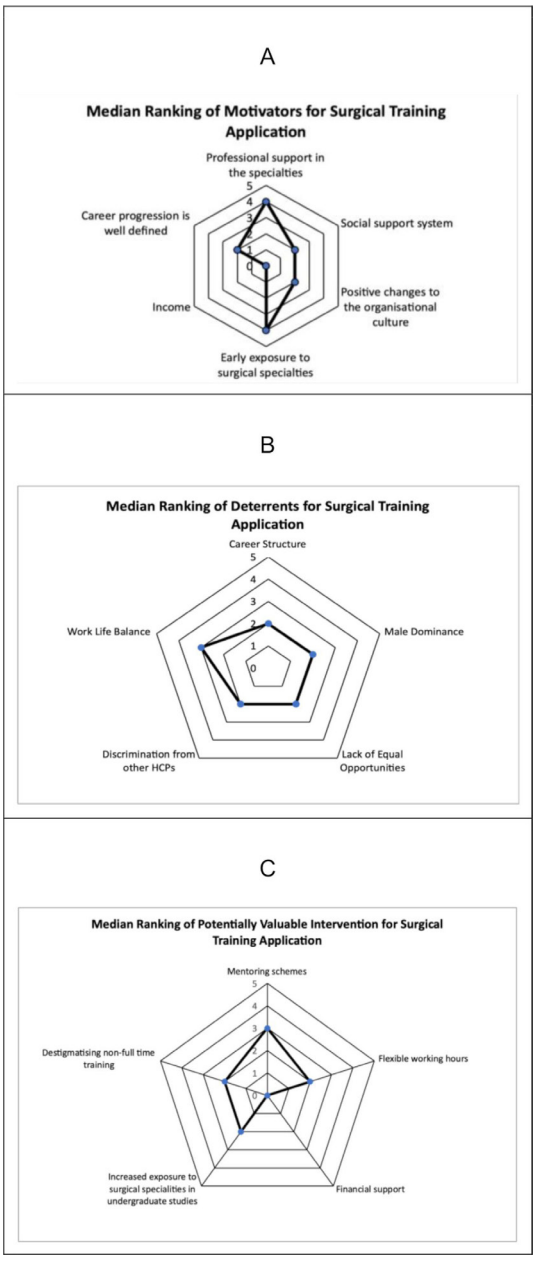

Figure 2 Radar graphs showing the median ranking of motivators (A), deterrents (B) and suggested implementations (C) for core surgical training programme applications. Points further away from the centre (0) indicate a greater influence of the factor, while those closer to the centre indicate a lower influence. HCPs, healthcare professionals.

a run-through programme: paediatrics, plastics and academic.[12]

DISCUSSION

Our mixed-methods study used a questionnaire and semi-structured interviews to determine deterrents and motivators considered by female trainees early in their career when applying for a surgical training programme. This study confirmed that the most influential motivator was 'early exposure to surgical specialties' (table 2), while the greatest deterrent was 'work-life balance'. Income was ranked as the least influential motivator. The establishment of mentoring schemes was suggested as the most valuable implementation to the surgical training application process (table 3). Furthermore, median GIR of the cohort was 3 (some impact) out of 5 (major impact), confirming that there continue to be significant barriers that discourage females from applying for a career in surgery.

Motivators, deterrents and interventions

The findings of this study concur with those of Singh *et al*[13] which showed early exposure to surgical specialties and professional support were the most influential motivators. However, Walker *et al*[14] contradict these results having found, in a cohort of male and female surgeons, that role models and well-structured career progression were more important driving factors than early exposure. Walker *et al*[14] further contradict our study finding that 90% of their participants believed there was sufficient time for training during working hours. The women interviewed in our study believed that more time is needed to be allocated for self-development and training activities. Further analysis of our qualitative data suggests that this difference may be due the perceived greater involvement of male doctors in surgery by consultants leading to less training opportunities being available to females.

The results showed that work-life balance was ranked the most influential deterrent which corroborates with a questionnaire conducted by the RCS.[3] Qualitative analyses suggest that this is due to the lack of flexible working hours as well as stigma around less than full-time training (LTFT).

The most valuable intervention found in the quantitative analysis was the establishment and availability of mentoring schemes. In 2017, Faucett *et al*[15] emphasised that same-sex role models were essential to promote the entry of women into surgical specialties, as well as motivating them to take higher academic roles in the field. This study also highlighted a statistically significant difference in exposure to role models between the genders, which further emphasises the importance of providing these, particularly from an undergraduate level.[15]

Income as a motivator was ranked lowest in most specialties, which is supported by existing literature.[14 16] Financial support was also often a low-priority implementation in our cohort. However, participants who ranked it higher often mentioned that training courses and entry examinations were 'very expensive'. Financial support could potentially be a more important factor for women than expected due to the gender pay gap as mentioned in interviews. Stephens *et al*[17] suggested that women in surgical subspecialties have the largest difference in mean income compared with their male counterparts than other specialties, which alongside the increased cost of surgical career pathways makes entrance and progression through CST more difficult.

Table 1 Summary of the deterrents for women against applying for core surgical training

Deterrents		
Institutional factors		**Quotes**
Career pathway	Taking years out of training.	'Experience out of surgical training seen as negative in surgery, like if you've had to take more than a year's experience outside the foundation programme. Whereas, for example, in anaesthetics, that's favoured so you get points for that.'
	Pay gap.	'Surgical specialties have the biggest pay gap.'
	Expenses.	'Expenses caused an issue as it is "certainly very expensive doing surgical training and paying for the courses".'
Work-life balance	Flexible working hours.	'Financial support and flexible working hours is not a thing.' 'I think it's the way our training works, and you know it's not all that flexible and I find out a bit frustrating.'
	Balancing responsibilities with dependents.	'Enough time, effort and family support to look after [children] or arrange childcare.'
Application process	Too many requirements.	'I didn't have a full quality improvement project but had 5 published papers. But when I applied, that actually disadvantaged me, because I haven't jumped through some of the heaps that I needed to.'
	Lack of support from the deanery.	'Deanery didn't do anything to support my application process.'
Organisational culture		**Quotes**
Discouragement	Discouragement from non-surgical specialties.	'A lot of the discouragement comes from people who don't do surgery.'
	Discouragement from family.	'My whole family basically said don't do medicine and then they said don't do surgery.'
	Stigma surrounding family life and women.	'You're doing surgery that's the end of you having any children.'
Discrimination	Male validation.	'They validate them more than you even though they're more junior than you.'
	Proving yourself.	'You've got to spend a lot more time proving yourself and the bar will be set different.'
	Sexism.	'Male colleagues making sort of sexist remarks.'
	Prejudice.	'I do think slightly that women when they are at early stages of their surgical career, people still don't fully assume you that you want to become a surgeon.'
Surgical type	Stereotypes of female surgeons.	'Someone who's very… I would say… maybe male, maybe white middle class, maybe you know when you think about a surgeon… someone quite cold.'
	Stereotype of surgeons.	'Everyone thinks surgeons are going to be quite mean.'
Work environment	Lack of equal opportunities.	'People who are the loudest and the mouthiest will only get the opportunity and no one else.' 'Subtle undertone sometimes of men being given opportunities.'
	Male dominance.	'There will not only be more of them, but they will also have those positions of essentially running the other parts of the Department and having a greater say.'
	Resentment over less than full-time workers.	'As soon as someone on the rota goes part-time, it makes life harder for everyone else… [so] I think instead of resenting the system… you end up resenting the person who's part time.'
	Sexual harassment by consultants.	'And the consultant who had scrubbed in turned round to me and said "well, only if you give me a kiss" and stuck his cheek out. So I think that's probably the worst example I've had. Stuff like that is really common that women have experienced particularly in surgery.'
Social factors		**Quotes**

Continued

Table 1 Continued

Deterrents		
Dependents	Having children means that training takes longer.	'I do know people who do have children and they've done less than full time training, but it does take a really long time.'
	Wanting to have children is a deterrent.	'If I did have children, I'd- I wouldn't go down the surgical route.'
	Geographical limitations due to dependents.	'If I had dependents that were committed to a specific geographical location, for whatever reason, because that's where our support network is and so on that is then another.'
Family life	Impact of training on future relationships.	'This path would have some kind of impact on… future personal relationships, marriage relationships, and relationships that weren't even formed.'
	Wanting a family life is a deterrent.	'I'm not married and I'm single, but it's something that is constantly there at the back of my mind.'
	Compromise is necessary.	'Quite a lot of sacrifices to keep their family together.'
Personal factors		**Quotes**
Exposure	Negative experiences in foundation training can be a deterrent.	'What you were exposed to as an F1 and F2 probably does really influence your decision-making process or bias.'
	Lack of early exposure to surgery.	'Surgery gets shoved under in the curriculum and you don't get much exposure to it as a student.'
Finance	Financial burden of extra courses needed for applications.	'To pay for all of the exams and courses that you're expected to go on…if you want to have a kind of competitive CV for getting into higher specialty training.'
	Financial problems.	'I think if I had all of those at the back of my mind, then I may consider taking a year or something.'
Resilience	Necessity to handle negative comments.	'Develop a thick skin after a while.'
	Wanting to pursue extra hobbies but afraid of stigma.	'Don't want to be seen as being lazy or not interested… [but I] want to do a lot of singing and basically piano…and all of those things have largely slipped away.'
	Personality affects the number of perceived barriers.	'Probably difference between like perceived barriers there and actual barriers.'

Gender impact rating

The median GIR of participants varied by specialty, similar to Dixon *et al* who identified variation in the disadvantages faced by women in the entry to different specialties.[18] In our study, neurosurgery had the highest GIR, drawing parallels to a previous study that found >70% of female medical students expected inequality in a male-dominated profession like neurosurgery (online supplemental appendix D).[18 19] However, female neurosurgeons in our study ranked male dominance the second least influential deterring factor to application. Qualitative analysis suggests women are already aware of the male dominance, hence it does not deter them from entering the specialty.

Our quantitative data highlighted differences in the application experience of CT2s compared with CT1s and FY2s, having completed their application only 2 years earlier. The median GIR for CT2s (Mdn_{CT2}=2) was lower than that for both FY2s (Mdn_{FY2}=3) and CT1s (Mdn_{CT1}=3). This reduction in GIR among CT2s may be due to their place in the team hierarchies. The qualitative analysis showed that treatment was dependent on one's position in the workplace hierarchy as well as seniors noticing a reduction in the need to 'prove themselves'. A possible explanation for why they believe their gender has less of an impact is the recall bias CT2s experience when recollecting the application process given their current seniority, a phenomenon that is well explored in literature.[4 20]

The median GIR for BAME individuals (Mdn_{BAME}=3) was higher than that of individuals who identified as White/British/Other ($Mdn_{White/British/Other}$=2). Notably, the GIR of the White identifying group was negatively skewed towards lower values. The difference in GIR between these groups could be explained by the intersection of one's gender and ethnicity. BAME participants in the interviews described cultural norms and expectations they had to overcome to pursue surgery. Cultural norms and attitudes to females in surgical specialties vary between ethnocultural groups and geographical regions.[21] A scoping review on the topic identified that countries with extended family support systems allowed female surgeons to have

Table 2 Summary of the motivators for women against applying for core surgical training

Motivators		
Institutional factors		**Quotes**
Informative events	Going to conferences and courses for advice and application process.	'I just got lots of verbal advice from lots of registrars. Went to conferences, went to preparation courses and that sort of got me into it.'
	Going to conferences and courses for increased motivation.	'Just being in those conferences, which is very inspirational talks, so I think that was one of my motivation factors as well.'
Career progression		'One of the better fields to work in with regards to career progression.'
		'But like practically I thought "okay some specialties are better suited to private work".'
Work-life	The variety of work in surgery.	'Nice balance between, yes you've got lots of surgery but you do also still use some medical skills.'
	No difference in workload when compared with medicine.	'The same whether you do medicine or surgery.'
	Less than full-time training is available in surgery.	'You know less than full-time work is there and is available and you see lots of people make it work.'
Organisational culture		**Quotes**
Cultural shift	Reduce stigma about less than full-time training.	'Reduction in stigma about less than full-time training.'
	Encourage diversity, both ethnic and females.	'I think just generally within surgery there has been a move to encourage diversity, and I kind of saw that more when I started working within surgical specialties.'
Female presence	Increased female presence.	'There were actually a lot of female registrars where I was and that really motivated me to apply.'
	Inspirational female team members.	'She knows her stuff, she's confident, she's funny, she's sociable, she's nice, she's the kind of person that you'd happily, sort of, sit down and have a chat with and just completely respect clinically and I think it was that kind of eye-opening moment; oh actually, you know, you don't have to be a certain way to be a woman surgery you just have to be a woman who wants to do surgery.'
Active engagement	Having consultants who motivate and engage trainees.	'I had great, great consultants who were really motivating and really enthusiastic about their field, so absolutely.'
	Having a good team that actively got participants involved.	'Encouraging CTs and they yeah they were very encouraging and I was in a small District Hospital so they were constantly teaching us and they allowed us to do things to help operate so I think that's what inspired me to do it.'
Social factors		**Quotes**
Mentor	Mentors had an influence.	'They have definitely had a massive impact in my choices.'
	Impact of female presence throughout the training process, especially at senior levels.	'I think it is incredibly, incredibly just reaffirming and heart-warming to see other women at a consultancy level, registrar level or even just a year or two ahead of me.'
Social support	Having a good team environment.	'I really like when you're in a good team and with really supportive, you know, seniors like it's kind of an amazing experience.'
	Support from family.	'My family and husband always said just that go for it whatever you want to do, do that, you may as well.'
Personal factors		**Quotes**
Exposure	Positive early exposure in foundation years.	'I did not have the early exposure that I had during a really good surgical rotation I don't think I'd be even remotely interested as much as I am now.'
	Being actively involved by a team in medical school.	'Being taken on by that team quite early on and having that early operative exposure is quite important.'
	Positive exposure in foundation training.	'To balance that out, like I was, I enjoyed the specialty, and I was really interested in in the specialty then I decided to choose it.'
Intrinsic motivation	Early goal and motivation to do surgery.	'I wanted to do surgery before I went to medical school so that was always the plan.'
	Proving stereotypes wrong about women in surgery.	'Proving yourself and the bar will be set different. But sometimes I actually use that as more of a motivation than deterrent.'
Nature of surgery	Personal interest in physiology.	'I understand the range of pathology easily, mechanisms of disease comes naturally to me, I enjoy this abdominal anatomy.'
	Technical aspects and variety offered by surgery.	'Think just the surgical specialties themselves being quite straightforward. And I think there's the technical aspects I think which is another motivator. You really get to use your hands and you don't get very often in medical specialties.'

Table 3 Summary of the proposed implementations for women applying for core surgical training

Implementations		
Institutional factors		**Quotes**
Early exposure	Increased hands-on exposure in undergraduate level.	'Increased exposure to surgical specialities, I think it's got to be fairly hands-on exposure.'
	Increased hands-on exposure in foundation level.	'Think that's probably why there's a reasonable number of people who pull out of training during- because you just don't really ever get a true idea of what life as a surgical trainee is going to be like. But then I would think that increased exposure, because that's what I would enjoy.'
Representation	Increased female representation.	'There needs to be more gender representation. There needs to be more diversity.'
	Having more females in positions of leadership.	'I think more female leadership, more so. ****, she's the head of the GMC at the moment. She is a female surgeon which is great and I think that's important as well.'
Support	Offering maternal support to women.	'Identifying the need for it and then addressing the actual day to day practical factors, like less than full-time work and work challenges you might have. Like mothers for financial support, support with coming back to work and flexible training and working hours.'
	Having a standardised checklist of application requirements in one accessible place.	'Because it changes every year, it's changed for us this year compared to last year and there's a lot of new things but just having that and then the option to sit down with someone to go through your portfolio if you can, that's probably the main thing.'
	Application support from senior medical professionals (professional support).	'Consultants taking an interest in you, and saying that they'll look through your portfolio and give you interview practise.'
Training process	Availability of run-through programmes.	'Run-through training programmes are great for that. So, my friend is married and has two kids and she's run-through training ENT.'
	Alternative pathways to training.	'It would be much easier to sort of carve your own training without going through a training programme and I think for me that would be- yeah that's a useful change.'
	Workshops to educate applicants.	'I think it would be useful to have some like workshops and understand the patient process and what's required of you and what they are looking for and expecting.'
Organisational culture		**Quotes**
Cultural shift	Help with conversations about comments in the workplace.	'Frank conversation with them when I said as much as I appreciate where you're trying to see my best interest. I personally don't have those challenges, and if it comes to that point where, um, you know, say I do have children and I do. I need time off, the Deanery does support that and there are some kickass women with three children working less than full time and doing their thing and they've managed it.'
	Surgical teams need to accommodate females.	'Just making the culture more accepting of having more female trainees.'
	Reduce prejudices against women.	'Is possible and people just being generally supportive of "oh you want to be surgeon, great" rather than "oh you want to be a surgeon but you're a woman".'
Destigmatisation	Active engagement in undergraduate level,	'I think just the engagement is really important, just show that you actually care and you know that this student exists somewhere in the theatres. You know like, just go "can you help me hold it" - like get them involved.'
	Breaking stigma of the surgical type of woman.	'Maybe reducing I would say but it's kind of again the notion, thing that women in surgery are real hard and cold and you know not very nice which is completely untrue.'
	Normalising less than full-time training in the workplace.	'I still I find that quite daunting concept and I know that's quite far away for me at the moment, but trying to get that understanding in the Department without being feeling like you are doing less because you are not there as much as some others, and to normalize that behaviour.'
	Destigmatising less than full-time training and its impact on life out of medicine.	'And just this kind of it will take away so much of the pressure to be a perfect surgical trainee or a perfect partner or a perfect parent. I think it will actually mean that you have a longer term.'
Social factors		**Quotes**

Continued

Table 3 Continued

Implementations		
Mentorship schemes	Mentoring schemes should start in medical school.	'There's tonnes of buddy schemes out there at the moment, but I think maybe starting this from undergraduate level would be nice.'
	Female role models established early.	'Setting role models early and making female medical students think that they can do it, and know that it's a possibility at that stage.'
	A mentor should be close in training position to help with applications.	'So you might want to know like someone directly above you, like a year or two, that can get you through the applications. I think that will really make a difference.'
Networking opportunities	Spaces to get involved with research projects.	'Setting up networking meetings at hospitals and stuff where people could give projects, show what projects have got on offer and if they need any help and things.'
	Joint groups with peers to practise interviews.	'I think having a local group will be useful, where you can do face-to-face practise. I think that that's a huge goal within the interview checklist itself.'
Personal factors		**Quotes**
Self-development	Time should be scheduled in the rota to be able to increase theatre time and grow professionally.	'My job as an F1/F2 has been purely service provision and I really do feel, apart from if I came in on day-offs, I had no opportunity to go to theatre or go to clinic or do anything that like a specialty trainee might do. I do think that into the rota, it should have been scheduled for you to sometimes go to the theatre.'
	Time for self-development and career development.	'F1 is really critical, because by the time you get to F2 and your first placement like literally the end of your first placement. I think having some of those afternoons, or even like a couple of hours, where you can just go and assist in a case or you can go to clinics, is so important for people's choices. And those career conversations that go on very early on are really important, so I think if you were going to target anything to make a successful intervention, I'd really try and push up the F1 stage.'

children during training.[21] These cultural norms allowed better support for female surgeons.[21] However, studies in Pakistan and Zimbabwe have shown that cultural norms and expectations may also act as deterrents for female surgeons, such as the belief that surgery is not compatible with the expected role of women as the primary caregiver of children.[22 23]

Marital status and dependents

Majority of the cohort was unmarried and expressed concern over the compatibility of surgery with a fulfilling family life. Quantitative analysis showed a significant number of married participants ranking 'Professional support within the specialties' as their most influential motivator. Difficulties in parental leave and LTFT were quoted by participants, which could explain this trend. Previous studies showed that females of childbearing age stated organisational/financial worries when planning, and on return from maternity leave.[16] Therefore, doctors considering having children may value professional support to overcome this barrier.

In contrast, the deterrents emphasised by interviewees were around sustaining long-term relationships and choosing an appropriate childbearing time. The current selection process of CST does not consider the location and marital status of applicants resulting in many relocating multiple times during their career.[24] This creates uncertainty towards settling down and building a family home, which could explain the popularity and preference in the interviewees towards run-through CST programmes.

Flexible working hours

Flexible working was ranked highest among CT2s and FY2s. However, destigmatising LTFT was ranked equally for all levels of training. This suggests that flexible working hours are needed to meet the requirements for progression onto surgical training programmes. This was reflected in the qualitative study where participants described the need to find time to complete 'check box' tasks (eg, basic surgical skills courses, trauma courses) to be eligible to apply for surgical training, especially during FY1. A 2019 study by Walker *et al*[14] also supports our study's finding as pre-CST individuals are more likely to suggest flexible working/LTFT as an intervention than those currently in a CST programme.

Discrimination

Interviewees reported experiencing discrimination at work, especially from other healthcare professionals. Participants also mentioned unwanted comments, showing sexual harassment is still an issue. A questionnaire by Freedman-Weiss *et al*[25] found only 7% of incidents being reported by surgical trainees, especially if perpetrated by a senior clinician who may impact an individual's progression. Literature also showed that women were held to higher standards when applying to surgical specialties.[26] Moreover, our participants described a stereotypical view of senior female consultants; cold, detached

and unapproachable by other staff. Previous literature established this phenomenon as a female 'surgical type', without providing a successful intervention.[27] Our participants said this motivated them to pursue surgery to dispel these perceptions and encourage other women to pursue the field.

Implementations

The implementations suggested by the questionnaires were varied, yet they are not specific enough to address the issues discussed by the interviewees. However, we propose a few ideas as suggested by the interviewees.

- A centralised, easily accessible portfolio checklist to guide trainees in their application process.
  Qualitative results highlighted interviewee's frustration in the application process due to difficulties in finding easily accessible information.
- Bulletins for up-to-date information when applying.
  Especially given the current uncertainty after the COVID-19 pandemic, interviewees stated the importance of wanting up-to-date information.
- Networking events led by female consultant surgeons, inspiring young applicants.
  Literature states the importance of role models, which echoed the sentiments of the interviewees. These events would also serve as networking opportunities to enable trainees to build contacts and get involved in projects.
- Workshops to encourage open dialogue about destigmatising LTFT and how to handle negative comments in the workplace.
  Participants expressed that there is a stigma surrounding LTFT and a culture of discrimination of women in surgery.
- Undergraduate same-sex mentorship schemes with mentors gaining points to enhance curriculum vitae (CV).
  The benefits of mentoring schemes for the mentees are discussed extensively. This, combined with a point system to incentivise mentors, would lead to a mutually beneficial scheme.
- Groups to practise surgical application interviews, led by a senior surgical trainee.
  Interviewees mentioned having informal practice groups which they found helpful during applying.
- Allocated time during working hours for professional development including being on a rota for theatre.
  Existing literature and our study found that trainees need extra time to develop skills and gain experience to build their portfolios which is not currently adequate.

Strength and limitations

This is one of the most recent studies discussing the deterrents and motivators for women entering surgery, making the implementations relevant to current CST applicants. Other strengths include the extensive reach of the questionnaire and interviews across the UK. Furthermore, the use of mixed methods of both quantitative and qualitative data aided in verifying themes observed in the interviews. Additionally, a ranking system for factors was used, which has not been done in previous literature. In line with the TACT framework, the study shows transferability as the demographics of participants were recorded. Consequently, the findings from this study can be generalised to the wider population dependent on certain demographics.

However, this study also faces some limitations. The small sample size for quantitative analysis means that the conclusions may not be generalised. However, for qualitative analysis, data saturation was reached as after 15 interviews, no new themes were recorded. The use of snowball sampling can cause selection bias. Additionally, 15-min interviews were performed, which may not allow sufficient time for participants to explore the whole narrative. Another limitation of this study is that it only explored the perspective of women pursuing surgery, hence those who decided against applying due to their gender were unaccounted for. Furthermore, the questionnaire format of ranking existing factors may cloud and bias their judgement when asked to explore other factors and themes. This may have caused difficulty to bring out any new themes from the women. Similar to any study involving interviews, participants who agree to be interviewed often have stronger opinions than those who refuse,[28] which may explain the lack of significance in quantitative results despite recurrent themes in the qualitative interviews.

Future scope

Further studies should explore motivators and deterrents that arise in various surgical specialties as studies show disparities across the CST programmes. A larger cohort for the study would also allow the exploration of the impact of ethnicity and gender together, as well as the importance of ethnic representation and its contribution to GIR. It would also be helpful to recruit international cohorts to investigate the continuing paucity in female surgical trainees seen globally,[21] and compare geographical differences, as well as those between different healthcare systems (eg, state funded vs private).[26] Additionally, future research should explore personality traits commonly shared by female surgeons, which drive their intrinsic motivation against deterrents during their career as exhibited by the interviewees.

CONCLUSION

This mixed-methods study aimed to identify the deterrents and motivators to women entering surgery, followed by suggesting implementations for healthcare organisations. In concordance with existing literature, this study found work-life balance and early exposure to surgical specialties the most influential factors and suggested mentoring schemes and normalising LTFT as the most suitable interventions for women in surgery. Although there is much change afoot to encourage female surgeons

in the NHS, acceptance of diversity and flexibility would be a key factor in this.

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