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How surgical Trainee Research Collaboratives achieve success: a mixed methods study to develop trainee engagement strategies

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ABSTRACT

Objectives This study aimed to understand the role of surgical Trainee Research Collaboratives (TRCs) in conducting randomised controlled trials and identify strategies to enhance trainee engagement in trials.

Design This is a mixed methods study. We used observation of TRC meetings, semi-structured interviews and an online survey to explore trainees' motivations for engagement in trials and TRCs, including barriers and facilitators. Interviews were analysed thematically, alongside observation field notes. Survey responses were analysed using descriptive statistics. Strategies to enhance TRCs were developed at a workshop by 13 trial methodologists, surgical trainees, consultants and research nurses.

Setting This study was conducted within a secondary care setting in the UK.

Participants The survey was sent to registered UK surgical trainees. TRC members and linked stakeholders across surgical specialties and UK regions were purposefully sampled for interviews.

Results We observed 5 TRC meetings, conducted 32 semi-structured interviews and analysed 73 survey responses. TRCs can mobilise trainees thus gaining wider access to patients. Trainees engaged with TRCs to improve patient care, surgical evidence and to help progress their careers. Trainees valued the TRC infrastructure, research expertise and mentoring. Challenges for trainees included clinical and other priorities, limited time and confidence, and recognition, especially by authorship. Key TRC strategies were consultant support, initial simple rapid studies, transparency of involvement and recognition for trainees (including authorship policies) and working with Clinical Trials Units and research nurses. A 6 min digital story on YouTube disseminated these strategies.

Conclusion Trainee surgeons are mostly motivated to engage with trials and TRCs. Trainee engagement in TRCs can be enhanced through building relationships with key stakeholders, maximising multi-disciplinary working and offering training and career development opportunities.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The mixed methods approach and triangulation of data from surveys, interviews and observations that included multi-stakeholder perspectives enabled an in-depth and comprehensive understanding of Trainee Research Collaborative (TRC) research.
⇒ A range of surgical specialties and TRCs across geographical areas increased the potential generalisability of findings.
⇒ The survey uniquely included the views of trainees not engaged in TRCs that allowed broader insight into what influences trainee engagement in trials research.
⇒ We only interviewed trainees involved in TRCs.
⇒ The study only focused on surgical TRCs.

INTRODUCTION

Trainee Research Collaboratives (TRCs) are a supportive infrastructure established by surgical trainees collaborating on multicentre research with advice and mentoring from senior surgeons, trial methodologists and Clinical Trials Units (CTUs). The Royal College of Surgeons of England and the UK National Institute of Health Research (NIHR) also established Surgical Trials Centres and Surgical Specialty Leads to increase surgical research, led by Professor Dion Morton.[1] The West Midlands Research Collaborative (WMRC) was the first TRC[2] and 24 regional and national specialty surgical TRCs were formed subsequently,[2 3] including GlobalSurg internationally.[4] TRCs have conducted multicentre studies ranging from clinical audits and observational studies to randomised controlled trials (RCTs) such as ROSSINI.[5 6] The NIHR launched an Associate Principal Investigator (API) scheme in 2019 which built on the TRC experiences and aims to

encourage trainee clinicians to engage in research with recognition given for activity and training.[7] In 2020 the API scheme was used in the COVID-19 RECOVERY trial and thereafter was expanded to all NIHR portfolio studies—underlining its success. Understanding why this scheme has been so well received and beneficial will give insights into how to maintain and develop it further. This paper, therefore, aimed to identify reasons for successful trial conduct by surgical TRCs and to develop strategies to increase clinician engagement in trials.

METHODS

This study included non-participant observation of TRC meetings, semi-structured interviews, and a survey to gain an in-depth understanding of trainee engagement in research and TRCs. A stakeholder workshop used these findings to devise strategies for TRCs to enhance clinician engagement in trials which were disseminated in a digital animated story. The study was underpinned by a pragmatic research paradigm which emphasises practicality and real-world application in research. The Standards for Reporting Qualitative Research were used.[8]

Observations and semi-structured interviews

Sample and setting

Initially, we conducted a review of TRC webpages and with coauthors (CC/KC/TP/JB/NSB/JAL) identified a range of TRCs, the types and frequency of TRC meetings and key members. A request to observe meetings was sent to the meeting organiser and TRC chair by a study researcher (CC/KC). TRC meetings were sampled opportunistically focused on TRCs, trials or training meetings between March and December 2017. Due to timing and participant confidentiality issues, no trainee-led Trial Management Group meetings were observed.

Interviewees were purposively sampled to ensure people across clinical specialties, geographical locations and roles were included. Inclusion criteria were (1) either be a trainee or consultant surgeon, research nurse or trial methodologists with experience of TRC research and (2) speak English. Thirty-two people of 70 invited were interviewed (2 declined (time restraints), 36 did not reply to a single invitation without financial incentive (reasons unknown)), 19 were interviewed in person and 13 by telephone (May 2017 to January 2018) for between 20 and 59 min (mean 37 min) until information power (adequate quality and depth of information) was reached.[9]

Data collection

Observational and interview data were collected in parallel by experienced qualitative researchers in health research (CC and KC). Observations were non-participant (ie, observing study researchers were not TRC members and did not participate in meetings they were observing) although researchers were known to some meeting attendees and interviewees prior to data collection. Detailed field notes were taken during TRC meetings guided by an observation topic schedule (online supplemental material 1) based on the research questions.[10] Interviews were audio-recorded with permission and transcribed verbatim using a professional transcription service. Interviews were guided by a flexible topic guide (online supplemental material 2) which enabled a focus on the research questions and participants to introduce topics.

Qualitative analysis

Interview transcripts and field notes were analysed using thematic analysis.[11] Analysis began shortly after data collection started with early insights used in subsequent data collection. The main study researcher (CC) analysed all transcripts and field notes and the second researcher (KC) analysed nine transcripts. A hybrid approach using both deductive coding based on study aims and inductive coding to allow for theme development was used to create an initial coding framework based on the nine double-coded transcripts[12] (online supplemental material 3). The framework was agreed by the study team (CC, KC and JAL) and applied to remaining data. Triangulation addressed differences and similarities within themes across interviews and meeting observations for disconfirming and confirming instances. Data management and coding were facilitated using NVIVO V.10 software.[13]

Survey and analysis

An email invitation for the online survey was sent to trainees from all surgical specialties via administrators at the 18 Local Education Training Boards (LETB) in England and Deaneries in Scotland, Wales and Northern Ireland and advertised on social media in 2017. The anonymous survey asked about attitudes to, and involvement in, surgical research and collected basic demographic information (online supplemental material 4). Survey data were collected using Bristol Online Surveys (https://onlinesurveys.ac.uk/). Participants could enter a prize draw for a £50 voucher. Responses were analysed using descriptive statistics in STATA statistical software. Responses to open-ended survey questions were transferred into Microsoft Excel and two researchers (KC and NH) independently coded each response thematically then agreed the final themes to be integrated with the observation and interview data.

Stakeholder workshop and digital story

Thirty-seven expert stakeholders were invited to a workshop in 2018, of whom 13 attended: two consultant surgeons, four trainee surgeons, four trial methodologists, two research nurses, one chief operating officer for an NIHR Clinical Research Network, plus the study chief investigator (JAL) and researchers (CC and KC). Findings from the interviews, observations and survey were developed into key statements (CC/KC/JAL/NSB/NH) (online supplemental material 5) and these experts ranked the most useful strategies for TRCs and trainee development. Subsequently, a digital story outlining key

strategies for enhancing trainee engagement in trials was produced using an Integrated Participant Digital Storytelling technique (IPDS). IPDS uses digital storytelling techniques and participant data to combine stories from personal experiences with multi-media tools to communicate evidence in an approachable and engaging manner.

Patient and public involvement

As the primary focus of engagement in trials was on trainees as the key stakeholders who would be affected by the research, we did not include a patient and public representative.

Reflexivity

Throughout our research, we recognised the impact of our multidisciplinary team's roles on data interpretation and recommendations. While analysing data and shaping strategies, we embraced multiple perspectives, resulting in comprehensive data representation and more relevant findings. The team comprised social researchers, methodologists, clinicians and TRC members. Regular study management group meetings were held to review findings and key decisions.

RESULTS

TRC meeting observation and interview participants

We observed five TRC meetings at different geographical locations, four were approximately 2 hours in the evening, and a 1 day national TRC meeting with plenary sessions and breakout workshops. Interviews included trainees from 9 of the 14 LETBs and 5 clinical specialties (characteristics in online supplemental material 6) and half of the consultant and trainee surgeons had been involved in RCTs (n=16, 50%).

Trainee survey participants

Seventy-three participants completed the survey from 11 LETBs and 10 clinical specialties (online supplemental materials 6 for respondent characteristics). Of these trainees, 36 (49%) were currently involved in TRC research, 7 had previously been involved (10%) and 30 had never been involved (41%). In total, 37 trainees (51%) were undergoing or had completed formal research training and 12 reported being a current or former academic trainee (16%).

Thematic findings

Three main themes were developed which are mapped in figure 1: (1) motivations for engagement in trainee collaborative research, (2) challenges to that engagement

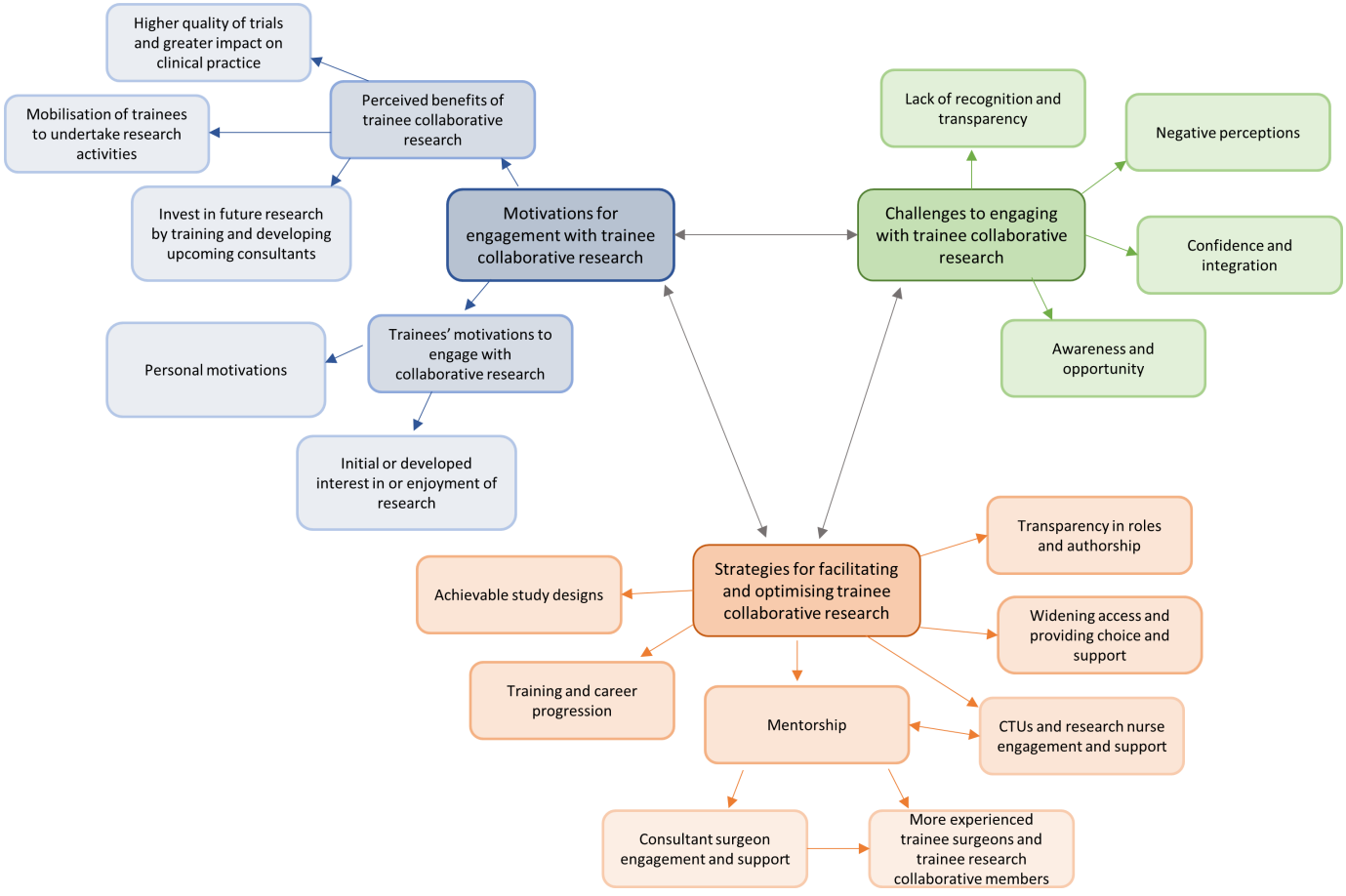

Figure 1 Thematic map of main themes for facilitating engagement with trainee collaborative research. CTU, Clinical Trials Unit; TRC, Trainee Research Collaborative.

and (3) facilitating and optimising trainee collaborative research.

Motivations for engagement in trainee collaborative research

Trainees, consultants and researchers recognised that TRCs provided momentum to trial conduct, contributed to higher quality study designs which produced greater impact on clinical practice than individualised research and so motivated their involvement. Interviewees spoke of the 'power' (P02, trainee, interview) of TRCs to deliver large studies relatively quickly by mobilising a cohort of trainees who facilitated access to, and recruited, patients and collected and reported data. Trainee engagement in TRCs and trials was viewed as mutually beneficial. It was also thought that trainees who engaged with TRCs would develop into research-active consultants (table 1).

In the survey, trainees engaged in collaborative research because of (1) an interest in surgical research (n=43, 59%), (2) publications (n=39, 53%) and (3) improving patient care (n=37, 51%) (table 2). Some interviewees thought that their interest in publications was 'purely selfish' (P19, consultant, interview) to further careers, or meet training requirements so a 'line in your CV' (P06, consultant, interview). In contrast (and in the survey) many interviewed trainees had a genuine interest and enjoyed research and took up research training positions while others initially engaged in research to meet training requirements but came to enjoy it (table 1). Contributing to the advancement of their field and meaningful research for patient benefit were also important to interviewed trainees. Trainees welcomed the opportunity to generate study ideas and receive training to build their skills and confidence (table 1) as was observed during TRC meeting presentations by a CTU member on trial methodology and Good Clinical Practice by a Clinical Research Network representative.

Challenges in engagement with trainee collaborative research

Some interviewees and survey respondents reported a perception that trainee collaborative research is of poor quality as trainees have insufficient skills or time to conduct research. This appeared to discourage some trainees and collaborators and was also discussed at observed TRC meetings. One of the main concerns were competing clinical priorities and a lack of time for research and 'trainee fatigue' (P09, trainee, interview). Individualised, smaller studies could be quicker to complete and publish. Trainee movement between hospitals can pose problems yet amplifies engagement opportunities but necessitates careful planning (table 1).

Trainees were also hesitant about engaging with TRCs if they did not receive appropriate recognition for their contributions. Confidence and integration into a trainee collaborative were sometimes challenging as several survey participants were unaware of how to get involved in TRCs or had limited opportunities, for example, evening meetings due to childcare provision (P31, trainee, survey) (observed TRC meetings were in the evening) (table 1). Some trainees also found it difficult if TRCs had a predominantly male membership so seen as a 'boys club' (P13, trainee, interview) (table 1) and we also observed that junior trainees (or those moving from a different Deanery) tended to sit at the back of TRC meetings and made fewer contributions.

Strategies for facilitating and optimising trainee collaborative research

Trainee engagement and collaborative research were optimised with support from consultants, CTUs, research nurses and by having transparency over roles and authorship. Additional facilitators were study designs that the TRCs could enact easily, training and career progression opportunities.

Role of TRCs

TRCs played an important role in providing a supportive infrastructure for collaborative research and in 'bringing together the pieces of the puzzle' (P19, consultant, interview) through mentorship from individuals with knowledge and experience in trials. In one observed TRC meeting trainees gravitated to discussion groups led by more senior members of the TRC. Trainees also presented study ideas or had a sandpit-type session with senior academics and surgeons and some trainees providing constructive feedback. TRCs were also seen to facilitate networking and collaboration and trainees could get involved at the level and time appropriate to their circumstances (table 3).

Consultant surgeon support for TRCs

Consultant surgeon involvement and support was critical to establishing and maintaining TRCs and clinical trials, providing consistency for trial oversight and regulatory bodies and encouraging trial completion. Interviewees recommended seeking consultants to collaborate with, including at TRC meetings (also seen in observed meetings) (table 3).

CTU and research nurse support for TRCs

TRCs fostered communication between trainees, CTU staff and research nurses. CTUs provided important methodological and statistical support to trainees but also benefitted from the TRC-led trials in a symbiotic relationship. Research nurses helped coordinate trial recruitment and held knowledge about studies which could benefit trainees although they described how it was difficult initially working with multiple trainees on a trial as a new working practice. Nurses also felt it was important for early engagement by trainees and to develop good communication between all those involved which was helped by technology (table 3).

Transparency in roles and authorship

The importance of being clear and realistic with trainees throughout a study in a 'terms of engagement' and authorship agreements agreed by all parties was highlighted by many interviewees (table 3). Collaborative authorship

Table 1 Interviewee quotes for motivations for engagement in trainee collaborative research and challenges to that engagement

Theme	Participant quotes
Benefits of trainee collaborative research	**Higher quality trials and greater impact** 'Hopefully, the attitude's changing from you can be a one-man band in your hospital and perform a small study that may not … have all that much influence … to do things in larger networks and nationally having a greater power … greater significance, better for patients'. (P06, trainee, interview) **Ability to deliver trials** 'We're able to turn over larger multi-centre studies quite quickly … that study … recruited 900 patients in a 12-week period over a national recruitment drive of about 50 sites'. (P02, trainee, interview) 'When we were trying to roll the study out, we were conscious that we needed the help of the registrars [trainees] all over [region] and the [collaborative] was a great forum to access that'. (P29, research nurse, interview) 'Trainees are pretty important in the way we deliver the trials. Nearly all of our patients are recruited in a very quick turnaround. A lot of it is out of hours … and the only people there are the surgical team [trainees] … a patient that comes in that's eligible and they will recruit them and randomise them … we really rely on the registrars [trainees] … You'd have quite substantial, well double the amount of staff that we do now'. (P11, consultant, interview) **Mutually beneficial relationship** 'I don't like the word using. I would say working with the trainees, and that's really important. It's a collaboration. They're not doing us a job. We are working with them and they're working with us, so I see it as them working with us, but equally our role with them is an apprenticeship in trials, and that's what they gain as well as a certificate and all the rest of it. They are actually gaining this exposure to working with an expert team, which is really valuable and unique, so that's what I'd like to think'. (P08, consultant, interview) **Investment in future research** 'Some of them [trainees] become research-active consultants and take their role to champion research in their unit … actually that's very valuable … the whole point of collaborative research is that we want to prepare trainees to be research active clinicians'. (P07, trainee, interview) 'They [TRCs] also give the next generation of academic's real experience of the difficulties and politics involved in running research projects'. (P16, trainee, survey)
Trainee motivations to engage with collaborative research	**Personal motivations** 'I think the initial carrot is always going to be the line on the CV that they become a named author, they get a publication or a presentation out of it and I think that is definitely what brings them into the room'. (P05, trainee, interview) **Interest in research** 'There was … that [training requirement] when I first got involved … didn't really know much about research. As I got involved, I actually found it enjoyable'. (P02, trainee, interview) **Altruistic motivations** 'Best opportunity as a trainee to contribute to meaningful research that has the potential to improve patient care'. (P5, trainee, survey) **Gaining knowledge and skills** 'They [trainees] understand that participation will develop skills for them not just understanding how to do research, but … transferable skills—communications skills, how you talk to patients, colleagues … leadership skills, and so on'. (P07, trainee, interview)

Continued

Table 1 Continued

Theme	Participant quotes
Challenges in engagement with trainee collaborative research	**Awareness and opportunity** 'Never been informed of the existence of a trainee research collaborative'. (P29, trainee, survey) **Time restraints** 'The time is a big constraint … there's so many other demands on your time as a surgical junior. It's the wards want you, theatre … nurses, clinic … assessments as part of your training … to leave time for research … it all gets a bit squeezed … shifted to the bottom of the pile'. (P06, trainee, interview) **Perceptions of poor quality** 'Research should be led by people with the sufficient time and training to do so and who are paid from this role'. (P65, trainee, survey) 'Some people … would say that it's a risk in terms of poor quality data … if you involve a hundred people at a site rather than three, there's an understandable concern that you will have a lower quality trial'. (P08, consultant, interview) **Lack of recognition and transparency in roles** 'At the end of the day really there are one or two people who put a lot of time and effort in who are actually going to benefit from this … there can be some cynicism that although it states collaborative, the person whose name is at the front or at the back of the authorship is really the one that you're doing it for'. (P24, trainee, interview) **Confidence and integration** 'When you have a group of people who are well established and you're the new person coming in … sometimes it's hard to break into the ranks of that'. (P23, trainee, interview) **Trainee movement** 'You can look at it both sides of the coin I think, it can be a difficulty because yes trainees will find it difficult to be a CI [chief investigator] because we're not registered in a permanent kind of role at a hospital, but it really allows trainees to move round trusts. Also to try and spread the word if you would to one site to another and get other sites involved where they might have been involved in a study at one site setting that up and then they move on to the other site and so that site then gets set up etc and they can move round each time'. (P02, trainee, interview) 'I think as the CI [chief investigator] of a project you need to be wary of when the rotation dates are, because you don't want to plan to collect data just before or just after someone's moved a rotation. So, I think you have to be mindful of when you plan your data collection points'. (P05, trainee, interview) 'Depending on which consultant you're working with at that time is probably going to negate whether you act on that research or not but because they move around fairly quickly then most of them get a chance to do so at some point'. (P29, research nurse, interview)

Table 2 Survey reasons for trainee involvement in or declining surgical collaborative research

Reason	Number of respondents (N=73)
Involvement in surgical collaborative research	
Interest in surgical research	43 (58.9%)
Increase publications	39 (53.4%)
Improve patient care	37 (50.7%)
Satisfy Annual Review of Competence Progression (ARCP) requirements	22 (30.1%)
Mentoring	21 (28.8%)
Education about research and governance	17 (23.3%)
Encouraged by programme director	1 (1.4%)
Declining involvement in surgical collaborative research	
Insufficient time	13 (17.8%)
Timing of meetings	7 (9.6%)
Issues with authorship of collaborative research	7 (9.6%)
Not recognised at Certificate of Completion of Training	6 (8.2%)
Projects not of interest	6 (8.2%)
Too junior to be part of the collaborative	5 (6.8%)
No surgical research collaboration in my region	4 (5.5%)
Other	4 (5.5%)
Not feel welcome at the collaborative	3 (4.1%)
Not interested in collaborative research	2 (2.7%)
Location of the meeting is too far away	1 (1%)
N/A as not involved in Trainee Research Collaboratives	39 (40.2%)

models used by some TRCs recognised specific inputs and activities for group authorship which was supported by 49% (n=36) of surveyed trainees. However, 47% (n=34) of trainees surveyed stated coauthors should be individually named and in the observed meetings some trainees thought that collaborate authorship prevented first author publication requirements for the UK General Medical Council Certificate of Completion of Training (CCT).

Achievable study designs

Interviewees recommended that new TRCs commence with audits or feasibility/pilot studies to build skills and confidence as RCTs were regarded as daunting due to their duration, complexity, skills required and funding requirements. It was also helpful to identify specific aspects for trainees to contribute to obtain outputs (table 3).

Training and career progression

Interviewees felt that greater recognition of research activity was needed in their career pathway and greater emphasis on research training in the surgical curriculum. Survey respondents also thought TRCs should be part of surgical training (94.5%, n=69) but research should not be compulsory. Trainees valued informal, experiential in addition to formal training. Having trainees colead studies with more senior colleagues also allowed trainees to build confidence and skills and addressed funder requirements for a 'consistent', consultant on grant applications. Trainees could benefit from dedicated research time away from their busy clinical routines or for formal research training (eg, undertaking a PhD/MD) (table 3).

TRC engagement strategies and dissemination

The expert workshop prioritised five strategies for enhancing TRCs (table 4). These strategies were converted into a 6 min animated digital story on YouTube in 2019 (https://www.youtube.com/watch?v=vbITEHMjQfU) with 378 views (online supplemental video 1). A presentation at the national TRC meeting in 2019 received positive feedback including 232 Twitter impressions and was subsequently uploaded to four national and international TRC websites illustrating its perceived usefulness.

DISCUSSION

Interviewees thought that surgical TRCs were generally successful in engaging trainees in research. However, we identified barriers and issues for trainees engaging in TRCs including time pressures due to clinical and other competing priorities (eg, childcare), concerns about research quality and wanting recognition for their inputs, most notably authorship. Trainees wished to increase surgical evidence and improve patient care; advance their careers and receive training and we used these motivations in developing strategies for enhancing engagement in TRCs. TRC strategies included gaining consultant and

Table 3 Interviewee quotes for facilitating and optimising trainee collaborative research

Facilitator	Participant quotes
TRCs facilitation of collaborative research and consultant support	**Mentorship** 'Medical students coming, they can see that senior registrars want to make contributions and hopefully inspire people or guide them in the path … there's an educational, a mentorship element'. (P04, trainee, interview) **Consultant support** 'Our role with them is an apprenticeship in trials … they are actually gaining the exposure to working with an expert team, which is really valuable and unique'. (P11, consultant, interview) 'The consultants are there for mentorship but also because we need consistency within the site … because trainees move around the region'. (P02, trainee, interview) **Widening access and providing choice** 'There are a few people that like to get involved in different aspects of the research pathway … part of the attractiveness of it [TRC involvement] is that you can be as much or as little invested in it as you like'. (P12, trainee, interview)
TRCs engaging with CTU and research nurses	**CTUs** 'A person who will be based within the [CTU], whose remit will be to spend their entire time working with trainees … on an idea that we have said it's worth taking forward and they will help them deliver the first steps of it'. (P28, methodologist, interview) '[methodologist] has been supporting us … we are trying to build that link … he came along to our meetings … you can't do these things out of thin air; you need to link in with people who have expertise, and the trials unit is great for that'. (P06, trainee, interview) **Research nurses** 'Tap into your research nurse. Because the research nurses are the ones with all the protocols, all the paperwork, they've probably got more time to discuss the studies with you than the consultants'. (P29, research nurse, interview) 'We'd never done anything like this before … it's not bad, it's just the enormity of the challenge … previously … there's one or two doctors that you liaise with … it's a very clear linear pathway as to who's your point of contact, and who's recruiting the patients… then … there is this new idea of getting as many trainees involved in research, and … a whole new strategy that we had to come up with'. (P32, research nurse, interview) 'We managed to set up a WhatsApp group … liaising on a daily basis making sure that you connected with the surgical trainee that was on that day, what they had and hadn't done, who were the eligible patients?'. (P32, research nurse, interview)
Transparency in roles and authorship	**Clarity and transparency in roles and responsibilities** 'For trainee involvement to work well there has to be a clear objective task for them to do … for a specific award had to be clearly defined'. (P26, methodologist, interview) 'In the [CTU] we've got a policy that if somebody moves on, they do not lose their intellectual property rights … we expect you to respond to requests and … a system like … the International Committee of Medical Journal Editors as to who is eligible to be an author'. (P21, methodologist, interview) **Collaborative authorship** 'The research collaborative is offering something different … we have a corporate authorship policy whereby this single authorship for anything that comes from the groups and then within … will be broken down into different groups … writing groups, steering group, data analysis, local leads, collaborators'. (P12, trainee, interview) 'I think there's a perception that it's more useful, more important to have your own first-author paper'. (P07, trainee, interview) 'It [corporate authorship] doesn't in any way recognise the disproportionate or the varying effort that different trainees make … we ended up with … sixty-five authors … it's promoting a lot of the worst practice that happens with medical authorship in my opinion'. (P26, methodologist, interview)
Achievable study designs	'Don't start with a trial, because it takes a long time, you need a grant, stats, a protocol and ethics, and those are the hardest things to do … Start with a simple, collaborative prospective snapshot audit or cohort study … a quick win, then set up some bigger stuff, like trials'. (P08, consultant, interview) 'I think another thing is running simpler studies … entry step, so that they can see, well this is what collaborative studies are about … and maybe they'll be excited and inspired to then take part in an RCT'. (P07, trainee, interview)

Continued

Table 3 Continued

Facilitator	Participant quotes
Training and career progression	'We've moved towards changing some of our CCT requirements from … you have to produce three papers … that actually nobody seems to really care what the quality is and what the content is it's just sort of a box ticking exercise. There's a move from that to having recruited a certain number of patients … I think that if you were to make it a requirement that would shift the culture and the way people think about these things'. (P06, trainee, interview) 'I think you need to understand the methodology more, so I absolutely think there is a place in the curriculum. I think if you're going to shift critical mass of understanding about research, that's one of the only ways it's going to happen'. (P05, trainee, interview) 'They have set up what they call a co-PI network, so they've got the PIs … the experienced [clinician] and they've all identified a junior colleague who is working with them'. (P20, methodologist, interview) 'Ideally, we would give people time, because I think that's the biggest, constraint people have. Everyone's busy, you know, they've got on-call rotas, they're busy looking after patients on the ward, they're trying to go to theatre to get their surgical training, and this stuff does take time. It takes time to get your head around the trial, to see a patient, talk to patients about it, so if there was one thing we could do, I would say, 'Well, let's give every single trainee in the region half a day a week or whatever to spend participating in research'. That would be a huge help'. (P07, trainee, interview) 'There's no substitution for being involved and learning on the job as you would because you see the pitfalls, you understand the drawbacks and limitations of things, hurdles that you have to get across then also you learn about the rules and regulations of everything, why they're in place, the importance of the protecting patients, protecting clinicians and all that kind of thing as well that you don't really grasp unless you apply it in practice'. (P02, trainee, interview)

CTU, Clinical Trials Unit; TRC, Trainee Research Collaborative.

CTU support, creating opportunities for mentoring of trainees and to design studies, promoting the TRC with a rapid simple study and transparency about involvement and recognition, including authorship. These principles are valuable insights for TRCs as they are now being expanded into all clinical areas by the NIHR through their API scheme. The strategies can be accessed most easily by TRCs through the digital animation which was produced to promote their dissemination and wider uptake.

The establishment of TRCs, their structure and conduct of trainee-led studies have been described for several clinical specialties,[14 15 16] including some of the strategies developed in this research, for example, a consultant champion.[5] Consultant support was also highlighted in a recent study of a trainee-led clinical trial involved with the NIHR API scheme.[17] Some TRC-led publications also advocated starting with a simple study design to give rapid recruitment and outcomes[15] since trainee and consultant support can be variable until they are convinced of the merits of TRCs.[15 16] Providing opportunities for trainees to generate study ideas and take on leadership roles, for example, as co-PI in TRC-led studies had not been highlighted previously to engage trainees. The interests of trainees in progressing their careers were also highlighted clearly in this study and although regarded by some as 'selfish' this benefitted the TRCs and potentially research more broadly. Identifying committed trainees was a WMRC principle[5] but we showed that time and competing priorities are significant barriers, possibly reflecting increased trainee workloads since the formation of the WMRC. If TRCs can offer different options and levels of activity this could potentially increase trainee engagement.

The expectation of trainees for transparency around their involvement in a TRC and recognition of their inputs has been raised by several TRCs[5 15] and in an analysis of TRC-led publications.[18] Some TRCs have collaborative authorship policies to acknowledge trainee inputs.[5 14] Although our study found some support for this model, others preferred 'headline' named authors, in part through concerns about publication requirements for the CCT. A consensus group has subsequently defined which TRC roles qualify for 'significant authorship' for journal and CCT requirements[19] although acknowledging that named authorship for a TRC writing group could be appropriate. The National Research Collaborative (a TRC umbrella organisation) is also campaigning for recognition of collaborative research in training pathways.[20]

Advice and support from methodologists and CTUs in designing and conducting TRC studies was a key strategy in this study which was also highlighted by the WMRC.[5] Professional specialty associations have provided infrastructure, academic and logistical support to TRCs[2 20] although this was not a main strategy found in our study. Several TRCs have called for more tangible support to maintain their success,[18] for example, data collection systems or funding[20] having relied on technologically expert trainees for project infrastructure and database skills.[16]

Challenges in clinician involvement with TRCs, like competing priorities and time constraints, also impact engagement at the trial level.[21] Limited awareness of

Table 4 Top five strategies for enhancing Trainee Research Collaborative engagement

Strategy	Strategy	Examples of how strategy can be achieved
1	Create opportunities for trainees to generate study ideas and complete trial methodology training	► Having trainees get involved in trial development alongside more experienced colleagues ► Trainees taking formal methodology courses and undertaking on the job training
2	Promote trainee and collaborative engagement by having achievable study designs with quick wins	► Getting involved in simpler studies like audits and feasibility studies can help build research skills and confidence ► Provide flexibility for trainees to be involved in different research aspects that suit their needs and circumstances
3	Seek out the support of a consultant champion to provide consistency for a trial and mentorship to trainees	► Have consultants involved in a trial to provide advice and guidance to trainees ► Having senior expertise can increase perceived credibility of a study to funding and oversight bodies ► Provide consultants with summaries of what is expected of them (eg, agreeing to their patients being recruited) and what the trainee will be responsible for doing (eg, data collection and follow-up) ► Have consultants attend monthly trainee collaborative meetings to provide feedback and expertise
4	Be transparent about what is expected from all those involved in the trial and clarify roles, responsibilities and working practices early on	► Ensure the work of trainees is recognised ► Terms of engagement can help define expectations for all those involved from the outset ► Creating a transparent authorship policy makes it clear up front how everyone will be credited for both trainees and collaborators such as universities and clinical trials units ► Consider having a corporate authorship model which can ensure everyone is acknowledged when a large group are involved
5	Engage with and have better communication with collaborators such as Clinical Trials Units and Clinical Research Networks	► Clinical trials units can provide expertise clinicians do not have (eg, statistical support, data management and trial oversight) ► Have a key person from the trials unit to work with, provide guidance and help develop the trial ► Build good relationships with research nurses. They will have trial protocols and paperwork and have more time to discuss the trial with trainees

research chances and training also hinders clinician engagement with trials.[22] We propose addressing these through TRC involvement and provide organisational/network level strategies to surmount trial-level clinician engagement challenges.

To our knowledge, this is the first multi-stakeholder investigation of trainee motivations to engage in surgical TRCs and research using quantitative and qualitative methods. The digital animation was also a novel dissemination strategy and potentially enhanced uptake by trainees and TRCs. The positive evaluation of using digital videos in science communication has highlighted their potential to expand dissemination, enhance understanding and shift perspectives.[23–26] The range of surgical specialties and TRCs across geographical areas increased the potential generalisability of findings. Triangulation of survey, interview and observation data gave an in-depth understanding of trainee collaborative research and correlations between data sources reinforced the main themes. The survey, we believe, uniquely included trainees not involved in TRCs so giving a broader perspective to inform these strategies. There are some limitations to the study as we only interviewed trainees involved in TRCs and those who were not involved may have held different views, possibly more negative or less informed about TRCs and enhanced understanding of engagement. The survey response rate was unknown (as there was no access to LEFT/Deanery registers) but was likely to be low and the uptake of the invitation to the stakeholder workshop was around 40% as some individuals did not reply to the invitation or were unavailable. The causes of interview non-response are unknown. Therefore, those who took part in interviews and the survey might have had greater interest and stronger beliefs about TRCs than non-respondents, possibly affecting these findings. This study predates the NIHR API scheme,[7] so we were unable to assess its impact on trainee research and engagement with TRCs which would be an interesting extension to this study. Involving patients and public in the research process may also have added value. This study focused on surgical TRCs so these results may not be applicable to other TRCs although similar benefits and challenges were identified for physician TRCs in a recent study.[27] Limited time during the COVID-19 pandemic led to a publication delay from 2019 to 2023, during which time practice may have changed. However, reports of continuing challenges to clinician engagement in trials[21 22] suggest these strategies are still relevant.

Conclusions

Trainee surgeons are generally motivated to engage with research and through TRCs can conduct RCTs. Trainee engagement in collaborative research can be facilitated by enhancing relationships between key stakeholders, maximising multi-disciplinary working and providing trainees with training and career development opportunities. This study focused on surgical trainees and TRCs, but these findings and recommendations may be applicable to other clinical specialties and health professional groups which is important since the NIHR API scheme has been expanded recently across the NIHR portfolio.

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Competing interests NH, TP, JB, NSB, JG, DN have been involved with a TRC; CC, KC, JAC, RB, AA-P, CS, LM, GM, JAL are methodologists who work with a CTU or in trials methodology and ZH and VH are research nurses who work with clinical research networks.

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