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Medical Students' and Supervisors' Experiences of Extracurricular Research at a Rural Clinical School: A Mixed-Methods Study

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ABSTRACT

Objective: The purpose of this study was to explore student and supervisor experiences of medical student research activity in a rural area, as well as reasons for interested students not engaging in research and projects being delayed or discontinued.

Setting: One university's rural clinical school programme encompassing four regional training locations.

Participants: Medical students completing their training at a rural location who expressed an interest in participating in extracurricular research, along with supervisors of extracurricular research projects for rural students within the preceding 2 years.

Design: Convergent mixed-methods study involving an online survey with students and semi-structured interviews with supervisors. Thematic analysis was used to analyse the interview data.

Results: Common student participation reasons ($n = 14$) included gaining new skills, strengthening their curriculum vitae, interest in a future research career, and supervisor encouragement; however, only eight projects were successfully continued thus far. Analysis of the interview data (10 supervisors) led to the creation of three themes and five sub-themes: advantageous partnerships (collegially co-designed, student benefits, and broader benefits), navigating research processes (time constraints and lengthy processes impacting workloads, and support needs), and setting students up for success.

Conclusions: Training or working in a rural area is associated with specific barriers and enablers for medical students participating in research and their supervisors. Time constraints for both students and supervisors were key barriers to project continuation, with successful projects usually having a clear finite timeframe. Targeted strategies specific to rural contexts are needed to maximise rates of project completion and publication.

1 | Introduction

Medical students benefit from learning about and participating in research throughout their training. These benefits include being able to critically evaluate and incorporate research evidence into their practice [1], improved academic performance [2], and preparing them for potential research requirements of speciality training [3]. The amount and type of research activity, whether embedded in the regular medical curriculum or offered as an optional extracurricular activity, varies considerably

Summary

- What is already known on this subject
  - Medical student research can improve critical thinking, academic performance, and implementation of evidence-based practice, among other factors.
  - The nature and amount of research activity embedded into regular medical training vary considerably across Australian medical schools.
  - Barriers and enablers to medical student research are likely to be specific to rural areas and extracurricular research structures.
- What this paper adds
  - Engaging with extracurricular research in a rural area provides a unique context for medical students and supervisors, influenced by barriers and enablers to research participation and project completion.
  - Workforce shortages in rural areas severely restrict the time healthcare workers have for research; however, access to medical students increases their capacity for research.
  - Improving the process for gaining ethical approval for student projects and having projects of interest available at the start of yearlong placements may improve project completion rates and the likelihood of progressing to publication.

across medical schools despite these benefits. To further encourage medical students to participate in research, a number of studies have assessed barriers and enablers to research participation [4, 5]. Barriers include a lack of research training, financial constraints, insufficient access to suitable research supervisors, lack of time or interest, and perceptions that research would detract from their studies [5]. A recent (2024) systematic review [5] not specific to rural areas identified 18 eligible studies which documented a lack of research training for medical students as prohibiting research activity, making this the most common barrier identified. This finding further highlights the substantial variability in the amount and type of research training within the curriculum of medical schools. The inconsistency and lack of research training are problematic as they may impact medical students' skill development (e.g., critical thinking) and academic performance. Furthermore, there are likely to be flow-on effects later in their careers such as being unprepared for research during speciality training and while working as a doctor and being less equipped to implement evidence-based practice.

Medical students are often attracted to research because they feel it will strengthen their curriculum vitae (CV). Other motivations include promoting skill development (e.g., critical thinking, literature interpretation abilities), financial incentives (e.g., paid research opportunities) or a personal interest in the topic [5]. Understanding barriers and enablers supports the development of strategies to increase medical students' research participation. However, previous evidence has largely omitted the experiences of supervisors, with findings typically generated from students' perspectives [2]. Supervisors of medical student research are typically drawn from within local health services and/or academics at the institution [6]. Having healthcare workers and academics responsible for research supervision means that they, like students, have conflicting time demands (e.g., patients, other research, education) and varying levels of research experience and support [7]. Evidence is required to understand the needs of supervisors and how they can be better supported to guide medical students undertaking research.

Medical training in rural areas has expanded greatly in the last ~20 years; however, most evidence relating to medical student research participation outcomes is generated from metropolitan medical schools and may not be generalisable to non-metropolitan (henceforth referred to as 'rural') contexts [2]. Healthcare workers in rural areas have differing resources (financial and infrastructural), research expertise, and workforce capacity compared to their metropolitan counterparts. By extension, students training rurally may experience different barriers and enablers to research participation—or experience the same barriers differently—compared to peers in metropolitan areas. Published literature exploring medical student research at one rural-based programme showed similar publication rates to those previously reported in metropolitan medical schools, despite high rates of non-participation by students interested in research and projects being delayed or discontinued [6]. While this finding is positive, the study's use of administrative data precludes any exploration of students' and supervisors' experiences, and therefore cannot fully inform future improvements to student participation in research in rural areas. Therefore, the purpose of this study was to explore student and supervisor experiences of medical student research activity in a rural area, including reasons for interested students not engaging in research and projects being delayed or discontinued.

2 | Methods

2.1 | Context

This study relates to medical student research at one rural clinical school (RCS) which hosts students at four different rural locations (all classified Modified Monash Model 2) within Queensland, Australia. At the time of data collection, the Doctor of Medicine (MD) program had limited research opportunities embedded within the curriculum, with the exception of a short quality improvement activity undertaken by all domestic students during placement. As such, medical student research experiences were predominantly extracurricular. Those attending the RCS (years three and/or four of the MD) could express an interest in research at the beginning of the year; students may then be matched to a suitable supervisor and project across the year, as opportunities become available. Students may also identify their own project/supervisor across the year and gain approval from the medical school. Supervisors must have an affiliation with the university (e.g., employment, adjunct, or academic title) but are not provided with formal research/supervision training by the medical school and are not formally 'screened' to accredit their research abilities and capacity to supervise. Where possible, RCS staff provided high-level support to supervisors and students (e.g., advice on research design and methodology), noting that this is contingent on the capacity of the few research-focused staff employed by the RCS.

2.2 | Methodology and Research Design

This convergent mixed-methods study [8] was comprised of an online survey and semi-structured interviews. The bespoke survey was distributed to medical students and semi-structured interviews were conducted with medical students' research supervisors. The decision to conduct surveys and interviews on separate participant groups was based on logistical challenges in scheduling interviews with students and that previous research [6] had explored administrative datasets to gain insights into medical student's research interests and outcomes. As such, we felt that it was the supervisors' perspectives that warranted a more detailed investigation via the qualitative interviews. This study was approved by the University of Queensland Human Research Ethics Committee (Ref: 2023/HE001643).

2.3 | Data Collection and Analysis

2.3.1 | Student Survey

A copy of the survey instrument is available as Appendix S1. Students who expressed an interest in research over the last 2 years ($N = 78$) were invited to participate in the study regardless of whether they participated in research during their time at the RCS. This recruitment approach aimed to understand the reasons why interested students did not complete research and why certain projects were discontinued. Students were emailed a link to the survey, which was distributed online via Qualtrics (Provo, UT) in October 2023. The survey comprised closed and open-ended questions and was designed to take < 10 min to complete. A total of three reminders were emailed. Demographic information was not obtained within the survey to protect participant anonymity of the small number of potential respondents.

Following the closure of the online survey, data were exported to SPSS version 29 (IBM Corp, Armonk, NY) for cleaning, coding, and analysis. Closed-ended questions are reported as frequencies and percentages. Open-ended questions were reviewed by the research team but, due to inadequate data, were omitted from the qualitative analysis.

2.3.2 | Supervisor Interviews

A copy of the interview guide is provided in Appendix S2. The guide was not provided to participants prior to the interview. Supervisors from the last 2 years who were not involved with this study ($N = 19$) were invited to participate irrespective of how far their project had progressed and their completion status. Potential respondents were contacted by email and three reminders were sent. Interviews were conducted between June and July 2024 and were held online via Zoom (Version 6.1.11; Zoom Video Communications Inc). The interviewer is an experienced qualitative researcher who holds a PhD (WM). He had no prior relationship with the participants; participants were informed of the interviewer's occupation and role in the project prior to the interviews. Interviews lasted up to 53 min and were automatically transcribed verbatim using the interview software and subsequently reviewed for accuracy by the interviewer but not returned to participants for correction or comment and no field notes were collected during the interviews. No repeat interviews were carried out.

Qualitative data were analysed using a thematic analysis approach [9] where the researchers became familiar with the data, interpreted meaning and identified patterns across the data set. Themes were subsequently developed for reporting. Two researchers (WM and PM) undertook this process, and the broader authorship team helped with the verification and interpretation of findings. Two researchers were involved in the process, participated in peer checks, and ensured the data's conformability. Coding decisions were tracked, and regular discussions occurred during data analysis processes to ensure dependability. Transferability of findings to other settings was supported by the study encompassing students and supervisors from several geographical areas.

2.4 | Reflexivity and Trustworthiness

Some researchers (JLF, MM, SKC, PM) were known to participants due to their role in the RCS; hence, a researcher from an external organisation (WM) conducted all interviews to minimise perceived power imbalances and encourage supervisors to provide honest feedback about their experiences. Surveys were conducted online and were anonymous and voluntary. The authors considered how their professional prior assumptions, backgrounds, and experience impacted data extraction and analysis. JLF is a rural health researcher; at the time of the study, she was jointly responsible for coordinating and supporting extracurricular student research at the RCS. MM is an experienced rural health researcher. DE is an experienced researcher and medical educator responsible for overseeing medical student research across the medical faculty. SKC is an experienced rural health researcher. PM is a rural health and educational researcher and occupational therapist with experience in qualitative methods; at the time of the study, she was jointly responsible for coordinating and supporting extracurricular student research at the RCS. WM is a rural health researcher with a background in education, physiology, and basic sciences and is experienced in qualitative research methods. WM approached interview data collection and analysis through the lens of an educator with experience supervising medical student-led research and clinical audits. JF, MM, DE, SKC, and PM interpreted the results in the context of their experience as rural health researchers and their roles in overseeing medical student research within the RCS and across the wider medical school.

Through the demonstration of credibility, dependability, transferability, and confirmability, the researchers ensured the trustworthiness of the research [10]. To establish credibility, the researchers have offered detailed information on data collection and analysis, including all relevant data in their analysis. The researchers maintained objectivity by acknowledging and discussing potential biases, staying impartial throughout the study, and adopting a neutral position when representing participant voices in the findings. The researchers recognised their diverse areas of expertise, personal biases, methodological preferences, and worldviews as they conducted the study, thereby exemplifying reflexivity [11].

3 | Results

While the intent was that the survey and interviews would contribute equally to the study, the number of survey responses returned was low. As such, interviews were the main source of data for this project, with survey responses used to provide context around research participation and activities across the study period.

3.1 | Survey

Of the 14 survey respondents (18% response rate), 7 (50%) were third-year students, 5 (36%) were fourth-year students, and 2 (14%) had graduated from the program. Nine (64%) respondents had participated in research prior to coming to the RCS, and this included Honours research ($N=2$) and other structured research activities ($N=2$). Reasons for expressing an interest in research included gaining new skills ($N=10$; 71%), strengthening their CV ($N=8$; 57%), interest in a future research career ($N=6$; 43%), and encouragement from a supervisor/staff member ($N=4$; 29%). When expressing an interest in research, students hoped to gain skills in quantitative data analysis ($N=12$; 86%), qualitative data analysis ($N=11$; 79%), research design ($N=11$; 79%), academic writing ($N=9$; 64%), literature reviewing ($N=8$; 57%), and developing ethics applications ($N=3$; 21%). Only 3 respondents (21%) had a specific type of project they wanted to complete, and 4 (29%) had a particular clinical area they wanted to explore.

Eight respondents (57%) were working on a project at the time of survey completion, 4 (29%) did not engage with a project while at the RCS, 2 (14%) were assigned to a project that was later discontinued, and 1 (7%) had completed the project/their role on the project. For students who engaged in research and answered the relevant survey questions ($N=7$), they joined the project because it was in their clinical area(s) of interest ($N=5$; 71%), it was with a supervisor they wanted to work with ($N=5$; 71%) or it was the type of project they were interested in ($N=5$; 71%). Six respondents (86%) felt they were adequately prepared/skilled for participating in the project, and 7 (100%) reported that participating in research met their expectations. Six respondents (86%) felt that assisting with the project benefitted the supervisor.

3.2 | Participants Interviews

A total of 10 interviews were completed with participants who responded to the invitation to participate. All participants resided rurally (classified Modified Monash Model 2) and were predominantly male doctors. Participants were from six healthcare providers in four regional centres. Further participant details are provided in Table 1.

3.3 | Thematic Analysis

During the interviews, participants described their experience of supervising extracurricular student research within rural healthcare centres. Supervisors critically reflected on the benefits created by the research process, analysed the challenges they encountered and potential solutions to them, and reflected on their affective experience. Analysis of this rich data led to the creation of three themes and five sub-themes: advantageous partnerships (collegially co-designed, student benefits, and broader benefits), navigating research processes (time constraints and lengthy processes impacting workloads, and support needs), and setting students up for success.

3.3.1 | Theme 1: Advantageous Partnership

3.3.1.1 | Collegially Co-Designed. Most supervisors positively described their supervision of extracurricular student research and found it intrinsically rewarding: "I love doing [student research] because at the end, there's there are a lot of 'aha' moments" (P09). Participants were motivated to supervise students so that they could share their "passion"

TABLE 1 | Participant demographics.

					Extracurricular research supervision		
Identifier	**Gender**	**Profession**	**Years in profession**	**Medical specialty**	**Years of experience**	**Total students**	**Intending to continue**
P01	F	Nurse, Midwife	40	NA	5	8	Yes
P02	M	Doctor	28	Anaesthetic ICU	5	10	Maybe
P03	M	Doctor	18	Not stated	2	6	Yes
P04	F	Doctor	18	Orthopaedics	<1	6	Yes
P05	M	Doctor	20	Orthopaedics	<1	1	Yes
P06	M	Doctor	22	Nephrologist	7	5	Yes
P07	M	Doctor	36	Nephrologist	5	4	Yes
P08	M	Doctor	13	Medical oncology	3	2	Yes
P09	M	Doctor	37	Paediatrician	10	≥ 30	Yes
P10	M	Doctor	27	Radiation oncologist	4	5	Yes

Abbreviations: F, female; ICU, intensive care unit; M, male; NA, not applicable.

and "opportunities" arising from their research (P06). Supervisors also wanted to provide research experiences which were "a little better" than those they received in their own training (P06) and made efforts to ensure that students felt "like part of the team" (P08). The needs of students were central to supervisors' teaching approaches, with the majority of supervisors articulating student-centred approaches to supervision and teaching.

> It's really for me ... more like enabling them to explore their own ideas and trying not to spoon-feed them ... supporting them and offering guidance where I could and allowing them to find their own way.
>
> (P07)

> It's not me deciding. It's mutually agreed between the two of us. It's a partnership.
>
> (P10)

3.3.1.2 | Student Benefits. Supervisors detailed multiple benefits to students from engaging in extracurricular research. These included general learning opportunities (P02, P07, P08), gaining experience or knowledge in an area of interest (P05), improved networking (P02, P04), strengthening students' CV (P03, P04), contributing to medical college (speciality or sub-speciality training) entry requirements, gaining research skills and experience (P03, P05, P06, P08, P10), learning to critically evaluate published literature (P04) and obtain grants (P06), and delivering presentations and obtaining authorship on academic manuscripts (P02, P04, P05, P06, P10).

> They all get good benefits... they can have a paper under their name, they will learn during the process, and they have some networking with other people.
>
> (P02)

> I think that being able to actually read that research and know what goes into research ... [that] gives you a much better understanding of the literature as you go forward.
>
> (P04)

3.3.1.3 | Broader Benefits. Overall, the extracurricular research activities were seen as "win-win" arrangements which provided benefits not just to students, but also to their supervisors and the health service (P5, P06, P10). Supervisors explored the benefits to themselves and others due to students' participation in the research projects. These benefits mostly flowed to supervisors (such as academic benefits), followed by benefits to health services (such as workforce recruitment or improvements in healthcare), and less commonly, the broader community. Perceived benefits to supervisors related to reductions in workload (P04, P06, P08–P10), "progress" on academic titles (P03), having a paper "under my name" (P02), receiving non-expert perspectives on their research (P04), students returning to rural sites to work after their training (P09), contributing to their continuing professional development (P07), and personal learning from students and the research process (P03, P08). One participant also noted intrinsic benefits to their participation.

> When I look at those people who help me to stand on my feet, why can't I help somebody to stand on their feet? That's the major motivation for me, where somebody becomes someone tomorrow.
>
> (P09)

A few supervisors mused upon the broader benefits to their health service and rural communities. Direct benefits discussed by supervisors included improved patient care (P03, P07) and collecting data to advocate for improved services (P05). Supervisors also hypothesised that students engaging in research in rural sites could help "dissolve some of the stigma or biases and barriers" that negatively affect rural workforce recruitment and retention (P03). This could provide "massive" future benefits to "suffering" rural health services by attracting doctors and researchers to "[rural] areas to grow [their] research career" (P08). One supervisor felt that the opportunities provided through the extracurricular research program had already led to an increase in students returning to work in [rural] hospitals post-graduation (P09), while a second participant hoped for a similar outcome.

> We're transforming rural and regional sites. Rather than the stigma of being backward backwater ... I'm hoping that's what [extracurricular research] ultimately gets us. A better name, a better training site, ... more trainees. I think this is how we ... dig ourselves out of ... working too hard [due to workforce shortages].
>
> (P03)

One supervisor felt the opportunities for positive impact were greater still. With students analysing their collected data—a task beyond the capacity of the local workforce—they felt they could objectively demonstrate the benefits of their services in rural areas, thereby improving access and healthcare outcomes for rural inhabitants.

> If we can show there's value in putting radiation oncology services closer to where people live ... You know, "here's proof of the principle" that investing in regional centres, produces good outcomes, then that can enhance everything and that's good for everyone.
>
> (P10)

3.3.2 | Theme 2: Navigating Research Processes

3.3.2.1 | Time Constraints and Lengthy Processes Impacting Workloads. The most common barrier to extracurricular research discussed by supervisors was the impact of limited time (P01-P02, P04, P06, P08–P10). For supervisors, lack of time

for research was accentuated by "staffing crises" and medical practitioner "turnover" (P04). Staff shortages flow into workload, with participants reporting excessive and problematic workloads.

> My hours [are] already like 12 h a day you know. All my research [occurs in] my spare time on the weekend and after 8:00 at night.
>
> (P02)

> The clinicians have other priorities ...it comes down to the lack of a dedicated time to do [research].
>
> (P03)

Students time barriers presented differently, with constraints relating instead to study burden, placement hours, hospital placement duration, and rotation requirements.

> It can delay [the research] for weeksor months. [The] person might go away for 1 month.
>
> (P02)

The principal barrier was the interaction between students' placement duration and lengthy research processes such as ethics applications.

> They had such a short time with us ... by the time you put together a protocol, get it ready to submit to ethics—they've probably already moved on or [they're] doing a different rotation where they are more busy.
>
> (P08)

Supervisors felt that student research could be supported by: streamlining processes (P03, P05, P07); starting research early (P05, P07); being organised, practical, and having pre-established projects (P08, P10); expanding students' timelines (P09); and designing projects which can run over multiple student cohorts (P02, P05, P10) or across multiple sites so that students moving for rotations can easily continue their research (P04). Supervisors expressed that employers also have a role to play and could assist by accepting that student research supervision is part of a clinician's teaching role (P08) and by endeavouring to provide their non-clinical time (P03-P04).

3.3.2.2 | Support Needs. Supervisors further elaborated on the challenges related to research processes. Chief among these was the lengthiness of ethical and approval processes (P04, P07–P08), which were generally viewed as too long relative to student placements (P04, P07). One supervisor had experienced substantial delays due to requested 'unreasonable' revisions.

> [Human Research Ethics Committee, HREC] at [hospital] is stupidly complicated ... [the] standard is way higher than is needed ... I was doing a [negligible risk non-clinical project]... the [HREC] was just getting into this stupid level of detail.
>
> (P08)

Other challenges included arranging data access for students (P05), particularly for students undertaking research with non-public providers (P10).

> We're a private organisation ... some [data] is kept on the hospital system ... but some of it's kept in our data system ... when a student comes ... we put them on as an unpaid employee so that they can get access to the data.
>
> (P10)

Reflections from supervisors on changes which could improve research processes explored a variety of topics. Some suggestions explored changes in health service processes such as embracing digital vs. paper records (P08) and streamlining ethics processes (P07-P08). Others emphasised training on how to supervise research (P04, P08) and ensuring research support librarians (P07), the RCS (P02, P08), and increased university investment in rural research and student research scholarships (P09).

3.3.3 | Theme 3: Setting Students Up for Success

Most supervisors positively reflected on their students and described their "motivation", "perseverance", and "enthusiasm" as the greatest enablers of successful engagement in a research project (P01, P02, P06, P07, P09, P10).

> Number one is motivation. Number two is motivation. Number three is motivation.
>
> (P09)

Supervisors also explored what else supported, or could support, students to successfully engage in the research projects. Clear outputs from the research, such as publications, CV building, and skill development, were seen as driving student engagement (P04, P08-P10). Designing projects that are achievable (P03, P06, P08), match student interests (P03, P05), and are relevant to students (P03-P04, P07, P10) were felt to improve students' probability of successfully completing a project.

> Projects that are achievable within a year, mindful of any external rotation they might have ... [it does not] need to be a complex question; it just needs to achieve a paper and an outcome.
>
> (P03)

Other avenues for improving student engagement included understanding their interests (P06), providing one-page summaries of available projects (P06), ensuring that they are given purpose and are valued (P04), making them part of the team (P08), providing a "supportive, enthusiastic, engaging" environment (P03), "enthusiastically promoting [research] at the beginning [of the placement]" (P04), "cultivating" interest in research (P07), and addressing the misconception that research is "too hard" and "cumbersome" (P03).

4 | Discussion

The purpose of this study was to investigate medical students' and supervisors' experiences of engaging in research in a rural area, including barriers and enablers to student research and factors contributing to projects being delayed and/or discontinued. Approximately 50% of interested students participated in research; comparable evidence from Australia and internationally suggested a high proportion of each cohort reported being interested in research but only a small proportion went on to actively engage with a project [12, 13]. Our data also support previous findings that a key factor influencing students' engagement with a research project is their interest in the topic [6, 14]. Our data is the first to show that the experience of supervisors in rural locations is unique, characterised by time constraints beyond what is typically encountered in metropolitan healthcare settings and an absence of dedicated research time during work hours. As such, despite some similarities with past research on the common barriers and enablers, these data highlight that to improve satisfaction and research outcomes for students and supervisors, targeted supports and strategies are needed which are relevant to rural contexts.

Students' motivations for engaging in research is essential to capture given that it can lead to improved critical thinking and evidence-based practice as well as medical students who participate in research being more likely to engage in research and academic publishing later in their careers [15]. In this study, students were most commonly motivated by self-development, including increasing their own skills and boosting their CVs. In comparison, supervisors referenced their own needs (building their research profile and academic standing) as well as a range of benefits to other stakeholders including the student, health service, and wider community. Supervisors often reported on rural workforce shortages and an absence of dedicated research time as factors leading them to reduce their research activity or complete it in their personal time. Significant underinvestment in rural-based health research compared with metropolitan areas is widely acknowledged [16, 17]. Supervisors reflected on the value of medical students for capacity building within the health service, with students supporting—or even enabling—research activity in the supervisor's resource- and time-constrained context. As a flow-on effect, supervisors perceived that this increased research capacity had the potential to improve workforce outcomes in rural settings whereby students saw firsthand the opportunities available to them and were more inclined to stay in a rural health service post-graduation. Supervisors postulated that demonstrating research opportunities available within the rural healthcare setting was likely to entice healthcare workers by showing that working in the setting does not prevent such opportunities for staff. Past evidence has demonstrated that investing in research capacity building in rural health services, in a manner that contextualises the environment and needs of the health service [18], can have tangible outcomes on project completion and publication [19]. As such, investing in medical student research in rural areas may form part of the solution for increasing research capacity within health services. In metropolitan hospitals, research is often considered to be part of the 'core business' [20]. Building the research profiles of rural health services may therefore help to portray that rural hospitals are still desirable work environments, despite the current workforce shortages.

Time constraints for students were also cited frequently as a barrier to research activity and project completion, from a supervisor's perspective. Specifically, at the time of the study, students trained rurally for 1- or 2-year rotations, which often meant that by the time supervisors had completed pre-study requirements such as ethics and research collaboration agreements and negotiating access to patient data, limited time was left for project completion, particularly getting it to a stage where it was suitable for publication. In this way, project momentum was often lost as students moved to different training locations and/or transitioned into the workforce. Furthermore, supervisors often felt that processes such as obtaining ethical clearance were at times made unnecessarily complicated and onerous, with non-sensitive or low-risk projects experiencing excessive scrutiny which delayed the project. This type of concern has been cited in rural health services elsewhere whereby, when attempting to do low-risk research (e.g., quality improvement), often the ethical processes and additional requirements were not proportional to the size, complexity, or risk level of the project, acting as a source of frustration and a deterrent from completing research [21]. Given these concerns, it is recommended that strategies are rolled out to efficiently assess and enable low-risk research projects in rural healthcare settings.

Several supervisors suggested that to facilitate project completion, projects should be designed to be completed within approximately 1 year. While this may be achievable for smaller projects such as case studies or audits, past research has shown that publication adds further delay, with only 16% of medical student research projects published within a year of completion [22]. However, these data pertain to a summer research program where students likely had dedicated research time, unlike the present study where research was extracurricular. As such, aiming for medical students to complete research projects within 12 months (especially to publication standard) may be an ambitious target and therefore other strategies should be prioritised.

In enabling medical student research and counteracting some of the barriers posed, supervisors frequently spoke of the importance of recruiting students who were sufficiently motivated to participate in research. Ways to authentically measure the level of motivation need to be explored in this context. Given the level of personal-time commitments required from the students, this finding suggests students should be carefully selected for extracurricular research. Other strategies which could be considered include providing projects with pre-approved ethics, covering a variety of topics, and projects which are longitudinal [23]. However, these strategies may create a spurious workload for clinicians and ethics committees if projects are designed, approved, and not completed due to a lack of student interest [24]. Furthermore, longitudinal projects would need to be designed to ensure all students can contribute significantly enough to warrant authorship. In this regard, while a number of strategies for including medical students in rurally focused research have been postulated in our own study and past work [25], our data highlight the need for practical strategies which consider the resource-constrained rural context.

This study represents the most detailed investigation to date regarding enablers and barriers to medical student research in a

rural context. Though medical student response rates were low, data received from students align with the experiences of supervisors and existing literature. Findings from the study highlight that time available for research, relating to high workloads and a lack of dedicated research time for healthcare workers as well as short-term placements for students, poses considerable barriers to medical student research in a rural context. Requirements for ethical approval, which were not proportional to the risk level of the research, were also emphasised as a factor causing substantial delays to research in rural healthcare settings. As such, future work should compare the experiences of students and supervisors from metropolitan and rural areas as well as seek to implement strategies for increased medical student research activity and completion rates. When interpreting our study findings, it is useful to note that the structure of student research at this RCS has been revised since the completion of data collection. In the revised structure, all medical students must complete a yearlong research project; the change to compulsory research activity and more substantial projects may be seen as an increased emphasis on/investment in research and, as such, future investigations identifying whether this has had a subsequent impact on research outcomes or publication rates should be considered.

5 | Conclusions

The benefits of research activity for medical students are well established; however, the rural environment appears to influence barriers and enablers to extracurricular research for medical students and supervisors. Barriers to research participation largely relate to time constraints for students and supervisors; supervisors already face workforce pressures and are not being allocated dedicated research time, while students are in the same location for a finite time, with part of this time often spent waiting for ethics and other approvals. Enablers include ensuring students with appropriate motivations are selected for extracurricular opportunities and, where possible, having projects established (e.g., ethics approval etc. obtained) for students to join early in their training to maximise the time they have for project work and subsequently increase the likelihood that the project will lead to a publication.

Author Contributions

Conceptualization: J.L.F., M.M., D.E., S.K.-C., P.M.; Supervision: J.L.F., P.M.; Data curation: J.L.F., W.M.; Formal analysis: J.L.F., W.M., P.M.; Writing – original draft preparation: J.L.F., W.M., P.M.; Writing – reviewing and editing: M.M., D.E., S.K.-C.

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Ethics Statement

This study received ethical approval from the University of Queensland Human Research Ethics Committee (Ref: 2023/HE001643).

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.