



Selected Topics: Prehospital Care

PARAMEDICS AS RESEARCHERS: A SYSTEMATIC REVIEW OF PARAMEDIC PERSPECTIVES OF ENGAGING IN RESEARCH ACTIVITY FROM TRAINING TO PRACTICE

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Abstract— Background: The need for a stronger evidence-base in paramedicine has precipitated a rapid development of prehospital research agendas. Paramedics are increasingly involved in research, leading to changes in their role. Yet, the integration of research responsibilities has proven to be challenging, resulting in varying attitudes and levels of engagement. **Objective:** This systematic review aimed to explore paramedics' views and experiences of research as researchers during training and within practice. **Methods:** A systematic search was performed across six databases. Qualitative empirical peer-reviewed articles that discussed paramedic perspectives on engaging with research activity were included. Of 10,594 articles identified initially, 11 were included in the final synthesis after quality appraisal. **Data** were extracted and subjected to narrative synthesis. **Results:** The following four themes were identified: motivation to engage, moral dilemmas, structural issues within the profession, and reflections on trial involvement. **Attitudes** toward research, understanding of related concepts, and the drive for patient benefit were interwoven core issues. **Conclusions:** Research was highly valued when links to patient benefit were obvious, however, this review highlights some cultural resistance to research, particularly regarding informed consent and changes to standard practice. **Paramedic research methods training**

should provide structured opportunities to explore concerns and emphasize the role of research in developing a high-quality evidence base to underpin safe practice. Currently, there is inadequate organizational support for paramedics to engage effectively in research activity, with minimal allocations of time, training, and remuneration. Without properly integrating research activity into the paramedic role, their capacity to engage with research activity is limited. © 2024 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Keywords—paramedics; prehospital; research; trials; evidence-based practice

INTRODUCTION

In the United Kingdom, paramedicine has been a regulated allied health profession since 2001, with practice historically founded on best-practice and reasonable assumptions governing care (1,2). While still in its infancy, there has been a recent exponential growth in the volume of prehospital research (3–5). Simultaneously, the paramedic role has evolved from being vocationally trained and protocol-driven, to requiring tertiary-level qualification with heightened expectations for clinical autonomy and delivery of evidence-based practice (EBP)

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(6,7). EBP is now widely regarded to be an essential tenet of providing safe and effective health care, including paramedicine (8). It is defined as the combination of quality research evidence, patient preferences, and clinical experience to enhance the treatment provided (9).

It is the outcomes of research that drive EBP, and health care providers are expected to evaluate and incorporate findings into their practice (10). Increasingly, there is an expectation that paramedics play a role in the design and conduct of research (6). The rapid development of prehospital research agendas to address the need for more research in this area has led to changes to the paramedic role; paramedics are now involved in research as researchers, such as being tasked with enrolling patients into research projects and delivering research interventions (4,8,11). Outside of paramedicine, previous reviews with clinicians and allied health professionals have concluded that engagement in research is likely to lead to health care performance improvements in terms of processes of care and health care outcomes (12,13). However, the introduction of research tasks to the role has proven to be challenging, with varying levels of engagement from paramedics and the identification of multiple barriers (14). For example, challenges with gaining informed consent and a lack of contractual time for research (15,16). Furthermore, dedicating time to research activities, for instance, the consent process, may not align with paramedics' traditional priorities of treating and getting a patient to hospital as soon as possible (4).

With increasing demands on paramedics, additional tasks, such as research, may be seen as burdensome on their already limited capacity (17,18). Engagement with research activity does not automatically occur, it requires organizational commitment to foster the acceptance and adoption of research practice, accompanied by a culture shift within paramedicine toward this way of working (6,19). It also requires researchers and clinical trial managers to develop effective means of facilitating paramedic engagement (4,20).

Views of research as part of the paramedic role are likely formed early in a paramedic's career or during training. Paramedics in the United Kingdom must complete a preregistration qualification to register with the Health and Care Professions Council; this is increasingly undertaken in higher education institutions. Paramedicine does not have a strong tradition of research, and the relationship between higher education and professionalism is perhaps not as straightforward as in other disciplines (21,22). Furthermore, students often choose allied health training due to their interest in patient care (23). After the emergence of research as a component of the paramedic role, the focus on research in paramedic education is increasing, however, engrained beliefs about the prioritization of hands-on care can form a significant barrier to success-

fully teaching research (7,24). A better understanding of student attitudes that may form barriers to acceptance of research is required.

To better understand how research activity can be promoted most effectively within paramedicine, it is necessary to first explore current views within the profession. This will contribute to the development of strategies to support research engagement, foster positive attitudes toward the role of research in paramedicine, and increase paramedic understanding of research (25). The purpose of this systematic literature review was to synthesize the available empirical qualitative literature to address the following review question, which was defined under the SPICE (setting, perspective, intervention/phenomenon of interest, comparison, and evaluation) framework: What are paramedics' views and experiences of research as researchers during training and within practice? (26).

METHODS

This review followed the six stages outlined in the Enhancing Transparency in Reporting the Synthesis of Qualitative Research guidelines, and the reporting was guided by the standards of the Preferred Reporting Items for Systematic Review and Meta-Analysis Statement (27,28). Details of the protocol were registered on PROSPERO (ID: CRD42022310711).

Search Strategy

A research librarian supported the refinement of search terms and identification of databases most likely to produce appropriate results. During this initial scoping research, Google Scholar was also explored. Formal searches were performed in 2022 in the following five electronic databases: PubMed, APA PsycINFO, CINAHL (The Cumulative Index to Nursing and Allied Health Literature), Web of Science, and Cochrane Library. To maximize the amount of relevant literature, truncation (*) and Boolean operators "AND/OR" were applied. The following search strategy was applied to title and abstract:

*Paramedi** OR *Prehospital* OR "*pre hospital*" OR *ambulance* OR *EMT* OR "*Emergency Medical Technician**" OR "*paramedical clinician**" OR "*prehospital research*" AND *research* OR "*research method**" OR "*data collect**" AND *engage** OR *access** OR *participat** OR *support* OR *perspective** OR *involve** OR *perception** OR *view** OR "*paramedic-driven*" OR "*driven*" OR "*paramedic-led*" OR *led* OR *experience**

Study Selection

Inclusion and exclusion criteria were set before any search commencement. To be eligible, articles needed to

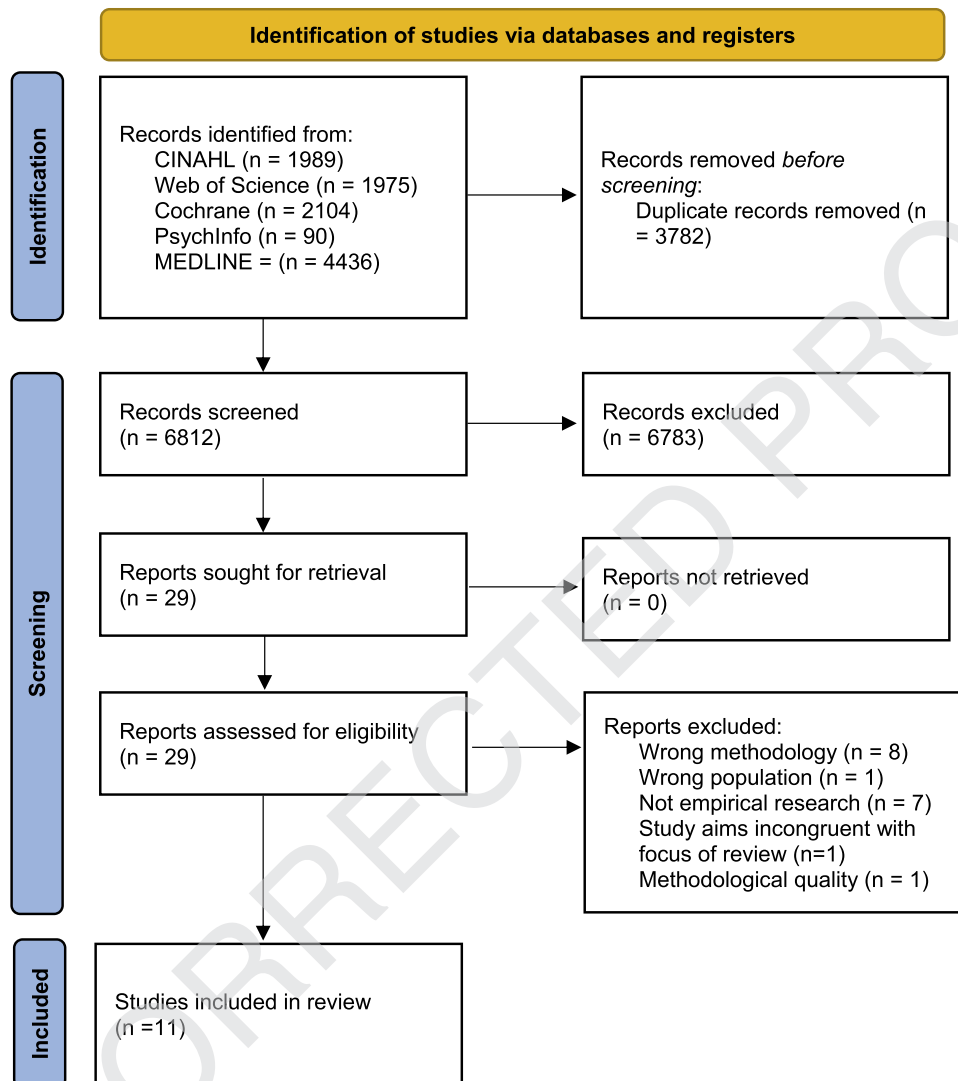


Figure 1. Preferred Reporting Items for Systematic Review and Meta-Analysis flow diagram for article selection (28). CINAHL = The Cumulative Index to Nursing and Allied Health Literature.

116 use a qualitative research design and discuss paramedic
117 or student paramedic perspectives on research or experi-
118 ences of involvement in conducting research. Studies
119 using mixed methods were eligible, but only the qual-
120 itative data were included in the synthesis. The review
121 focused on qualitative research because the aim was to
122 understand perceptions and experiences that cannot be
123 gleaned from quantitative data. No date restrictions were
124 applied. Articles were excluded if they were not peer re-
125 viewed or not published in the English language or if no
126 published English language translation was available.

127 All authors independently screened items yielded by
128 the search against the eligibility criteria, initially by titles
129 and abstracts and then by full text (Figure 1). Uncertain-
130 ties were resolved through group consensus. To support
131 reliability, one author (J.R.) screened 10% of the excluded

132 articles with 100% agreement. Lastly, the reference lists
133 of all included articles were searched, and a hand search
134 of Google Scholar was conducted; no additional relevant
135 articles were identified at this stage.

Quality Assessment 136

137 Each included article was independently assessed for
138 quality by two authors using the JBI Critical Appraisal
139 Checklist for Qualitative Research (29). Adherence to
140 each item is answered with “yes,” “no,” “unclear,” or “not
141 applicable.” A numerical value of 1 was attached to each
142 “yes” answer; a minimum score of 0 and a maximum
143 score of 10 could be awarded by each reviewer and over-
144 all quality was determined by averaging scores. Table 1
145 presents the allocated JBI scores. Q7

Table 1. JBI Quality Appraisal Scores

Study, First Author, Year	JBI Quality Scores*		
	Reviewer 1	Reviewer 2	Mean
Ankolekar, 2014 (16)	7	9	8
Armstrong, 2019 (30)	7	7	7
Burges Watson, 2012 (20)	8	7	7.5
Charlton, 2019 (31)	10	10	10
Green, 2020 (14)	8	5	6.5
Lazarus, 2019 (32)	4	5	4.5
Leonard, 2012 (33)	5	7	6
Lim, 2014 (34)	2	1	1.5
Pocock, 2016 (35)	5	5	5
Pocock, 2019 (36)	9	9	9
Ripley, 2012 (37)	8	7	7.5
Wilson, 2021 (24)	9	8	8.5

* Each “yes” answered is assigned a numerical value of 1. A minimum score of 0 and maximum score of 10 could be awarded.

146 The evaluation of the studies found variable quality
 147 across the articles. There is no consensus on specific
 148 thresholds for excluding studies from qualitative synthesis
 149 and it is typical for reviewers to make informed deci-
 150 sions based on their topic and the literature identified (38).
 151 Articles of all quality can generate insights for an under-
 152 standing of paramedics’ views, and in the current review,
 153 few relevant studies were identified. Therefore, only one
 154 article was excluded at this stage (34). This was a self-
 155 reflective case study that raised concerns during quality
 156 appraisal in relation to poor methodological and reporting
 157 rigor, it was therefore deemed that inclusion of the study
 158 may jeopardize the integrity of any conclusions drawn
 159 from this review, and it was removed. In total, 11 articles
 160 were included in the final synthesis.

161 *Data Extraction and Synthesis*

162 The following information was extracted from the in-
 163 cluded articles into an Excel spreadsheet: authors, title,
 164 year of publication, country, aim/research question, popu-
 165 lation/participant demographic characteristics, methodol-
 166 ogy and methods, findings, and conclusions. As is typical
 167 of qualitative research, variation in reporting styles across
 168 articles presented challenges in identifying the most ap-
 169 propriate findings, therefore all text labeled as “findings”
 170 were extracted (39,40). Key information is summarized in
 171 **Q8** Supplementary Table 1.

172 A narrative synthesis was performed in accordance
 173 with the synthesis method set out by Thomas and Harden
 174 (40). This inductive method is well-suited to synthesize
 175 empirical research conducted across different research

paradigms (e.g., medicine and psychology) (41). It com-
 176 prises the following three stages: coding text, developing
 177 descriptive themes, and generating analytical themes that
 178 address the research question. 179

In the first stage, all authors independently undertook
 180 line-by-line coding in which they coded the text in consid-
 181 eration of meaning and content. This stage was iterative,
 182 as the text within each code was repeatedly examined to
 183 check the consistency of interpretation and to see whether
 184 additional levels of coding were needed. The initial codes
 185 from all authors were then combined and grouped into
 186 descriptive codes through group discussion. After which,
 187 using an iterative process and discussion among authors,
 188 descriptive codes were grouped into analytical themes that
 189 provided a narrative to answer the review question. 190

191 **RESULTS**

192 *Presentation of Studies*

The initial search returned a total of 10,594 articles, as
 193 shown in Figure 1, from which 3782 duplicates were re-
 194 moved. Screening at the level of title and abstract resulted
 195 in the exclusion of 6783 articles. Full texts from the re-
 196 maining 29 studies were assessed against the eligibility
 197 criteria and quality appraised, and 18 studies were ex-
 198 cluded subsequently. No additional relevant articles were
 199 identified through further hand searching. In total, 11 ar-
 200 ticles were included in the final synthesis. 201

Full details of included studies are listed in Supple-
 202 mentary Table 1. Studies had a publication date range
 203

Table 2. Themes Extracted from Data

Theme	Theme Description	Data Extraction Sources
Motivation and reservations	Factors that were reported to have been influential in paramedics' decisions whether to engage with research	Ankolekar et al. (16) Burgess Watson et al. (20) Charlton et al. (31) Leonard et al. (33) Pocock et al. (36) Ripley et al. (37)
Moral dilemmas	Issues that concerned paramedics in relation to the morality of research in paramedicine	Ankolekar et al. (16) Armstrong et al. (30) Burgess Watson et al. (20) Charlton et al. (31) Green et al. (14) Lazarus et al. (32) Leonard et al. (33) Pocock et al. (35,36) Ripley et al. (37)
Structural issues in the profession	Factors ingrained within the paramedic profession led to barriers to research engagement	Ankolekar et al. (16) Leonard et al. (33) Pocock et al. (35,36) Green et al. (14) Lazarus et al. (32) Wilson et al. (24)
Reflections on trial involvement	Experiences of past research involvement had an impact on paramedics' views on research.	Ankolekar et al. (16) Lazarus et al. (32) Pocock et al. (35) Leonard et al. (33) Armstrong et al. (30) Green et al. (14)

204 of 2012–2021; most were conducted in the United King-
 205 dom (4,14,16,31,32,35,36), one in Australia (24), one
 206 in the United States (37), and one reported on experi-
 207 ences of paramedics from both the United Kingdom and
 208 United States (20). All studies reported paramedic views
 209 and experiences of research participation; most reported
 210 on specific trials (14,16,31,32,35,36), and others inves-
 211 tigated general perceptions of research (20,24,30,33,37).
 212 All studies were conducted with paramedics, one study
 213 exclusively recruited student paramedics, and sample
 214 sizes had a range of 5–152 (24). Approaches to qualita-
 215 tive study designs included textual content analysis, focus
 216 groups and interviews, with thematic analyses applied in
 217 all studies.

218 *Thematic Findings*

219 The thematic analysis of the findings across the 11
 220 studies generated four themes, as detailed in Table 2.

Theme 1: Motivations and Reservations

221

222 Most articles reported that, overall, research was held
 223 in a positive regard by paramedics. Participants inter-
 224 viewed by Ripley et al. expressed excitement at the
 225 prospect of delivering “ground-breaking” protocols, with
 226 the recognition that research holds potential to improve
 227 national standards (37). Paramedics were patient-focused
 228 in discussing motivations for their involvement, often
 229 driven by the possibility of providing better and faster
 230 care for improved patient outcomes (16,20,31,33,36,37).
 231 Equally, paramedics were resistant if a direct or obvious
 232 benefit to patients was lacking, if administrative pro-
 233 cesses were considered lengthy and out of alignment with
 234 the traditional paramedic role, or threatened autonomous
 235 practice (20,33). Ankolekar et al. identified that some
 236 paramedics were intrinsically motivated to be involved
 237 when they had personal experience of the condition un-
 238 der investigation (16).

239 Paramedics recognized the potential for professional
 240 benefits associated with research. Pride for the profes-
 241 sion drove paramedics to contribute to a stronger evidence
 242 base (20,36,37). There was also recognition of possi-
 243 ble individual career progression and advancement of
 244 practice-based skills (16,33,37). However, the resistance
 245 of colleagues was found to be a barrier, which is pertinent,
 246 given that most paramedics work as part of small teams
 247 (32). Burges Watson et al. suggested that the incorpora-
 248 tion of research within paramedicine precipitated a newly
 249 emerging professional identity, in which the adaptation to
 250 increasing medical roles within the service was welcomed
 251 (20).

252 *Theme 2: Moral Dilemmas*

253 By following stringent procedures to establish consent,
 254 paramedics were confronted with competing priorities of
 255 providing time-sensitive patient care and managing the
 256 emotional status of those on scene (16,20). In addition
 257 to practical challenges, paramedics held conflicting views
 258 regarding the enrollment of patients when consent was not
 259 possible due to a reduced level of consciousness (31,32).
 260 Charlton et al. reported that several paramedics expressed
 261 concern that this impedes patient autonomy, thus render-
 262 ing recruitment to research as immoral and unacceptable
 263 (31). Ankolekar et al. suggested that the development of
 264 an abridged consent procedure for conscious patients may
 265 provide a viable means to address such concerns (16).
 266 However, it was generally reported that paramedics ac-
 267 cepted a lack of consent if the overall goal was to improve
 268 practice (31,32,37).

269 A further ethical dilemma was the unknown efficacy
 270 of interventions being trialed, particularly if protocols
 271 required withholding standard care for trial purposes
 272 (31,33). This led to reluctance from some paramedics to
 273 be involved, with some “equating trial medicines with
 274 placebo” (14,31,36). In addition, some paramedics were
 275 uncomfortable with the blinded nature of trials when they
 276 could not disclose to patients or families whether the stan-
 277 dard or trial treatment was being administered (20,36).
 278 This was significant as “honest relationships with their
 279 patients were seen as fundamental to their identity as
 280 paramedics” (20). Pocock et al. noted that education about
 281 the background and need for research was important to ad-
 282 dress concerns, studies also called for robust and specific
 283 ethics training and continued guidance for paramedics
 284 during data capture periods (14,16,30,35).

285 *Theme 3: Structural Issues within the Paramedic Profes-* 286 *sion*

287 A lack of organizational priority for research was
 288 deemed to be a barrier to engagement with research

(35). Articles reported that paramedics do not have time
 allocated for research activity within contracted hours
 (16,20,33). Consequently, research was viewed as an addi-
 tional task rather than integral to the paramedic role, and
 involvement thus relies on the motivation of individuals.
 The capacity of paramedics to undertake tasks in addition
 to their current workload is further limited by the nature
 of working practices, such as long hours, shift patterns,
 and winter pressures (35). The lack of contractual time
 for research activity contributed to the perception that re-
 search was not part of a paramedic’s role (16,20). This
 view may also be reflective of a lack of research teach-
 ing pre-registration, particularly about how knowledge is
 produced and integrated into practice (24). Without devel-
 oping knowledge of, and confidence in, research at this
 initial stage, paramedics may not feel confident to engage
 with research once qualified (24).

Training to understand the research process is required
 before paramedics can decide whether to be involved;
 however, Ankolekar et al. and Green et al. reported that
 training was unpaid and scheduled outside of working
 hours, which discouraged participation. Attendance at re-
 search training increased when organizations rewarded
 engagement, although instances were rare (14,16,33,35).
 Consequently, voluntary recruitment of paramedics to re-
 search projects was cited as a challenge, although this was
 overcome by mandating involvement (14,35,36). Pocock
 et al. identified that a large-scale research project in-
 volving multiple paramedic teams fostered feelings of
 inclusion and being valued and, therefore, increased will-
 ingness to participate (35).

289 *Theme 4: Reflections on Trial Involvement*

290 Reflections from paramedics about their involvement
 291 in clinical trials were reported across several studies. Ex-
 292 periences of training were positive across some studies,
 293 with ongoing support and regular trial updates found to
 294 be particularly supportive (16,32,33). Simplicity in trial
 295 protocols was highly valued by paramedics involved and
 296 Ankolekar et al. reported that paramedics found trial
 297 processes to be straightforward and became easier with
 298 experience (16,35). However, communication with inves-
 299 tigators was sometimes perceived to be poor, compounded
 300 by a lack of researcher awareness of the prehospital envi-
 301 ronment (30,35). Practically, the mobile nature of the pro-
 302 fession also posed challenges for communication, given
 303 that it was not possible to guarantee that crews would be
 304 at their ambulance station (35). Ineffective communica-
 305 tion channels were thought to prevent trial paramedics
 from reporting protocol deviations to investigators (14).
 These deviations were more common when there were
 large discrepancies between trial protocols and standard
 practice or when there was limited training on when trial

341 deviations would be acceptable (14,35). These challenges
342 became less apparent as paramedics became more famil-
343 iar with the trial protocol (16).

344 Practical obstacles to trial involvement experienced by
345 paramedics included the volume of paperwork, particu-
346 larly when data collection was paper-based, the need
347 to store and transport sometimes heavy equipment, and
348 maintenance of research logs (16,33,35). Storage of trial
349 devices posed an additional difficulty and items were
350 often lost when vehicles were moved for servicing or
351 transferred to another ambulance station (16,35).

352 DISCUSSION

353 The appetite for research among paramedics was ap-
354 parent across studies, yet issues were highlighted that
355 compromised engagement with research activity. A fo-
356 cus on patient welfare shaped many of the views held by
357 paramedics in relation to research. Although better pa-
358 tient care was a motivator for paramedics to be involved
359 in developing a better evidence base, it also induced con-
360 cerns regarding safety and consent (16,20,31,32,37,38).

361 Paramedics had reservations about the ethics of recruit-
362 ing patients to clinical trials in circumstances when they
363 have a reduced level of consciousness, and thus capac-
364 ity. Pocock et al. advocated for more explicit teaching on
365 the necessity of research during pre-registration training
366 (36). Increasing research awareness at this stage may also
367 provide an opportunity to address ethical concerns and
368 reservations, such as the internal struggle of weighing the
369 individual risk to patients against public good (30,36,37).

370 There is a strong indication that the introduction of
371 research tasks to the role has been poorly supported at
372 an organizational level. Paramedics play an important
373 role in the recruitment of participants and the delivery
374 of interventions for research (16,32,33). Yet, although re-
375 search protocols may only deviate minimally from routine
376 care, reporting and administrative processes were highly
377 time-consuming, and led paramedics to question whether
378 research activity can be in alignment with their role (16).

379 Considering the incongruencies between research and
380 paramedic processes, the incorporation of research within
381 paramedicine requires a culture shift toward this way of
382 working. Although both share the goal of improving pa-
383 tient care and outcomes, this needs to be made explicit
384 through organizational commitment to foster its accep-
385 tance and adoption (6,19). It also requires researchers and
386 clinical trial managers to develop effective means of facil-
387 itating paramedic engagement if research is to be carried
388 out in practice (4,20). A sustainable and desirable strat-
389 egy would enable research to become embedded, such as
390 bespoke training opportunities, integration within typical
391 shift patterns, and remuneration (33,35). Such practices

not only affirm the value of research, but build capacity 392
into the paramedic role. Considering the strong colle- 393
giate bonds in paramedicine, significant efforts may be 394
required to address a culture of resistance (42). Con- 395
sequently, paramedics need to be involved in research 396
design, whether directly or through consultation. This is 397
important, given the complexity of the prehospital setting, 398
and could reduce perceived barriers and negative percep- 399
tions, particularly with the use of a placebo or managing 400
unconscious patients (31,33). 401

We found that the training opportunities for research 402
engagement were limited (35,36). Wilson et al. reported 403
that cynical attitudes toward research and frustration re- 404
lated to the complexity of research principles (24). Many 405
hold a binary view towards knowledge and practice and 406
research is not valued with equivalence to clinical skills 407
(7). Challenges in understanding and applying the princi- 408
ples of research have been found to contribute to negative 409
perceptions of its role in the profession (23). This empha- 410
sizes the need for high-quality pre-registration teaching, 411
in order to draw awareness to the necessity for research 412
in paramedic practice. Lim et al. highlighted the positive 413
experiences that students can yield if offered supportive 414
research mentoring (34). To address current deficits in 415
paramedical research, resources need to be directed to 416
support the identity development of paramedic academics 417
(43). 418

419 *Implications for Research*

Further research is required in the following areas to 420
develop some of the findings of this review: 421

- 422 1. Student perspectives: Most studies reported the high
423 value placed on training opportunities for building
424 research skills, yet there was little evidence from stu-
425 dent paramedics. Obtaining student views holds the
426 potential to understand how research might be taught
427 more effectively.
- 428 2. Understanding resistance: The perspectives captured
429 in studies were largely of paramedics who had volun-
430 teered involvement in the delivery of clinical trials.
431 Future research needs to include the perspectives
432 of paramedics who choose not to engage in re-
433 search trials. Specifically, further work should seek
434 to understand the nature of individual concerns and
435 widespread negative attitudes.
- 436 3. Systems perspective: To facilitate the translation of
437 such research, a systems perspective should be used
438 to identify the wider factors (e.g., logistical or fi-
439 nancial) that impact the inclusion of research in a
440 paramedic's role.

We also identified the following areas for improvement 441
in the design of research: 442

- 443 1. Paramedic involvement: Many studies reported barriers to paramedics' engagement with research. Future research that relies on paramedic "buy-in" should consult paramedics, or involve them in the research team, on factors such as research design, consent processes, training needs, and support required throughout the study process.
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- 450 2. Research quality: The quality of included studies was varying, which yields the recommendation that processes are installed to support the quality of future research.
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454 *Strengths and Limitations*

455 This is the first systematic review to explore allied health care professionals' perspectives of research. The overall quality of the research articles identified through this review was varying, owing largely to methodological rigor; this reflects the overall paucity of research in paramedicine (29). All studies adopted a self-selecting sample, therefore, it is likely that the research captures the perspectives of those with relatively strong views. Some only recruited paramedics who had been involved in a preceding trial, which suggests participants would hold more favorable views compared with those who had not elected to participate in a trial (14,16,30–32,35,36). Furthermore, although some perceptions may be transferable to research more broadly, it is likely that some factors will be relevant to that trial only. As a result of the limitation to articles available in English, all studies were conducted in the United Kingdom, United States, and Australia. Consequently, findings and recommendations may be less transferable internationally.

474 The potential for bias of the authors has been acknowledged throughout the review process. Two authors (S.O., A.H.) are paramedics and two teach research methods to paramedic students in higher education (J.R., S.O.). Owing to the potential influence of preconceptions, a subject-nonspecialist methodologist was recruited to the team (H.H.). As part of the analysis process, the group engaged in critical discussion and group reflexivity to support the confirmability of findings (44). To maximize trustworthiness and rigor, a stringent qualitative systematic review methodology and analysis process was followed.

485 **CONCLUSIONS**

486 Paramedicine presents unique challenges and opportunities for research, spotlighting moral debates, such as obtaining informed consent from unconscious patients and distressed relatives during emergency situations when treating and transporting the patient is the priority. With the safety and autonomy of patients at the forefront of

practice, and the commitment to "do no harm," this places significant pressures on paramedics. Evidence from this review highlights a strong drive to develop the evidence base to improve patient outcomes from many paramedics. However, there were also widespread reservations, particularly regarding the ethics of enrolling patients in clinical trials that may involve withholding interventions or changing standard practice. This appears to have cultivated resistance to research engagement across the profession, and a culture shift within paramedicine toward this way of working is potentially required (6,19). Currently, there is inadequate organizational support for paramedics to engage in research activity. Researchers must develop effective means of facilitating paramedic engagement if research is to be carried out in practice. Research methods training in paramedicine should provide a platform to explore concerns and emphasize the role of research in developing a high-quality evidence base to underpin safe practice. Without integrating research activity into the role of the paramedic and increasing capacity, the future of evidence-based paramedicine is at risk.

Declaration of competing interest

None.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jemermed.2024.01.008](https://doi.org/10.1016/j.jemermed.2024.01.008).

CRediT authorship contribution statement

Jessica Runacres: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Hannah Harvey:** Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Amy Halck:** Data curation, Formal analysis, Writing – review & editing.

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