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Review Article

Unveiling paramedic confidence: exploring paramedics' perceived confidence in out-of-hospital births and obstetric emergencies - a scoping review

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Abstract

Introduction: The centralisation of birthing care, driven by the closure of 225 of Australia's rural birthing centres over the past 20 years, has resulted in a 47% increase in births before arrivals at hospitals. This shift positions paramedics as critical primary health providers for out-of-hospital births and obstetric emergencies. Despite the infrequency of such emergencies for paramedics, they demand proficient clinical management due to their severity and potential complications. Confidence is vital for paramedics in managing high-risk obstetric emergencies effectively. However, there is limited research on paramedics' confidence levels and the factors influencing them, particularly in Australia following the introduction of paramedic registration and mandatory obstetric training in 2018. This scoping review seeks to explore paramedics' confidence in managing prehospital obstetric emergencies, identify influencing factors and examine the implications of confidence on both patient and paramedic welfare.

Methods: Following Joanna Briggs Institute methodology, a comprehensive literature search across three databases yielded 125 results. Screening of titles and abstracts by two authors, followed by full-text screening of 18 remaining articles, was conducted. Conflicts were resolved by the primary author, and three additional relevant articles were retrieved manually. Thirteen studies met the inclusion criteria and were analysed to inform the review.

Results: The findings consistently highlighted feelings of low confidence, insecurity, vulnerability and heightened stress among paramedics when confronted with prehospital obstetric emergencies. These were largely attributed to infrequent and inadequate education and training, leading to skills decay and difficulties in distinguishing normal from complicated obstetric events. Rurality due to various logistical, geographical and resourcing factors was found to exacerbate paramedic insecurity

attending and managing obstetric emergencies. The decline in confidence not only affects clinical proficiency but also poses risks to patient safety and contributes to paramedic stress and poor mental health outcomes.
Conclusion: Proportional confidence emerges as a crucial factor in medical education, facilitating enhanced clinical competence and better mental health outcomes for patients, clinicians and teams. This is of increased importance in rural areas where logistical barriers to ensuring appropriate care are prevalent. Further research is needed to ascertain the optimal frequency and type of training/education required to bolster paramedic confidence in managing obstetric emergencies effectively.

Keywords

ambulance, Australia, emergency medical technician, EMT, obstetric, out-of-hospital birth, paramedic, pregnancy complications.

Introduction

Over the past 20 years, nearly half of Australia's birthing centres, predominantly in rural areas, have closed, resulting in the centralisation of birthing care[1,2]. The Rural Doctors Association reported that, between 1992 and 2011, over 225 rural birthing centres were closed, representing more than a 40% reduction in Australia's rural birthing facilities[2]. This substantial reduction in rural birthing centres has correlated with a 47% increase in births occurring before reaching hospitals[2]. Consequently, this trend positions paramedics as essential primary healthcare providers, responsible for managing out-of-hospital births and assisting women who give birth en route to medical facilities or opt for home births. Although high-risk pregnancies identified in the early stages are typically referred to regional or metropolitan birthing centres with greater capacity to manage the anticipated level of risk, ultimately not all births occur at these specialised facilities[2]. While obstetric emergencies remain relatively rare occurrences for paramedics, they signify instances of elevated acuity and risk, necessitating a strong sense of clinical confidence in their management due to their association with substantially heightened rates of complications[3-8], as evidenced by a reported perinatal mortality rate of 15 per 1000 for out-of-hospital births compared to 5 per 1000 for in-hospital births[4-9]. Evidence highlights the comparably poorer outcomes for both mothers and neonates in unplanned out-of-hospital births, with increased incidence of post-partum haemorrhage, perineal tears, delayed third stage of labour and need for neonatal resuscitation[5-9]. Studies have reported obstetric complications in 11.7% of out-of-hospital births attended by Australian paramedics, with a neonatal death rate of 2.7%. Antenatal and intrapartum complications occurred in 27% of cases, and 22% of neonates had reduced Apgar scores[5,9]. While data on the exact proportion of out-of-hospital births occurring in rural areas are limited, evidence suggests that a significant number of these cases take place in rural and remote settings, where access to timely obstetric care is restricted, thereby increasing the likelihood of obstetric emergencies[5,9].

Professional, societal and patient expectations mandate that paramedics possess not only clinical competence but also confidence in managing obstetric emergencies for optimal patient outcomes[3,5,10-12]. However, empirical evidence indicates a notable discrepancy between these expectations and the reality of paramedics' confidence levels, as evidenced by qualitative data highlighting experiences of vulnerability, overwhelm, insufficient readiness and heightened stress during obstetric emergency responses[5,7,12]. Despite these findings, there exists a dearth of research focusing on paramedics' confidence levels specifically within the realm of obstetric emergencies, along with an assessment of the factors influencing confidence and the ramifications of confidence levels on clinical proficiency, patient safety and mental wellbeing[5,7,13].

Confidence, defined as a dynamic mental attitude of trust or certainty, is influenced by various factors including clinical competency, hierarchical structures, emotions and professional experience[11]. While historically, medical education has primarily focused on skill-based competency, recent attention has turned to understanding the role of confidence in facilitating or hindering clinical competency[11,14]. Research is now beginning to acknowledge confidence as a phenomenon impacting clinicians' ability to execute essential skills, manage cognitive load, and optimise patient and team experiences[11,14,15]. In clinical settings, the discrepancy between possessing necessary knowledge and lacking confidence can impede the implementation of critical skills and decision-making processes, potentially compromising individual contributions and team performance[11,16]. Effective management of medical emergencies hinges on proportional confidence, cultivated through rigorous training and adequate clinical exposure[5,11,16]. Acknowledging and addressing confidence levels is essential for clinicians and healthcare teams dealing with obstetric emergencies, as confidence strongly shapes decision-making, behaviours and team dynamics, fostering improved communication, clinical judgement and team cohesion[11]. Conversely, misalignment between confidence and competence poses risks, with documented cases of overconfidence leading to unsafe practice, and lack of confidence inhibiting critical decision-making skills[11,14,16]. Furthermore, confidence is a modifiable factor that may help mitigate paramedic ill-being, as lower confidence has been associated with increased vulnerability to mental health challenges, including stress, anxiety and burnout[11,17,18]. Therefore, confidence should be viewed as a modifiable risk factor in preventing paramedic mental illness. This review aims to explore paramedics' confidence in managing prehospital obstetric emergencies, identify influencing factors, and examine the implications of confidence on patient and paramedic welfare.

Methods

Methodological framework and reporting

This scoping review adheres to the Joanna Briggs Institute methodology and the Preferred Items for Systematic Reviews and Meta-Analyses (PRISMA) Extension for Scoping Reviews (PRISMA-ScR) guidelines (Supplementary figure 1). The protocol was not registered.

Eligibility criteria

For evidence to be included in the scoping review, articles must have met a pre-determined set of inclusion and exclusion criteria, outlined in Table 1.These were developed in line with the

Population, Concept, and Context framework, which was unanimously agreed upon by all authors.

Table 1: Inclusion and exclusion criteria

Population, Concept, and Context framework	Inclusion criterion	Exclusion criterion
Population	Paramedics	Other healthcare workers and allied health professionals (eg midwives, doctors, nurses)
Location	Worldwide	
Clinical context	Prehospital births, both planned home births and unplanned births before arrival that occur outside the pre-determined birth setting	Births that occur in birthing units
Concept	Articles that discuss: • how confident paramedics are when attending and managing obstetric emergencies • factors that influence paramedic confidence, especially in the setting of obstetric emergencies • the impact of confidence on paramedic clinical practice.	
Study designs	Randomised controlled trials, observational, descriptive, qualitative research and grey literature	Grey literature and unpublished studies
Language	English	Non-English

Search strategy

During January 2024 an early search using Google Scholar was carried out to identify initial articles and assess the breadth of available evidence. Subsequently, titles, abstracts and subject headings from these articles were used to construct a comprehensive search strategy for databases CINAHL (EBSCOhost), MEDLINE (Ovid), and SCOPUS (Supplementary table 1). These databases were chosen based on their extensive collection of international prehospital and paramedic literature, which was deemed crucial for addressing the research aim amid limited existing research. A hand search of relevant citations within reference lists was also conducted to identify additional papers that may been missed in the database searches.

The search utilised a combination of key terms and MeSH headings including *emergency medical technician*, paramedic*, ambulance, EMT, confidence, obstetric, pregnancy complication(s), out of hospital birth(s)*. Terms were combined with the appropriate truncation symbols and Boolean operators, and were adapted for each database dependent on keywords and index terms (Supplementary table 1).

Evidence screening and selection

After conducting an initial search across databases including CINAHL Plus, Scopus and MEDLINE ALL, a total of 125 articles were identified and uploaded into EndNote, from which 33 duplicates were eliminated, resulting in 92 unique articles. Additionally, three articles were identified through manual literature search. Subsequent screening involved a thorough review of titles and abstracts by the first and second authors against the review's inclusion criteria. Eighteen articles were selected for full-text review, with their citation details managed using JBI SUMARI. Both authors independently evaluated the full texts against the predefined inclusion and exclusion criteria. Any conflicts in screening and selection were resolved through discussion, with the primary author making the final decision based on objective criteria. Data extraction was also conducted independently by both authors to ensure accuracy and consistency. Ultimately, 13 articles met the criteria for inclusion in the scoping review. A comprehensive overview of the search and selection process is presented in the PRISMA-ScR diagram (Supplementary figure 1).

Data extraction

Data extraction was completed by both authors using a standardised data extraction template developed by the authors. This outlined specific details related to the study's aim, participant characteristics and study design to ensure strict alignment with the inclusion criteria. An additional column outlining findings relevant to the study aim was used to draw key points from each of the studies (Table 2).

Data analysis and presentation of results

The data were carefully analysed in accordance with the methodological directives delineated by Peters and Marnie[19]. This structured approach involved extracting and combining data in a descriptive and logically structured manner, thereby facilitating the identification of key points relevant to the review's objective (Table 2).

Results

This review included the following studies: Flanagan et al (2017, 2019)[7,8], Hill et al (2023)[5], Kumar et al (2016)[20], Lenson and Mills (2018)[21], McLelland et al (2013, 2015, 2016, 2017, 2018)[9,13,16,22,23], Persson et al (2019)[12], Schultz et al (2021)[24] and Vagle et al (2019)[17]. These studies were systematically analysed to assess paramedics' experiences, confidence levels and training in managing out-of-hospital births.

Demographics for search results

Most publications were from Australia (n=11) with the remaining from the US (n=1), Norway (n=1) and Sweden (n=1). The main methodology utilised was a retrospective data analysis of patient healthcare records (n=6), followed by qualitative methods (n=4), quasi-experimental (n=2) and narrative enquiry (n=1).

Table 2: Characteristics of included studies

Authors, year of publication and location	Aim	Methods and participant characteristics	Relevant findings
Flanagan B, Lord B, Barnes M (2017), Australia[7]	To assess the incidence, risk factors, complications, pain management practices and outcomes associated with births attended by paramedics during the study period	Audit of retrospective analysis of de-identified patient care records, Queensland Ambulance Service 1 January 2010 – 31 December 2011	Obstetric care constitutes a small fraction of paramedic workload. While complications are infrequent, they do occur, thus highlighting the importance of ensuring paramedics are well trained to identify and manage such complications safely. Furthermore, there is a need to reinforce accurate documentation practices, as some cases lacked sufficient vital sign and management entries.
Flanagan B, Lord B, Reed R et al (2019), Australia[8]	To explore the experience of women who birthed in the care of Queensland paramedics	Narrative inquiry *n*=22 women who had unplanned out-of-hospital births in paramedic care in the previous 5 years	Various factors, including subsets, shaping women's experiences during childbirth in paramedic care, revealing a spectrum from feeling empowered, safe and confident to expressing concerns about paramedics' uncertainty, task-oriented approach and lack of interpersonal skills.
Hill M, Flanagan B, Mills B et al (2023), Australia[5]	To investigate Australian paramedics' perceptions of training, experience and confidence with out-of-hospital births	Qualitative study utilising semi-structured interviews Data underwent thematic analysis *n*=14 Australian paramedics	Paramedics expressed low confidence and anxiety in managing out-of-hospital births, citing insufficient training. Interviews revealed four themes: lack of preparedness due to inadequate training and experience, anxiety about imminent births affecting emergency management, challenges in patient-centred care and a desire for more training.
Kumar A, Nestel D, Stoyles S et al (2016), Australia[20]	To evaluate how high-quality, simulation-based emergency training enhances the management of home birth emergencies within a publicly funded program involving midwives and paramedics	Quasi-experimental research design with pre- and post-test evaluation subjected to content analysis *n*=73 participants (46 midwifery, 27 paramedical)	The simulation highlighted the importance of fostering clear communication and teamwork, serving as fundamental principles for enhancing clinical practice in the future.
Lenson S, Mills J (2018), Australia[21]	To identify paramedic psychomotor skills that could be practised in the obstetric setting and understand the nature of key learning events	Qualitative case study *n*=42 third-year paramedic students who had completed an obstetrics clinical placement as part of their mandatory undergraduate training	Paramedics can practise a variety of psychomotor skills in simulated obstetric settings, many aligned with their undergraduate curriculum, with key themes including gaining confidence in maternity care, observing experts managing situations and applying theoretical knowledge in practice, emphasising the importance of adequate education and experience in maternity care for paramedics.
McLelland G, McKenna L, Archer F (2013), Australia[16]	To present data on the incidence of unplanned BBAs in Victoria between 1991 and 2008, and to provide an extensive literature review highlighting the issues surrounding an unplanned BBA	Data extraction from government reports, primarily sourced from the Australian Institute of Health and Wellbeing and the Perinatal Data Collection Unit of Victoria The data on place of birth from both sources were tabulated and compared to depict the extent of out-of-hospital births	Unplanned BBAs in Victoria have increased steadily since 1991–2008, mirroring trends in other developed countries. However, outcomes for both mothers and newborns following BBAs are significantly worse compared to planned home or hospital births, highlighting the importance of understanding and addressing maternal risk factors
McLelland G, Morgans A, McKenna L (2015), Australia[22]	To investigate the caseload of women in labour attended by a statewide ambulance service in Australia for 1 year and the management provided by paramedics	Audit of retrospective paramedic clinical data from the Victorian Ambulance Clinical Information System 1 January – 31 December 2009 *n*=4096 obstetric cases *n*=196 neonatal cases	Paramedics provide emergency care for women in labour, but these cases are infrequent, mostly involving full-term pregnancies with minimal complications. However, some cases do present complications, emphasising the need for paramedics to possess diverse clinical assessment skills for safe decision-making.
McLelland G, McKenna L, Morgans A (2016), Australia[23]	To report findings from research conducted before the implementation of publicly funded home birth programs in Victoria, Australia. It investigated the occurrence of planned home births attended by paramedics, examined the clinical assistance they offered and discussed the implications for education and practice	Audit of retrospective data of electronic patient care records from Ambulance Victoria 1 January – 31 December 2009 Part of a larger investigation examining paramedics' clinical involvement in maternity-related cases during pregnancy, childbirth and the 6-week postpartum period	Paramedics managed obstetric complications, but lacked confidence in handling birthing emergencies, indicating a need for ongoing education. Collaborative efforts among ambulance services, midwives and maternity services could minimise risks in planned home births and facilitate interprofessional education.
McLelland G, Perera C, Morphet J et al (2017), Australia[13]	To determine if an interprofessional simulated birth scenario enhances self-efficacy scores and clinical knowledge among undergraduate paramedic, nursing and midwifery students when handling births in unplanned locations	Quasi-experimental descriptive study with repeated measures Simulated unplanned vaginal births *n*=24 final-year undergraduate paramedic, nursing and midwifery students (divided into five interprofessional groups)	Interprofessional simulations significantly increased students' confidence in managing births, with nursing students showing notable clinical knowledge improvement, possibly due to differences in curriculum content, while overall satisfaction with the simulation experience was high.

McLelland G, McKenna L, Morgans A et al (2018), Australia[9]	To analyse the clinical profile of births attended by paramedics over 1 year statewide, focusing on encountered complications and subsequent management	Audit of retrospective of data accessed from the Victorian Ambulance Clinical Information System *n*=324 out-of-hospital births reviewed (*n*=190 occurring before paramedic arrival; *n*=134 under paramedic care on scene)	Although most birth events were uncomplicated, the analysis of paramedic management retrospectively showcased adeptness in employing intricate medical skills for obstetric care. Conducting further research to comprehend the factors facilitating successful paramedic management in such cases would be instrumental in shaping future practices.
Persson A, Engström Å, Burström O et al (2019), Sweden[12]	To explore the experiences of specialist ambulance nurses' with birth before arrival BBAs	Qualitative interview *n*=9 completed a semi-structured interview Average ambulance career experience of 9 years Average had assisted in three or four BBA cases	The analysis revealed that specialist ambulance nurses experience both anxiety and joy during childbirth assistance, feeling unprepared due to a lack of knowledge and training. They face significant challenges such as long distances, inadequate equipment and no midwife support, highlighting the need for scenario training to enhance their confidence and competence in these situations.
Schultz B, Hall S, Parker L et al (2021), Australia[25]	To describe the prehospital administration of oxytocin by paramedics following attendance at out-of-hospital births	Audit of retrospective data for all out-of-hospital births attended by the Queensland Ambulance Service 1 January – 31 December 2018 *n*=350 out-of-hospital births	Most patients eligible for oxytocin administration during out-of-hospital births received the treatment, although a significant proportion declined or had it withheld by paramedics, highlighting the need for further research to understand reasons behind paramedics' decision-making and ensure optimal patient outcomes and clinical safety.
Vagle H, Haukeland GT, Dahl B et al (2019), Norway[17]	To explore medical technicians' experiences with unplanned births outside institutions	Qualitative interview *n*=12 EMTs in Norway completed a semi-structured interview September – November 2017	The analysis revealed that EMTs face a significant mismatch between societal expectations and the reality of out-of-hospital maternity care, compounded by a general lack of training and practical challenges, including poor communication with hospital midwives. This results in EMTs feeling stressed, insecure and vulnerable, highlighting the need for improved education and training to boost their confidence in managing maternal cases prehospitally.

BBA, birth before arrival. EMT, emergency medical technician.

Education and training

A recent Australian inquiry uncovered significant deficiencies in obstetric education and training within the paramedic community[5]. Of the 14 paramedics surveyed, almost 80% reported gaps in their exposure to obstetric training during the initiation of their paramedic induction[5]. Six participants recalled receiving no obstetric training during this pivotal phase, while an additional five indicated a lack of ongoing education in obstetrics[5]. Despite an average service tenure of 7.5 years, paramedics recounted receiving minimal obstetric training beyond their initial induction, with estimates ranging from none to 3 days[5]. One participant likened their readiness to identify obstetric complications to what could be expected of a basic first aider trained to assist with an uncomplicated childbirth[5]. These findings highlight a concerning scarcity and a perceived inadequacy of obstetric training opportunities, resulting in reservations among paramedics regarding their knowledge base and skill proficiency.

Given the scarcity of Australian research, it is crucial to consider international studies that also outline how inadequate training exacerbates low confidence and imposes a significant psychological burden on paramedics tasked with handling obstetric emergencies[12,17]. This was pronounced in a qualitative investigation conducted in Norway with 12 participants who provided valuable insights into their obstetric training experiences[17]. For some participants, their sole exposure to obstetric education consisted of a single 1-hour lecture[17]. This minimal exposure left many feeling ill-prepared and overwhelmed by the complexities of managing obstetric emergencies[17]. One participant described feeling that women unable to reach the hospital in time for delivery were vulnerable to unpredictable outcomes, colloquially described by the participant as being 'at the mercy of nature'[17]. Participants consistently called for enhanced obstetric training, yet many had to rely on their own initiative and networking to try secure training[17]. The study revealed that numerous participants sought additional obstetric education following traumatic obstetric cases or personal experiences, but attempts to arrange supplementary clinical training in birthing facilities often encountered logistical challenges, necessitating reliance on personal connections or acts of goodwill to secure placements[17]. However, some participants, particularly the male paramedics, recounted instances of hostility, discrimination and social isolation during their interactions in birthing environments[17]. Frustration was also voiced at the limited opportunities for hands-on training, with one participant describing the importance of practical training in obstetrics as akin to that required for practising for resuscitation[17]. Similar frustrations were echoed in an Australian study, with one participant recalling a conversation with her paramedic educator about the inadequate time allocated to obstetrics training[5]. The educator responded, 'It's quite rare we go to it', indicating that infrequency of attended obstetric cases justifies an absence in training[5]. The participant reflected that this rarity was precisely why more time should be devoted to such training[5].

Despite repeated recommendations that paramedic training include regular placements in hospital settings to increase exposure to normal obstetric events and improve identification of obstetric complications, this approach faces several challenges[7,12,17]. The value of obstetric clinical placements for paramedics has proven inconsistent due to access difficulties and high demand from medical, nursing and midwifery students, making this solution for skills training unviable[7,20,21,25]. Alternatively, the literature supports implementing regular interprofessional obstetric training programs that offer high-fidelity training outside hospital settings[13,20,21,26]. An Australian study evaluating the psychomotor skills of 29 paramedic students during simulated obstetric emergencies found that hands-on experience was confidence-building, and reflective opportunities

were invaluable for learning[21]. Likewise, McLelland et al (2017) found that effective simulation training significantly increases paramedics' confidence in achieving successful birth outcomes by 40%[13].

A larger study with 73 participants (paramedics and midwives) evaluated the efficacy of high-fidelity, in-situ simulation workshops focused on home birth practices[20]. The findings aligned with those reported by Lenson and Mills that high-fidelity workshops not only bolstered paramedics' preparedness for obstetric emergencies but also elicited positive behavioural shifts and fostered enhanced interprofessional rapport and knowledge transfer[20,21]. Participants across these studies reported heightened confidence and empowerment after their engagement with simulation scenarios, increased situational awareness and strengthened team cohesion between paramedics and midwives[20,21,26]. These findings are noteworthy, given the reported interprofessional tensions between paramedics and midwives, which act to exacerbate the insecurity of paramedics navigating and transferring care during obstetric crises[17].

Despite the potential antiquation of several studies examining the link between education, training and paramedic confidence in managing obstetric emergencies due to their pre-dating the implementation of paramedic registration and the adoption of graduate entry pathways within the profession, recent literature (post-2018) highlights consistent findings of low confidence levels attributed to ongoing inadequacies in education and training[5,10]. A 2023 survey of 264 Australian paramedics reported prehospital obstetric care knowledge as an area of concern, regardless of the diverse clinical scopes of practice represented among the participants[10]. Given median attendance of only two births over their careers, paramedics lack substantial exposure to out-of-hospital obstetric emergencies, emphasising the need for ongoing, high-calibre training to enhance confidence and competence[10]. Respondents emphasised the importance of consistent in-service education and training to strengthen confidence and ensure the retention of skills[10].

Impact on patient safety

The limited number of obstetric emergencies encountered by paramedics contributes to skills deterioration, diminished confidence and potential patient clinical safety risks[7,9,27]. Several studies reveal instances where paramedics either administered treatment unnecessarily or failed to administer indicated treatment[7,9,27]. For instance, fundal massage, an essential practice for preventing postpartum haemorrhage, was found in certain studies to be initiated prematurely[7,9]. Prematurely initiating fundal massage before the completion of the third stage of labour poses life-threatening risks such as placental separation and excessive maternal blood loss, making it contraindicated[7]. In one study, 76 women received fundal massage initiated by paramedics, although only 21 of these were documented to have completed the third stage of labour[9]. This mismanagement was attributed to inadequate clinical knowledge, limited exposure, cognitive overload and high paramedic stress levels[9].

The discrepancy between recommended care and actual implementation by paramedics in obstetric emergencies is a recurring theme in literature. Current international guidelines for modified active management of third stage labour include the administration of uterotonic medication such as oxytocin to prevent postpartum haemorrhage[24,27-29]. However, Schultz et al (2021) found that paramedics withheld modified active management of third stage labour in 17.4% of cases, with half of these lacking justification, which raises concerns about paramedic knowledge and competency[24]. Inadequate and inconsistent patient documentation also poses significant clinical risks, hindering safe decision-making, continuity of care and communication among multidisciplinary teams[28-30]. Inconsistent documentation during out-of-hospital births, particularly regarding neonatal vital signs and Apgar scores, is also reported[7,9]. Flanagan et al (2017) found that the requirements for separate documentation for newborns were adhered to in only 66.8% of cases, and continuation of vital sign documentation after the initial Apgar score was recorded in only 60% of cases[7]. Given the higher rates of complications in out-of-hospital births, proper identification and timely management of neonatal issues are crucial, necessitating improved neonatal knowledge and assessment skills among paramedics[7,9].

A Swedish qualitative study by Persson et al (2019) unveiled a prevailing theme of apprehension and insufficient confidence among paramedics in handling neonatal patients[12]. Paramedics often found themselves overwhelmed when confronted with the sudden responsibility of attending to both the mother and the newborn, a sentiment exacerbated by feelings of unpreparedness attributable to limited clinical exposure and their insufficient training[12]. Two additional Australian studies also highlighted concerns regarding neonatal management, emphasising themes of uncertainty and limited confidence, particularly in challenging scenarios such as breech births where the potential risk of limb entrapment posed cognitive barriers to feeling confident in managing emergencies[5,21]. Another study highlighted the significance of the historically limited availability of monitoring equipment for neonates within ambulance services, such as paediatric oxygen saturation probes and temperature measurement devices, which further compounded the challenges faced by paramedics in managing neonatal emergencies[7]. In the absence of adequate equipment and support, paramedics encounter considerable obstacles in confidently identifying and addressing neonatal complications, thereby posing significant risks to patient safety[7,12,17]. Furthermore, it was suggested that this uncertainty and apprehension may contribute to incomplete documentation practices, as paramedics might be hesitant to conduct comprehensive assessments of neonates[5]. These findings highlight critical deficiencies in patient care and safety.

Patient experience and maternal psychological wellbeing

Given the apprehension and fear reported by paramedics in managing out-of-hospital births, and the acknowledged impact of attending clinicians on women's birth experiences, it is imperative to explore how paramedic confidence influences women's childbirth experiences[10]. Although evidence regarding women's experiences of out-of-hospital births in paramedic care is extremely limited, an Australian narrative inquiry study offers some valuable insights[10]. Interviews with 22 women elicited diverse experiences ranging from positive to negative interactions[10]. Positive experiences were underpinned by stories of competent paramedics who conveyed clinical proficiency while providing reassurance and effective communication[10]. Participants recalled the importance of a calm demeanour, clear communication and

reassurance as fundamental to a positive birth experience[10]. Conversely, negative experiences stemmed from concerns about clinical incompetence, poor communication, perceived disrespect and lack of empathy[10]. Instances of feeling violated, disrespected, yelled at, having legs held apart without explanation and failure to obtain consent were recounted as extremely traumatic by some women[10]. One woman recounted the attending paramedic admitting uncertainty in managing the birth and instead prioritised immediate transport to the hospital[10]. Such encounters are not isolated occurrences, as evidenced by one participant in another Australian study admitting they would advise a woman to 'close her legs' until arriving at the hospital if birth was imminent during ambulance transport[10].

Psychological impact on paramedics

While attending an imminent birth may be perceived as a pinnacle of one's career and a moment of anticipation, the realisation of joy and fulfillment often occurs retrospectively, upon confirmation of the wellbeing of both mother and child[12]. Qualitative insights from paramedics attending obstetric emergencies as reported by the Swedish study by Persson et al (2019) reveal that the initial call to attend to an obstetric emergency evokes profound stress, anxiety and apprehension, primarily attributable to the notably low confidence paramedics harbour in their ability to manage even a 'normal', 'uncomplicated birth'[12]. This deficit in confidence was demonstrated to undermine paramedics' sense of safety and wellbeing when responding to out-of-hospital births[9]. In this study, paramedics articulated feelings of significant helplessness and frustration in managing obstetric emergencies[12]. They described experiencing immense pressure to remain clinically confident and competent as they felt these directly influenced their own sense of safety and subsequent ability to deliver optimal patient care[12].

Australian and Norwegian studies highlighted the profound consequences of diminished confidence in managing out-of-hospital births[5,17]. Common themes of low confidence fuelling feelings of isolation and helplessness were prevalent and exacerbated by logistical and environmental challenges[5,17]. Factors such as rurality, extended distances to definitive care, insufficient clinical support, poor mobile phone signal and limited staffing were found to significantly contribute to paramedic stress during out-of-hospital birth management[5,17]. Participants in the Norwegian study recounted the need to often improvise their clinical setting to effectively address obstetric emergencies[17]. This involved innovative measures such as repurposing dining tables into makeshift resuscitation areas or converting loungerooms into makeshift birth suites[17]. Participants from both studies highlighted additional rural challenges, such as extended transportation times over substandard roads, ferry crossings over rivers and minimal support staff resources, all of which exacerbated the difficulties encountered by paramedics[5,17]. These circumstances expose paramedics to environmental hazards and accentuate the inherent unpredictability of their working environments[5,17].

The psychological implications of paramedic confidence in managing out-of-hospital births are also shown to be influenced by the experience level of their partners, with paramedics reporting greater reassurance and confidence when partnered with experienced colleagues[5,17]. Conversely, attending an out-of-hospital birth with an inexperienced partner was demonstrated to exacerbate feelings of anxiety and stress, impeding effective management of the situation[17]. Instances of inexperienced partners becoming overwhelmed and panicking during emergencies highlight the critical importance of having competent and experienced colleagues in such situations[17]. Notably, the burden of addressing both clinical and logistical challenges weighs heavily on paramedics, exacerbating their anxiety and stress levels, and potentially leading to poorer psychological outcomes[5,17]. However, amidst these challenges, paramedics have highlighted the value of being able to follow up on patient outcomes in hospital settings[12]. This not only provides closure on the case but also serves as a reflective learning tool for future events[12,17].

Discussion

This review found that paramedic training and education significantly impact paramedic confidence in managing obstetric emergencies, which in turn may affect both maternal wellbeing and paramedics' own mental health. However, due to the recency of paramedic registration in Australia in 2018 and the extremely limited evidence available beyond this timeframe, it is unclear whether registration itself has influenced paramedic confidence in obstetric care.

The relationship between confidence and its impact on clinical competency is complex. Confidence can influence clinical competency, predispose to clinical risks and facilitate either positive or negative patient experiences, thus significantly affecting paramedics' mental health outcomes during obstetric cases[11]. Additionally, paramedics' confidence in managing obstetric emergencies is heavily influenced by their education and training, which plays a critical role in contributing to or alleviating cognitive overload[5,11,17]. Paramedics who lack confidence and adequate hands-on training may rely solely on procedural memory or feel overwhelmed and helpless when handling unfamiliar emergencies, potentially compromising patient safety and comfort[11,12].

Subsequently, it can be hypothesised that paramedics experiencing cognitive overload and lacking confidence may struggle to create a safe and reassuring environment for patients, which in turn affects the patient's psychology and trust in the attending clinician. Gottlieb et al (2022) supports this hypothesis, suggesting that clinicians who possess an appropriate balance of confidence and competence are better equipped to adapt their skills without succumbing to cognitive overload, thereby enhancing the patient experience[11]. Findings from an investigative interview study conducted by Ahl and Nyström (2012) also support the notion that diminished clinician confidence may compromise patients' sense of safety under paramedic care. The research indicates that patients exhibit greater trust in clinicians who maintain composure and provide reassurance, particularly in emergency situations[31].

Prior to the introduction of paramedic registration in Australia, the title of 'paramedic' was not legally protected, resulting in a lack of standardised, mandatory training across the country[25]. Consequently, there was no uniformity in the education and training of paramedics, which may account for the historically low confidence levels observed among paramedics when managing obstetric emergencies[25]. However, since the establishment of paramedic registration in Australia in 2018, entry into the paramedicine profession now typically necessitates the completion of a university degree program accredited for paramedic

education[25]. These programs are meticulously designed to impart the essential knowledge and skills required for providing emergency medical care in diverse settings, thereby ensuring that paramedics meet a consistent academic benchmark for education and training[21,25]. However, despite the rigorous training provided by these programs, there are clear persistent challenges in ensuring that paramedics are adequately prepared to manage obstetric emergencies effectively[5,7,10]. Despite the limited research in this field, there is clear evidence demonstrating an ongoing pervasive culture of fear, low confidence and critical knowledge gaps among paramedics when responding to obstetric cases[5,7,17]. There remains a critical need for comprehensive obstetric education and training programs tailored to paramedics' needs, including regular high-fidelity simulation training and interprofessional collaboration opportunities[18,21,26]. Additionally, addressing barriers to accessing obstetric placements and improving the quality of hands-on training can enhance paramedics' confidence and competency in managing obstetric emergencies[7,21,26].

Childbirth represents one of the most pivotal events in a woman's life, characterised by its profound individuality and susceptibility to a wide range of influencing factors[9,13,32,33]. The quality of maternal psychological wellbeing during the birth experience is significantly shaped by factors such as feeling supported, having trust in the attending clinicians, and a birth process tailored to the woman's cultural, social and emotional needs[10]. Furthermore, the birth experience significantly influences a woman's self-esteem regarding motherhood and her perceived capability in fulfilling the role of a mother[10,32]. This is significant considering perinatal anxiety and depression pose considerable public health concerns, affecting one in three and one in four women, respectively, with maternal suicide accounting for 10% of all maternal deaths[10,34]. When maternal expectations of childbirth are not aligned with the actual experience, particularly when there is a perceived loss of autonomy and a sense of being ignored or disregarded, it can lead to psychological trauma[10,31,34-36]. Women who undergo unplanned out-of-hospital births or encounter unexpected complications during home births are especially vulnerable to maternal trauma given the abrupt disruption to their envisioned birth plan[10]. The response of attending paramedics in such situations has a significant influence on maternal psychology[10]. Despite paramedics aspiring to exude confidence and control during emergencies, childbirth emerges as a clinical realm inhibited by diminished confidence, which must be addressed to ensure positive and safe patient experiences[5,6,10,12,17].

Clinician confidence exerts a dual influence, significantly affecting both patient psychological wellbeing and the clinician's own mental health[11,36-40]. Although not specific to paramedics or healthcare professionals, extensive research highlights the significant impacts of diminished confidence on mental wellbeing in general. Studies consistently show that individuals with low self-assurance are at nearly a six times higher risk of developing depression and four times more likely to experience depressive symptoms compared to their more confident counterparts[18,36,37]. Stressors such as diminished confidence, feelings of helplessness and lack of support have been identified by multiple studies as significant influencers of paramedics' physical and mental wellbeing[18,36-40]. Prevalence rates of anxiety, depression and post-traumatic stress disorder among paramedics range from 10% to 27%, markedly exceeding those observed in the general population[37]. Alarmingly, paramedic students report even higher stress levels due to low-confidence experiences during training and insufficient clinical exposure to bolster confidence, with studies indicating anxiety prevalence at 24%, depression at 28%, and post-traumatic stress disorder ranging between 16.8% and 20.2%[40-42]. Given paramedics' predisposition to mental health concerns due to the inherently 'traumatic' and 'high stress' nature of their role, it is critical to contemplate the implications of confidence beyond its influence on clinical competence and recognise it as a modifiable risk factor contributing to paramedic mental health issues[18]. Therefore, prioritising the mental health and wellbeing of paramedics through post-event debriefing, supportive supervision and access to mental health resources is imperative[12,17,18]. Additionally, addressing systemic issues such as inadequate resources and logistical challenges can mitigate paramedics' stress and enhance their confidence in managing obstetric emergencies[5,17].

While this review did not specifically focus on rural areas due to the scarcity of evidence on this topic, several reviewed studies highlight broader factors influencing paramedic confidence, which may have relevance in rural and remote contexts. Rural and remote areas often face unique challenges, including longer response times, limited access to specialised equipment or medical facilities, and fewer opportunities for training and professional development[5]. These factors may contribute to differences in paramedic confidence when managing obstetric emergencies, although further research is needed to explore this relationship directly[5]. As obstetric care becomes increasingly centralised, rural communities are experiencing higher rates of home births, further highlighting the importance of understanding how resource availability and geographic isolation impact paramedic preparedness[3]. Future research should examine the intersection of rurality, resource access and paramedic confidence to inform policies and training strategies aimed at improving obstetric emergency care across diverse settings.

Moving forward, it is essential to continue exploring the multifaceted relationship between confidence and competence in obstetric emergency management. While confidence can influence performance, it does not inherently equate to competence, and overconfidence without adequate skills may pose clinical risks. Therefore, both confidence and competence are necessary for improving paramedic management of obstetric emergencies. Future research should focus on evaluating the effectiveness of educational interventions, training programs and support systems in enhancing not only paramedics' confidence but also their clinical proficiency and decision-making abilities. Additionally, exploring innovative approaches, such as high-fidelity and virtual reality simulation training, can provide paramedics with opportunities to refine their skills and confidence simultaneously, particularly in resource-limited settings[21,25]. Addressing deficits in both areas is crucial for improving obstetric emergency management, enhancing patient safety and outcomes, and promoting the psychological wellbeing of paramedics[5,7]. By prioritising comprehensive education, training and support systems, healthcare systems can empower paramedics to provide both confident and competent care during obstetric emergencies, ultimately improving maternal and neonatal health outcomes[5,7,21,25].

Limitations

The limitations of this review primarily stem from the dearth of available literature for analysis, likely attributable to the relatively recent establishment of paramedicine as a recognised profession. Consequently, our analysis had to rely on literature pre-dating the introduction of paramedic registration in Australia during 2018, thus potentially limiting the applicability of results to the present status of registered paramedics. Despite initial efforts to source literature that was Australian based, the scant results forced us to include parallel international studies in the review to comprehensively address our research objectives. The literature with a specific focus on rurality and the implication of poorer paramedic confidence in rural areas is largely absent and represents a critical area of future research given the additional stressors of rural environments. Another notable limitation is that 8 of the 13 included papers were authored by two individuals, raising concerns about potential author biases. While we acknowledge these inherent challenges, this scoping study has identified a significant gap in current research on the chosen topic, emphasising that further investigation is required to develop knowledge of paramedic confidence in managing obstetric emergencies.

Conclusion

Paramedic education and training play a critical role in shaping confidence and competence in managing obstetric emergencies. While confidence is an essential factor influencing clinical performance, it does not necessarily equate to competence. Overconfidence without adequate skills may pose risks, whereas a lack of confidence can hinder effective decision-making and compromise patient outcomes. Achieving an appropriate balance between confidence and competence is fundamental to improving paramedic management of obstetric cases.

The introduction of paramedic registration in Australia in 2018 marked a significant shift in standardising paramedic education and training; however, little is known about how this has impacted paramedic preparedness and confidence attending obstetric emergencies. Existing evidence, both prior to and following its inception, indicates that many paramedics experience low confidence and significant knowledge gaps in this domain, which may contribute to cognitive overload, heightened stress levels and potential compromises in patient safety. Addressing these challenges requires comprehensive obstetric education and training tailored to paramedics' needs, including hands-on experience, high-fidelity simulation training and interprofessional collaboration.

Clinician confidence not only affects patient care but also has profound implications for paramedic mental health. Low confidence has been associated with increased stress, anxiety and burnout, which are prevalent among paramedics at higher rates than the general population. Given the inherently high-stress nature of paramedicine, it is crucial to consider confidence as a modifiable factor influencing mental wellbeing. Enhancing support systems, debriefing opportunities and access to mental health resources is essential in mitigating these risks.

With the increasing centralisation of obstetric care and rising home birth rates in rural areas, future research must explore the intersection of paramedic confidence, resource availability and geographic isolation to inform targeted training and policy interventions. Moving forward, research should continue to investigate the effectiveness of educational interventions, training programs and support systems in enhancing both paramedic confidence and clinical proficiency. Innovative training approaches, such as high-fidelity simulation and virtual reality, offer promising opportunities to strengthen both skill acquisition and confidence in obstetric emergency management. Additionally, future research should strive to quantify the impact of paramedic registration on confidence levels and discern the specific factors directly influencing paramedic confidence during the management of obstetric emergencies. Continued efforts to bridge the gap between confidence and clinical competencies are essential for ensuring safe and effective healthcare delivery in out-of-hospital obstetric settings, with focused attention on the unique needs of rural and remote communities. By addressing deficits in both confidence and competence, healthcare systems can empower paramedics to provide high-quality, compassionate care during obstetric emergencies, ultimately improving maternal and neonatal health outcomes.

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Conflicts of interest

The authors declare no conflicts of interest.

Data availability

The authors confirm that the data supporting the findings of this study are available within the article and/or its supplementary materials.

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