



# What are the mechanisms driving the early stages of embedded researcher interventions? A qualitative process evaluation in English local government

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## ABSTRACT

Improved collaboration and communication between public health practitioners and academia could enhance the flow of research evidence into policy and practice. Embedded researchers present one type of intervention with the potential to bridge the research-implementation gap through their dual affiliations with decision makers and academia. Although embedded researcher posts are garnering increasing attention in public health, there remains a need to understand the mechanisms through which they may promote the translation of evidence into practice. To address this gap, we conducted a processes evaluation incorporating data from seventeen semi-structured interviews with embedded researchers in local government public health teams across England. We aimed to expand theoretical understandings of embedded researchers in public health through providing a detailed conceptualisation of the mechanisms shaping the early stages of their roles. Interviews with embedded researchers were conducted from late 2021 to spring 2022. Our results suggest that the initial months of embedded researcher roles are defined by a lengthy embedding phase centred on building trust and gathering contextual knowledge. This phase forms the foundation on which these interventions are built. We identified seven categories of outputs delivered by embedded researchers which primarily revolved around building research capacity and addressed many of the primary barriers limiting research activity in public health. Improvements in research awareness, interest, and involvement reflected early changes in local research cultures. However, our results align with previous work suggesting that changing an organisational research culture is a long-term process. Expectations for embedded researchers should thus be proportionate to the seniority and scale of the post and we add our voice to calls for sustained investment in these valuable interventions. Further examination of how embedded researcher roles evolve over time in public health is necessary to broaden understandings of the concept of embeddedness in these settings.

## 1. Introduction

Despite a growing emphasis on the need to demonstrate “impact” in academic research, recent literature documents a persistent under-utilisation of research evidence in public health decisions (Kneale et al., 2017). In a climate of increasing austerity, addressing this lack of evidence use is necessary to promote the efficient allocation of public funds to reduce health inequalities (Homer et al., 2022; Kneale et al., 2019). Embedded researchers are one type of intervention intended to bridge this research-implementation gap through co-locating researchers in academic and policy/practice environments (Coates and Mickan, 2020). However, we lack a detailed conceptualisation of the mechanisms

employed by embedded researchers to enhance cultures of research in public health. We address this gap through the present study which explores the early phases of embedded researcher roles in public health teams across England.

While there is no single, agreed-upon definition for an embedded researcher, they can be conceptualised through a set of defining principles which build on existing definitions (e.g., McGinity and Salokangas, 2014) and reflect variation in their application (Kneale et al., 2021). Embedded researchers are co-affiliated with an academic and policy or practice setting and are situated, and continually engage, with a host team who have some level of influence over their work. Their purpose is to enable research activity and use in its broadest sense. A

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growing body of literature has documented the potential benefits of embedded researcher approaches (Cheetham et al., 2018; Reen et al., 2022) and these interventions are garnering increasing attention in public health (e.g., Kasaai et al., 2023; NIHR, 2022).

A large body of work has investigated the mechanisms through which research diffuses into practice in public health (Orton et al., 2011; van der Graaf et al., 2017). This literature suggests that the uptake of research occurs through complex, non-linear processes that are influenced by a wide variety of contextual factors. Barriers hindering this process emerge from both academia and practice settings, as well as from associated relational dimensions. For example, public health decision makers consider scientific evidence alongside many forms of information including political pressure and public opinion which can hold equal, if not greater influence (Kneale et al., 2019; Liverani et al., 2013; Sanders et al., 2017). Severe capacity constraints, research inaccessibility, and research lacking in applied value present additional barriers (Homer et al., 2022; Kneale et al., 2017). Mismatches in timelines and priorities further extend the research-practice divide and trust can be eroded across these institutions (Homer et al., 2022; Marshall et al., 2014; van der Graaf et al., 2017).

Embeddedness can address many of the aforementioned challenges and presents an alternative to the traditional separation of research producers and consumers (Coates and Mickan, 2020). Through this boundary spanning position, embedded researchers can act as translators across these highly disparate worlds, learn and embrace contextual factors, and produce and/or contribute to research that is of greater local relevance (Churruca et al., 2019). Their integration within a host team also can address issues of trust and contribute to fostering more collaborative relationships and local buy-in (Cheetham et al., 2018; Churruca et al., 2019). Despite these benefits, the body of knowledge on embedded researcher approaches in public health is still emerging and in relative infancy (Cheetham et al., 2018). As such, several gaps remain.

### 1.1. How do embedded researchers become embedded within a host team?

The literature has associated many advantages with a researcher's embeddedness within decision-making environments. However, we lack an understanding of the processes through which one becomes embedded within a host team. Some insight can be drawn from research on the challenges and enablers underlying embedded researcher approaches in healthcare and public health (Coates and Mickan, 2020; Vindrola-Padros et al., 2019). For example, Cheetham et al. (2018) examined the case study of an embedded researcher in a northeast England local authority public health setting. They identified a variety of enablers such as having a desk within the local authority which provided the opportunity for informal interactions and the development of trusting relationships. They also cited attendance at team meetings, a marker of embeddedness in the daily life of an organisation, as valuable to the role's success. Similarly, Reen et al. (2022, p. 96) suggest that in healthcare settings, embedded researchers "will need to build trust and be seen as 'one of the team'. Having tea or coffee with people in [the] organization is time well spent, especially early on". Much of this work on embedded researchers has employed autoethnographic methods or focused on a single case study (Kneale et al., 2023). While valuable, further research is needed to develop a stronger theoretical foundation for the concept of embeddedness within public health.

### 1.2. How do embedded researchers seek to influence research culture?

A second gap relates to the strategies embedded researchers employ to influence research cultures. Indeed, the specific role of an embedded researcher is a topic that is up-for debate within the literature. Vindrola-Padros et al. 2017, (p. 70) suggest that "embedded researchers may use techniques used by knowledge brokers such as knowledge management, linkage and exchange and capacity building [...]"

However, their main purpose is to carry out research, to coproduce knowledge". Coates and Mickan (2020, p. 744), on the other hand, frame research production and capacity building with equal priority in their conceptualisation of embedded researchers as "knowledge brokers that collaborate with clinical teams to undertake research, and build clinicians' capacity to understand and apply research findings". As such, more research is needed to explore the relative emphasis embedded researchers in public health place on different strategies and to understand these strategies in greater detail.

### 1.3. How can the influence of embedded researchers be measured?

Finally, researchers have stressed the need for clear evaluative frameworks to be integrated within embedded researcher interventions (Churruca et al., 2019). Continual learning is critical for embedded researchers, particularly considering their often short-term, trial-based funding. Unfortunately, studies of embedded researchers have identified that there is often ambiguity surrounding the remit of these roles (Ward et al., 2021). For example, through an online survey with embedded researchers in Australian healthcare settings, Mickan and Coates (2022) found that almost a quarter of participants had no specific measures by which to gauge performance. Evaluating embedded researcher interventions is complex, particularly within public health, given that they are one of many factors influencing research activity. The fact that there is no consensus on what constitutes a 'research active' culture and the fuzziness of embedded researchers as a model further complicate such evaluation. These challenges emphasise the value of integrating clearly defined objectives within the design of embedded researcher initiatives.

### 1.4. Study objective and aims

The literature gaps highlighted above demonstrate the need for further in-depth research on the mechanisms through which embedded researchers foster change in public health research cultures. The processes of embeddedness, influencing change, and evaluation do not happen in isolation, but instead reflect a continual progression of learning and development alongside the host organisation. Therefore, we addressed these gaps collectively in the context of the early phases of embedded researcher roles in public health. Exploring this phase is particularly valuable as the first several months in the role involve the transition from outsider to embedded member of a host team.

Through semi-structured interviews with embedded researchers in English local government, the objective of this research was to provide a detailed conceptualisation of the early stages of embedded researcher roles within public health. We focussed on Clinical Research Network Public Health Local Authority Research Practitioner posts (see description below) as an example of embedded researchers. Our results will aid in shaping embedded researcher activity, defining expectations, and measuring early outcomes. The project was guided by three aims:

- i. Explore the social processes shaping embedded researcher activity during the early stages of their roles
- ii. Identify which research outputs are delivered in the early stages of embedded researcher engagement
- iii. Investigate early indicators of change in organisational research cultures within local government

## 2. Methods

### 2.1. Background to Clinical Research network research practitioner posts

This study involved in-depth, semi-structured interviews with embedded researchers employed through a National Institute for Health and Care Research (NIHR) funded programme as part of its Clinical Research Network (CRN). The CRN is a research focused organisation in England who support, coordinate, and enable research delivery across

healthcare, community and social care, and public health organisations. This CRN funded programme saw embedded researchers - known as Public Health Local Authority Research Practitioners (PHLARPs) - placed across fifteen diverse local authority (LA) public health settings in England. LA public health teams are responsible for understanding local needs, setting the direction of local policy, and directing the delivery of most local public health functions (Kneale et al., 2017). Although many of these activities require cooperation with other LA departments and allied bodies, public health teams typically adopt a leading role in setting public health policy and commissioning public health services. Our research team was approached by the CRN to investigate their PHLARP programme's various dimensions, and the embedded research literature more broadly, through a diverse program of work. The present research reflects one component of this broader study.

The intention of the CRN-PHLARP programme was to enhance public health cultures of research engagement and activity within local government. The first two PHLARPs started their posts in March 2020, with most of the remaining cohort joining the scheme in spring 2021. In several cases, an open recruitment call was advertised through normal channels for LA positions. In other instances, academics were recruited through their university and seconded to the PHLARP roles. Although in these cases the university often had some pre-existing links with the LA, most PHLARPs themselves had no such relationship. Finally, in a minority of cases, PHLARPs were recruited from within the LA and, therefore, had strong pre-existing relationships with the local public health team. The positions were predominantly advertised as one-year contracts with a salary range of approximately £28,000–43,000 (Kneale et al., 2023), but this funding was extended to three years in most cases.

We view CRN-PHLARPs as a form of embedded researcher as the aim of the programme was for them to be situated within a host LA team, while still maintaining an affiliation with an academic institution such as a university or the CRN; the roles also involved the specific aim of facilitating research activity. These attributes align with the previously discussed defining principles of an embedded researcher. Although the PHLARPs were connected by overarching aims, they were meant to be operationalised with some flexibility across LAs. Indeed, LAs contributed to the construction of job descriptions to reflect local needs and priorities, typically in conjunction with an academic partner. As such, the CRN-PHLARP interventions provide an opportunity to identify trends across embedded researcher roles with shared aims but embedded within diverse LA settings.

## 2.2. Research framework: Social processes, outputs, and outcomes

The CRN-PHLARP programme can be thought of as a series of complex interventions to affect organisational change and, in turn, this research reflects a form of process evaluation (Moore et al., 2015). Process evaluations “assess fidelity and quality of implementation, clarify causal mechanisms, and identify contextual factors associated with variation in outcomes” (Craig et al., 2008, p. 3). An objective of our overarching research programme on embedded researchers was to develop a logic model to depict components, mechanisms (pathways of action), outputs, and outcomes as sequential (although not necessarily linear) chains of events. In the present study, the aim of our evaluation was to explore the social processes contextualising embeddedness, outputs, and outcomes, and connections among these elements.

Outputs were conceptualised as the immediate research activities of the PHLARPs such as funding applications completed, training sessions provided, or research connections facilitated. As this work was formative, we were not as concerned with quantifying these metrics, but rather exploring the emphasis placed on different categories of outputs which reflects how PHLARPs approached their roles as change agents in complex organisations. We conceptualised outcomes as early changes in organisational research culture. Interventions aiming to improve

evidence use in public health often cite the aim of enabling organisations to become more “research active”. However, the attributes that constitute a research active culture are often ill-defined, limiting the ability to measure progress of the intervention. Exploring outcomes as perceived by embedded researchers is thus useful as it will allow us to identify early indicators of change in research activity and provide recommendations for the design of embedded researcher evaluative approaches.

## 2.3. Recruitment and interview protocol

In late 2021, the CRN provided contact details for twenty-four PHLARPs and we conducted a pilot interview in November 2021. As the interview schedule did not change significantly, this participant was included in our sample. We then contacted the remaining PHLARPs and carried out semi-structured online interviews in spring 2022 through either Zoom or Teams. Prior to each interview we informed participants that their responses were anonymous and requested their consent to the use of an audio recorder. This research was approved by a University College London research ethics committee (REC1540).

At the start of each interview, we gathered basic information about PHLARPs' roles: start date, contract length, weekly time allocation, and any shared responsibilities (e.g., if the post was a job share). We also confirmed their LA and academic affiliations. The remainder of the interview covered three general topic areas: i) aims and outputs ii) embeddedness within the LA, and iii) influence and outcomes.

When exploring aims and outputs, we first asked PHLARPs to provide a general overview of their objectives and to describe a regular day in the role. As a prompt, we then showed participants a list of five activity categories, drawn from the literature on embedded researchers: generating/commissioning/facilitating research, synthesising research for decision-making contexts, applying research in decision making contexts, capacity building, and informally influencing research culture (e.g., Cheetham et al., 2018; Mickan and Coates, 2022; Ward et al., 2021). We asked PHLARPs to identify those categories in which they were involved and to provide examples of activity under each relevant category. We did not show the list to a few participants who had already discussed their activities and outputs at length.

During the portion of the interview revolving around embeddedness, PHLARPs were first asked if they felt they were perceived as a core member of the public health team and why, or why not. We then explored the social activities undertaken by PHLARPs within their initial months in post.

In the final section of the interview, we asked PHLARPs to describe their perceived influence on research culture within the LA and to provide examples. As an additional prompt, if necessary, PHLARPs were asked to describe what they were most proud of in their role to date. Finally, we explicitly asked PHLARPs to describe any factors they had not yet identified which inhibited or assisted them in the role.

In total, we conducted seventeen interviews with PHLARPs, reflecting 71% of all those originally identified by the CRN. All interviews were audio recorded, lasting an average of 49min (range: 34–69 min), and manually transcribed.

## 2.4. Overview of participants: Role structure and affiliations

There was significant diversity across participants in relation to their career stage, role structure, and affiliations. Over half of these PHLARPs had less than three years of recent experience in research positions outside of graduate degrees (65%). Most had been in post for approximately 1–1.5 years at the time of the interview (76%). Approximately half worked part time in their PHLARP roles (47%), with the remaining participants being full time for at least some of their appointment. Of those who were part time, five split the PHLARP role as part of a job share and five held academic positions outside of their PHLARP role. Over half (59%) worked within a single layer of local government (e.g., London borough, city council), but the remainder had a remit to work

across several local administrative units (e.g., a county council). Most PHLARPs worked primarily within lower levels of local government (e.g., a public health team), but a few participants were more strongly affiliated with teams and individuals at strategic levels within the LA such as directors of public health.

While the nature of the programme meant that all our participants had some level of dual affiliation across local government and a research institution (either a university or the CRN), the relative level of affiliation across these two types of organisations varied. In general, more experienced researchers held stronger levels of affiliations with universities. Indeed, of those PHLARPs more closely affiliated with a university than the local government (24%), most held established research careers. Conversely, PHLARPs holding relatively weak affiliations with a research organisation beyond the CRN and strong connections with a LA (47%) were primarily early in their careers with respect to research. The remaining five PHLARPs (29%) held an equal level of affiliation across a research institution and local government.

2.5. Analysis

We employed an inductive thematic analysis approach using NVIVO

qualitative analysis software following the guidelines of Braun and Clarke (2006). After transcribing our data, the first author identified a preliminary list of codes under each of our research questions then coded all transcripts using an inductive approach, adding to the initial list and grouping codes into themes and sub themes. As we adopted a semi-structured approach, each theme/sub theme could be identified and coded from any section of a transcript. As such, we often extracted text pertaining to a theme/sub theme from multiple points within a transcript. All coded text was reviewed twice for accuracy. Discussions of the coding framework took place throughout the analysis process to ensure all authors were in alignment with the first author’s interpretation of the data. Coding was adjusted accordingly by the first author. To add an additional layer of rigour, a random 25% sample of the interviews were double coded by the second author using the coding framework. Agreement was greater than 95% in the double-coded sample and minor discrepancies were all resolved through discussion, with no changes needed to the codes within the text. Considering this high level of agreement, we did not double-code the remainder of the sample. Finally, to provide an indication of the prominence of themes across our sample we calculated the proportion of the total respondents from whom we identified each theme (i.e., the number of interviews in

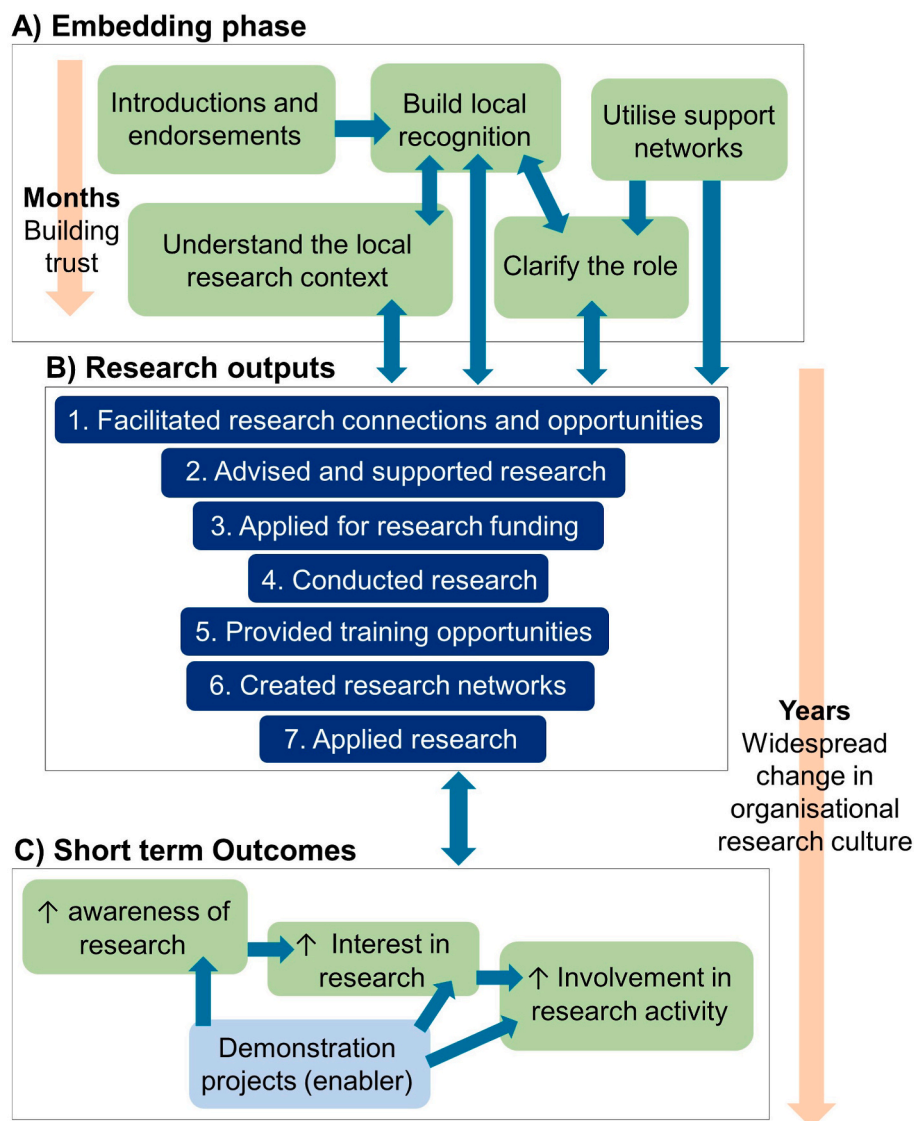


Fig. 1. The themes presented in this research framed as a logic model conceptualising the early stages of embedded research roles in local government public health settings.

which each theme was present at least once). While most PHLARPs in our sample were connected with a distinct LA, two individuals held their PHLARP posts as a job share within a single LA. As these two participants brought unique sets of experience to their roles and reflected individual perspectives, we considered them to be distinct units of analysis for the purposes of calculating proportional representation of themes.

### 3. Results

Our results are divided into three subsections, each of which presents the themes corresponding to one research question and reflects different stages of embedded researcher roles. Within these sections, we identify the proportion of participants who discussed each theme and narratively describe the diversity of associated responses (sub themes). Although these stages were somewhat sequential, there was also significant overlap. We have conceptualised themes across our research questions, and their relationships, as a logic model (Fig. 1).

#### 3.1. Social processes shaping the early stages of embedded researcher activity

Five primary social processes (themes) shaped the initial stage of PHLARP's roles, connected by the central thread of building trust with LA colleagues (Fig. 1A). These processes were largely concurrent and can be conceptualised as an initial embedding phase for embedded researchers. A final theme related to the time needed for this phase to occur, with most PHLARPs describing the embedding process as dominating the first several months of their role (76%). This longevity was exemplified by a participant who said, *"I think probably about four months in is when I started to think, okay, yes, [...] I found the connections and it's all come together. It did take a long time, and I think that's only natural"*.

##### 3.1.1. Building local recognition

To establish an initial level of trust, almost all PHLARPs discussed the need to build local recognition and grow their network (94%). Indeed, a lack of pre-existing connections within the LA was described as a significant barrier in the role or, conversely, any established networks were highly valued. Additionally, for those who has little prior experience working with local government, the complexity of LA processes presented an initial challenge.

To maximise their visibility, PHLARPs connected with colleagues repeatedly and tried to maintain a constant presence within the LA (e.g., through regularly attending team meetings). *"You need that physical presence, and that repeated physical presence for people to get to know you and trust you"* described one PHLARP. It was almost impossible to maintain this level of visibility outside of a single team, however, and PHLARPs widely perceived their influence to be limited upstream or downstream of their immediate network. For those PHLARPs expected to work across multiple administrative units, this was identified as a particularly significant challenge. For example, a PHLARP described this in saying, *"We're not known, they don't know us. In our team, it was quite a lot of effort required to hammer home the message about who we are, what we're doing, what the point is. And we're unknowns anywhere else. So, you don't have the opportunity or the captive audience"*. The lack of face-to-face interaction brought about by Covid-19 restrictions was also thought to have lengthened the time needed to build local recognition.

##### 3.1.2. Introductions and endorsements from colleagues

Endorsements from colleagues were identified as enablers for establishing trusting networks and building recognition (82%). In most cases these introductions came from line managers, but also from other colleagues and gatekeepers to community groups. Such individuals could directly link PHLARPs to useful contacts, advertise the PHLARP roles, and ensure PHLARPs gained entry to relevant meetings. For example, a PHLARP described the benefits of a colleague's endorsement in saying, *"Making [the role] easier is having a consultant who is absolutely*

*passionate about research. Our main contact, he opens doors for us. He'll send an email to the leadership group. He'll help us navigate the different levels of programmes or departments within public health"*.

##### 3.1.3. Understanding the local research context

During their first several months in post, PHLARPs needed to formulate a strategy for enhancing local research activity. To inform this direction of travel, PHLARPs emphasised the importance of taking time to listen and gain an understanding of the local research context including perceptions and priorities (82%). While PHLARPs often came by this contextual knowledge informally through conversations with colleagues, several also conducted more formal research and training needs assessments. Demonstrating this understanding as part of their research activity was described as critical to building trust among colleagues. For example, a few PHLARPs spoke about how the meaning of "research" was not viewed consistently across colleagues. This was exemplified by a PHLARP who explained, *"We did some soft pilot testing in the team, and lots of people really didn't resonate with the term "research". The feedback was that it was like too specific and academic a word and it wasn't very applicable in the local authority setting"*. The terms "monitoring" and "evaluation" were more widely used within LAs and, with this knowledge in hand, PHLARPs were able to communicate more effectively and build a shared understanding.

The value of local knowledge was also emphasised by PHLARPs who described the extreme resource limitations plaguing local government which limited the ability of their colleagues to engage with research. PHLARPs spoke about how being empathetic and accounting for these challenges within research activities was essential. Particularly important was the need for PHLARPs to approach research collaboratively. A PHLARP described this in saying, *"It wasn't the case of us saying "you need to do this". It was "Okay, so what is going on in the neighbourhood that you're working with? What do you want to know?" [...] I think it helped that we weren't dictating to them. It was collaborative"*. PHLARPs also described how negative prior experience with academics (e.g., a lack of collaboration) had eroded trust and could reduce their colleagues' desire to engage. Knowledge of such perceptions could inform PHLARPs approach to the role.

##### 3.1.4. Clarifying the role

In the process of networking, PHLARPs spoke about fostering an understanding of their role among colleagues (71%). They needed to clearly explain the purpose of their role and what they hoped to achieve in initial meetings, as well as overcome any misconceptions. One common point of misunderstanding, for example, was a view that PHLARPs were primarily there to conduct research rather than facilitate and support research (see section 3.2).

##### 3.1.5. Utilising support networks

Finally, PHLARPs regularly identified the value of a strong professional support network during their embedding phase (59%). These participants discussed the experimental nature of the posts and the value of sharing ideas and discussing the direction of their role with colleagues. In this regard, the PHLARPs had initiated an online community of practice, supported by the NIHR, which many praised as offering this support. For others, this support network came through splitting the role as a job share or through academic colleagues.

### 3.2. Early outputs of embedded researchers

We identified seven categories (themes) of outputs delivered by PHLARPs, five of which reflected a form of capacity building (Fig. 1B; Table 1). Despite the diversity of PHLARP roles, the relative emphasis placed across these categories was highly consistent among participants. Several other outputs were identified, but with less consistency (e.g., establishing data sharing agreements, improving access to peer reviewed literature). The process of delivering research outputs offered

**Table 1**

Early research outputs delivered by embedded researchers in English local authority public health settings (N = 17).

Output	Illustrative quote	Frequency
Facilitated research connections and opportunities	<i>“Connecting researchers is a big part of my role and connecting individuals within universities to the local authorities [and to] patients around the region”</i>	n = 15
Advised and supported research	<i>“Colleagues come to me, they ask me how to design a particular project or they ask me whether their idea of exploring this research question makes sense or not. So, I give them advice on the research design”</i>	n = 12
Applied for research funding	<i>“From November onwards it’s more about getting funding applications in. Because I have got a fair idea of where the research is, what’s happening. People are coming to me with ideas and they know what to do, they know how to do it, their major issue is, they don’t have the time or the capacity”</i>	n = 11
Conducted research	<i>“We also use some of our protected time to undertake research ourselves and upskill ourselves as embedded researchers”</i>	n = 10
Provided training opportunities	<i>“We organized a number of speakers as well, three or four speakers to come in for a webinar on topics related to research within public health teams. One of them was about how to carry out research, for example”.</i>	n = 10
Established research networks	<i>“We set up a wider network of local authorities and consultants in public health and each local authority would enter these meetings [...] And there we would discuss [research] for the entire region and see what our needs were”</i>	n = 8
Applied research in decision making contexts	<i>“I got invited to join a working group around this new piece of work that’s been commissioned [...]. I think the reason they invited me in is [because I] have that research into practice wider health and wellbeing inequality perspective”</i>	n = 7

valuable networking opportunities and PHLARPs described harnessing this potential to build upon existing contacts and continue to become embedded within their host team.

### 3.2.1. Facilitating research connections and opportunities

Nearly all PHLARPs emphasised facilitating and promoting research connections and opportunities as a dominant aspect of their role (88%). In this regard, PHLARPs acted as institutional bridges through sharing research opportunities across their networks and fostering sustained connections among colleagues. *“I bridge the local Council to the research world so that they can increase research activity, increase research output, increase the research connections”* described one PHLARP. Most notably, research facilitation included promoting opportunities for involvement with research among LA colleagues and external organisations (e.g., schools, care homes). For example, a PHLARP described an instance where they connected an academic with a key LA contact in social care for the purposes of research involvement and participant recruitment. Additionally, PHLARPs regularly connected LA colleagues interested in research to academics with relevant subject expertise. PHLARPs also facilitated research opportunities through signposting colleagues to research skills training and funding calls.

Developing connections across LA colleagues and external institutions was thought to contribute to a sustained improvement in research culture. One PHLARP described this long-term goal in saying, *“Part of my role is certainly around building sustainable networks beyond my time in the post. Building sustainable relationships between academic institutions, parts of the NIHR, and the Council”*. PHLARPs used a range of channels to broadcast research opportunities (e.g., regular updates at team meetings, email). This facilitation role involved a significant amount of *“detective work”*, as one PHLARP described it, to identify

relevant individuals and opportunities across organisations.

### 3.2.2. Advising and supporting research

Another output widely described across PHLARPs was advising and/or supporting LA colleagues in conducting and raising funds for research (71%). For example, PHLARPs assisted with data collection, participant recruitment, and bid writing. They also consulted on research activity including providing advice on refining research questions, protocols, and methods. One PHLARP described this support in saying, *“It’s almost mentoring really, expert mentoring support”*. PHLARPs felt that this advice contributed to building research capacity within the LA through the development of research skills.

### 3.2.3. Applying for research funding

PHLARPs were also heavily involved with completing research funding applications themselves (65%), often working across several colleagues and teams. Most notably, several PHLARPs contributed to applications for the NIHR’s Health Determinants Research Collaboration fund, a £50 million investment in local government partnerships to boost ‘local authorities’ capacity and capability to conduct high-quality research to tackle health inequalities” (NIHR, 2022). Even when unsuccessful, PHLARPs expressed the value of writing these applications to improving research capacity and collaboration. A PHLARP described this in saying *“this bid has focused people’s minds a bit more, realizing what could be done”*.

### 3.2.4. Conducting research

Over half of the PHLARPs described conducting research themselves including academic research and internal research to feed into local policy (e.g., a survey to inform Council strategy) (59%). For a minority of PHLARPs, conducting research was their primary directive. However, most PHLARPs emphasised that their role was more about research facilitation. *“My job is to enable the research, not to do it for them”* described one PHLARP. A few PHLARPs felt unsure about whether they should be involved with conducting research at all. This lack of clarity was described by a PHLARP who said, *“We have this sort of confusion about whether we’re supposed to be doing research or not. It’s obviously not our priority, it’s more about increasing the culture, rather than actually doing the research”*.

### 3.2.5. Providing training opportunities

PHLARPs were often involved with building research capacity through organising research skills training for their LA colleagues (59%) such as journal clubs and workshops covering a wide range of research methods and skills. *“I’m just trying to upskill people. And it’s not really even upskilling. It’s more of a refresh or confidence building exercise really”* described one PHLARP. In some cases, PHLARPs led this training themselves, while in other instances they invited external facilitators.

### 3.2.6. Establishing research networks

Several PHLARPs contributed to developing formalised research networks (47%). In some cases, PHLARPs brought colleagues together for regular dialog about research and identified a network of individuals who could promote research within their own communities. Others discussed establishing online research networks where relevant information and opportunities was shared. These digital tools included internal online platforms where resources such as research protocols could be posted as well as publicly available databases of LA research contacts.

### 3.2.7. Applying evidence in decision making contexts

Finally, several PHLARPs (41%) spoke about their involvement in applying research evidence in LA decision-making contexts. This activity included, for example, sitting on LA advisory panels: *“as part of the role, I sit on lots of committees or strategy groups. Then I’m the expert, the researcher in the room”*. In most cases, this type of knowledge brokering activity were not described as primary aspects of PHLARP roles.

### 3.3. Early changes in local authority research culture

We identified five themes relating to shifts in the LA research culture (Fig. 1C). Three of these themes reflect early indications of change: improved awareness of research, a growing interest in research, and greater involvement in research opportunities. A fourth theme, demonstration projects, acted as an enabler of this research activity. Finally, despite these observed improvements, PHLARPs also discussed the long term and incremental nature of organisational change and the implications for their role.

#### 3.3.1. A shifting research culture: Awareness, interest, and involvement

PHLARPs regularly perceived there to have been a positive change in the profile of research within their host team (76%). A PHLARP described this change in saying, *“I think we have put research on the table for lots of staff who didn't really think about it before”*. Another PHLARP discussed how they perceived their colleagues to be *“thinking about [research] more. Bringing it to the forefront in their minds. It forces people to have that narrative in their head”*. PHLARPs perceived their colleagues to be more aware of, for example, funding opportunities and other available resources, the kinds of research questions they could ask, the ways in which research could add value to public health interventions, and how the LA was already engaging with research (e.g., through evaluations which were often not initially perceived as research). PHLARPs widely emphasised that an appetite for evidence informed decision making already existed within LAs, and greater awareness of the support and resources that were available enhanced the perceived feasibility of research involvement.

Several PHLARPs (65%) also discussed how the queries and input they received from colleagues pertaining to research opportunities (e.g., training, proposed projects, and accessing the literature) had increased since they started in the role. A PHLARP described this change in saying, *“I now have people who email me quite a lot who are interested in reading a paper and they want to know how they can get it, or they're interested in doing some training and they want to know where to look”*. These examples offer evidence of a growing local interest in research opportunities.

PHLARPs also perceived there to have been an improvement in LA research involvement and activity (53%). Examples included strong turnouts for training opportunities, participation in research projects conducted or facilitated by the PHLARP, and investment in research. For example, a PHLARP provided an example of multi-level involvement in a research funding application: *“We went to every district and city council, even to the politicians in the Council, and discussed research with them. And they were all interested. Every one of them came on board for us to put in this application, which we didn't think was possible earlier. Like when I started, no way. People were not even willing to discuss it at one point of time”*.

#### 3.3.2. Demonstration projects

Connected to the aforementioned outcomes, several PHLARPs described how demonstration projects enhanced research involvement in a positive cycle of reinforcement (41%). This relationship was most often identified in relation to funding applications (both successful and unsuccessful), but also to directly witnessing the benefits of research for service delivery and publications. Illustrating this latter example, a PHLARP described the enthusiasm that was generated following a research publication: *“it just creates a bit of excitement in the wider public health team. And again, even that has an influence on people. People in the team are like ‘I want to do research, I want to be involved, I want to get something published’”*.

#### 3.3.3. Organisational change: A long term process

Despite perceived improvements in the local research culture, PHLARPs also spoke to the immense remit of their roles and the long-term nature of affecting organisational change (82%). *“It's evolution not revolution”* emphasised one PHLARP. *“I don't walk on water. My name's not Jesus!”* said another. The enormity of the task was articulated

well by a PHLARP who said, *“Embedding a research culture is a huge task. It's not going to happen overnight or I daresay it's not going to happen while I'm in the role. If this role goes on for five years, I still think it will take longer to embed that research culture”*. PHLARPs spoke about how being the only member of staff dedicated to research significantly limited their wider impact in the LA. A lack of seniority was also perceived to reduce their influence. *“This can't all be done by one relatively junior person in each local authority”* described one PHLARP. These factors have important implications for defining the expectations of embedded researcher roles and, indeed, many PHLARPs expressed the need for greater clarity in their objectives. Not only was this clarity necessary for PHLARPs to feel informed when driving their roles forward, but also for ensuring they could demonstrate achievement and, therefore, strengthen job security.

## 4. Discussion

### 4.1. Embeddedness in public health organisations

This research suggests that the early stages of embedded researcher roles in public health are defined by an embedding phase centred on establishing trust within the host organisation. Building local recognition through participating in the organisational routines alongside public health colleagues can enable embedded researchers, and their work, to eventually be perceived as part of the team. Endorsements from respected colleagues and physical co-location can further support this process. Given the value of taking part in day-to-day activities, embedded researchers will likely struggle to achieve the desired level of embeddedness beyond a single host team. Through building local networks, embedded researchers can develop the contextual knowledge necessary to direct their research activity and communications in culturally appropriate ways which are attune to the resource poor and political environment of public health systems. This embedding phase can take up to several months but forms the foundation on which later stages of the intervention are built. To avoid perceptions of under-performance, it is important for embedded researchers, funders, and other stakeholders to recognize this longevity and that expected outcomes are proportionate to the seniority and scale of the intervention.

Many of social processes we identified within the embedding phase such as regular contact with LA staff, taking time to understand the local context, and endorsements from colleagues, align with the existing literature in healthcare and public health (Cheatham et al., 2018; Reen et al., 2022; Vindrola-Padros et al., 2017). For example, in relation to local endorsement, Vindrola-Padros et al. (2019, p. 69) explored three case studies implementing embedded researcher models in healthcare settings the UK and found that *“key people within the host organisations where the researchers were embedded played the role of ‘sponsor’ or ‘champion’, introducing team members to staff and guaranteeing access to areas”*. As such, our results which were drawn from a diverse cohort of embedded researchers add support to the relevance of the existing body of knowledge in local government public health contexts.

While some authors have sought to unpack the components of embeddedness in healthcare settings (e.g., Ward et al., 2021), to our knowledge, no prior research has sought to delineate the concept of embeddedness explicitly in public health. Furthermore, there has been very little exploration of more intangible dimensions of embeddedness, with research tending to focus on design and operational features. As part of the wider program of research of which this study is a part, we produced a systematic map of the wider embedded researcher literature (Kneale et al., 2023), finding that ‘embeddedness’ can occur through physical (e.g., office space with the host team), procedural (e.g., participating in day-to-day processes), and/or cultural (e.g., perceived as a member of the host team) means. The present study suggests that becoming procedurally embedded within a host team can aid embedded researchers in developing a deeper level of trusted cultural embeddedness. Physical embeddedness can facilitate procedural embeddedness through offering more opportunities for regular contact with a host

team. Trust appears to be a central element in achieving greater degrees of immersion within a host team. Although the establishment of trust is often mentioned as an enabler to embedded researcher interventions (e.g., Cheetham et al., 2018; Reen et al., 2022) it has received little in-depth theoretical examination in this context.

Further examination of how embedded researcher roles evolve over time in public health settings is necessary to facilitate continued theoretical development of the concept of embeddedness in these settings. The embedded researcher literature could also benefit from insight on embeddedness drawn from other fields, such as the extensive research on the concept of organisational job embeddedness (Kiazad et al., 2015). This literature seeks to explain how “employees become psychologically and socially embedded with the organization and with the community in which the organization operates” (Ghosh et al., 2017, p. 130). One can envision significant overlap between this theory and the concept of embedded researchers. However, further work is needed to advance the concept of embeddedness specifically within the context of public health given the complexity of public health systems and environments in which decisions are made.

#### 4.2. Capacity building: A key, but complex, objective

Delivering research outputs will provide further opportunity for embedded researchers to continue extending their networks and demonstrate their aptitude in the role. Most embedded researchers in this study focused on capacity building, placing less emphasis on research production. Although outputs will depend on the local context, this research indicates that capacity building work will be necessary to address many of the barriers hindering research activity within LAs and thus maximise the sustainability of change. Indeed, many PHLARPs explicitly stated that this prioritisation would add greater value to the LA than if they were to undertake the research themselves. For example, facilitating research connections can support research funding applications to address capacity challenges and connecting LA staff to research training and advising on research projects can improve local research confidence and capability. In both examples, the capacity building activity serves to lessen local reliance on the embedded researcher themselves.

The focus on capacity building observed in this study is contrary to much of the wider literature on embedded researchers which tends to find that this type of work receives dual or lesser emphasis than research production (Cheetham et al., 2018; Mickan and Coates, 2022; Vindrola-Padros et al., 2017; Ward et al., 2021). Furthermore, although existing research provides some examples of capacity building activity, in many cases, “the literature shed[s] relatively little light on the precise meaning of capacity development” (Ward et al., 2021). The present study thus furthers this body of knowledge through providing in-depth descriptions of the diverse outputs associated with capacity building and research facilitation.

Public health decisions are made within the context of competing values and needs across diverse stakeholders both within and external to governmental systems (Liverani et al., 2013). Opportunities to use research evidence within public health systems are equally varied and interlinked, from day-to-day service delivery to long term strategic planning. In a climate of austerity and post-pandemic recovery, public health teams are also expected to undertake increasingly more responsibilities within resource poor and siloed, but highly pressurised environments. Thus, improving the local capacity for research, be it through funding, skill development, or other resources, could contribute to sustained, long-term impact beyond the tenure of the embedded researcher.

#### 4.3. Awareness, interest, and involvement: Indicators of change in public health research culture

Research awareness, interest, and involvements presented

dimensions of the LA research culture that were regularly perceived to have improved over the PHLARP’s time in post. These dimensions appear to reflect a progression of research engagement that could be used as initial indicators of change within a host organisation. Identifying what to measure in relation to research activity is essential if we are to assess how cultures of evidence use diffuse through an organisation. Although measuring change in research production is seemingly straightforward, equally as important to assess are the less direct, subtle ways in which individuals conceptualise and apply research and evidence in decision making throughout the LA (Weiss, 1977). Understanding motivational factors underlying research engagement such as awareness and interest as identified here is particularly valuable within the early stages of embedded researcher interventions as it will likely take much longer for observable change in research production to occur.

Although there is a need for clear evaluation strategies, those involved with embedded researcher interventions must keep in mind the incremental nature of organisational culture change. As Cheetham et al. (2018, p. 68) described, “There is a need to scale back expectations about potential impact and recognize the significance of incremental attitudinal change, leading to a willingness to try different ways of working”. Similarly, McAteer et al. (2019) suggest that any approach aimed at bridging the research-implementation gap needs to be in place for at least a few years for any impacts to become apparent. These sentiments were echoed by PHLARPs in this study.

#### 4.4. Conclusions

This study contributes to the growing body of literature on embedded researchers in public health settings. It provides a detailed account of the mechanisms driving early phases of embedded researcher roles in these contexts, emphasising the value of trust and capacity building processes and identifying early indicators of change in LA research culture. One limitation of this research was its lack of data from the perspective of LA staff. This detail could be used to triangulate findings and further clarify the stages of incremental change in research culture. Although measuring outcomes through the perceptions of PHLARPs did present a limitation with respect to objectivity, we found PHLARPs to be highly forthcoming in relation to the challenges they experienced and the extent of change in organisational research activity. The literature on embedded researchers could benefit from further conceptual development through the integration of theory from other fields, such as organisational literature, as well as research on monitoring and evaluation approaches which encompass capacity building activity.

Our results reveal a lengthy, but essential embedding phase for embedded researchers in public health through which these change agents establish themselves procedurally and culturally within their host teams. During this phase, embedded researchers could benefit from implementing the processes identified in this research (e.g., making oneself highly visible within the host team, taking time to learn the challenges experienced by colleagues, and seeking out support networks). This research also highlighted the value capacity building activity which can strengthen the sustainability of change. To support embedded researchers, there is a need for such non-traditional outputs to be assigned greater value by research organisations. Finally, our results suggest that measures of research awareness, interest, and involvement could be used as initial indicators of change in a research culture within public health settings. However, these shifts are not expected to have occurred beyond an embedded researchers’ immediate colleagues, particularly within their initial years in post. As such, if embedded researchers are to contribute to widespread organisational change and enhance the use of evidence in policy and practice seeking to address health inequalities, it is essential that these interventions are funded with sufficient longevity.



## CRediT authorship contribution statement

**Rachael C. Edwards:** Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing. **Dylan Kneale:** Conceptualization, Methodology, Investigation, Writing – review & editing, Funding acquisition, Project administration. **Claire Stansfield:** Conceptualization, Methodology, Investigation, Writing – review & editing. **Sarah Lester:** Conceptualization, Writing – review & editing.

## Declaration of competing interest

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## Data availability

The authors do not have permission to share data.

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