

What are embedded researchers and what influence do they have in public health settings?

Draft key messages, executive summary and main report

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DRAFT KEY MESSAGES, EXECUTIVE SUMMARY, AND MAIN REPORT

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Main messages

Embedded Researcher activity is broadly about an individual researcher or a research team having dual affiliation to a research organisation and a practice or policy organisation. To investigate variation in embedded researcher practice and their role in enhancing levels of research activity within organisations, we adopted a mixed methods approach which involved examining published literature as well as researching an embedded researcher scheme. This scheme involved placing research practitioners, who facilitated research and conducted research, into Local Authority public health teams (we refer to these researchers as Public Health Local Authority Research Practitioners (PHLARPs); this was a scheme funded by the National Institute of Health and Care Research (NIHR) and delivered through the Clinical Research Network (CRN)). Our main findings, which draw from the published literature as well as the primary research, are described below:

1. **‘Embedded researcher’ is a term that describes a wide variety of activities that can help organisations become more research active.** Embedded researcher interventions differ across several dimensions including the direction (researcher embedded in policy/practice setting versus policy-maker or practitioner embedded in research setting); the composition and balance of activities that help to foster a more research active culture (generating research, mobilising research, or facilitating research); as well as the type of embeddedness (for example, the extent to which a researcher was embedded through being physically present in the host organisation or whether they were embedded more remotely). We have developed typologies of how embedded researcher activity takes place, although recognise there is wide variation within these. Even among researchers embedded within the same PHLARP scheme, we have identified substantial variation in the activities they undertake, and even in the way they meet the criteria of an embedded researcher. This has implications for measurement and evaluation approaches.
2. **Embedded researchers do activate precursors in research activity that could lead to sustained organisational culture change.** Throughout this research we identified several examples where embedded researchers have made early or incremental changes to the research culture in an organisation through growing networks, becoming a local expert and champion, and enhancing evidence ‘fluency’ (the skills needed to source and interpret evidence) or curiosity about evidence and research. For example, a researcher in the PHLARP scheme described how they helped to support colleagues as a local research expert: *“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”*. There were also signals of longer-term changes to organisational cultures with respect to research activity, with several documented examples where research was being used to inform decision-making. However, due to the length of follow-up and scale of embedded researcher interventions, systemic cultural changes were not

observed. Embedded researchers help to move organisations towards being research active, although at this point, we tend to observe this ‘upstream’ and not through ‘downstream’ instrumental measures of research activity. These upstream changes could include early or incremental changes where the environment for using or conducting research has been altered (for example, the development of a policy/process around ethics, or the establishment of a journal club) in contrast to ‘downstream’ measures where, for example, there is evidence of sustained behaviour change in the way in which practitioners and policy-makers use or contribute to research.

3. **An embedded researcher intervention can be viewed as a staged approach that requires an ‘embedding phase’.** This embedding phase includes activities that increase understanding of the organisation’s needs, that secure local influence, and maximise the visibility of the embedded researcher in the host organisation. A key enabler of this phase is developing trusting relationships with the host organisation. Trust can be viewed as setting the foundation for becoming embedded within an organisation.
4. **The aims of embedded researcher interventions tend to be ambitious** and not always commensurate with the scale of the intervention (both with respect to the length of the placement and number of embedded researchers), the status/power wielded by the researcher, and the existing level of research activity. Within the embedding phase described above, a further key (recommended) activity is to revisit and refine the expectations of the role based on other activities that take place as part of becoming embedded.
5. Our research underscores that **there is a latent demand for embedded researchers within organisations**, and, across the PHLARP scheme that is a focus of this research, most were welcomed by colleagues. Our research also suggests that embedded researchers can build on substantial levels of curiosity about research and evidence within Local Authority public health teams. In addition, our results also suggest that there are substantial levels of interest in embedded researcher opportunities among academic researchers. However, we also identify concerns about the perceived value of applied research, misunderstandings about the impact of embedded researcher placements on career trajectories, and concerns about the sustainability of funding of posts, all of which are deterrents to more widescale adoption.
6. **Embedded researchers need support at all levels to create change.** In this research, a community of practice that formed among PHLARP practitioners was perceived as highly valuable by most in providing peer support; senior support (including an allied scheme of Public Health Leaders with Protected Research Time) was crucial in securing local influence and building trust; and support from home and host institutions was viewed as critical in helping to forge links between organisations, ensuring sustainability of the role, and in ensuring that the intervention remained an organisational-level intervention. In our research with PHLARPs, where these forms of support were absent,

embedded researchers were less likely to activate the precursors in research activity that could lead to culture change.

7. **There exists a burgeoning literature on embedded researchers**, but this is challenging to identify and in several cases the activities are reported opaquely. In several cases, embedded researchers may publish reflections of their experiences, but often this is done retrospectively, and in several studies, we note a failure to collect data through the course of the intervention. This means that our review is likely to reflect a partial representation of embedded researcher activities: we may not have identified the extent of studies, and for some studies identified, we are unable to fully integrate their findings into the synthesis.
8. **Co-creation happens (or should happen) throughout an embedded researcher intervention.** Co-creation has been identified within the literature as a strategy for creating research that is more relevant to user needs and timely. Embedded researchers are ideally placed to facilitate co-creation as they possess relevant contextual knowledge around research production and around the context of use (how research should be described, when it is needed etc). Embedded researchers, therefore, co-create from within host organisations. In this research, we also see evidence around the co-creation of knowledge mobilisation strategies. Where embedded researcher posts are not co-created and co-designed, this has far-reaching implications including a persistent mismatch between the aims of the embedded researcher intervention and what is actually possible to achieve. In addition, co-creation is a continuous process and should not simply be ‘frontloaded’ in interventions.
9. **Embedded researcher posts are often exploratory in nature but can lead to unanticipated challenges to embedded researchers themselves, and colleagues in the host organisation, without mitigation.** Mitigations can include developing and periodically revising a logic model for the intervention to clarify the expectations of the role, being clearer with embedded researchers themselves about the exploratory nature of the role, and being aware that becoming more research active can increase time and workload pressures on staff in the host organisation and planning accordingly.
10. **Becoming an embedded researcher is a rewarding career option for most researchers** (although one that is misunderstood by many researchers without experiences of being embedded). For example, in reflecting on their experiences, one PHLARP noted that: *“personally, it’s been a really fantastic development opportunity. I’ve learned loads and I really enjoy the variety it brings into my work and the way that my work with the CRN bleeds into all of my other work and means that I continue to work in an evidence-based way”*.

Executive summary

Background: Widespread concerns exist about whether the research produced within academic settings is useful or usable for decision-making and whether policy and practice organisations are sufficiently evidence informed. Embedding researchers into policy and other settings may represent one way of radically changing the ecosystem in which evidence is generated and applied. Bridging links between where research is produced and where it could usefully be applied could help to produce research evidence that more closely matches the need of decision-makers. Such roles could be a way of enhancing research capacity within policy/practice organisations to enable them to become more involved in the research process either as consumers, generators, commissioners, influencers, stakeholders or a mixture of these roles. There may also be benefits for research organisations through maximising the impact of research that is produced.

Research Questions: To explore what form embedded researcher interventions take and the influence they have, we examined the following research questions:

1. What are the aims of embedding researchers in decision-making contexts?
2. What different typologies of embedded researcher exist within public health decision-making settings and beyond?
3. How influential are embedded researcher activities in meeting their aims and helping organisations to become more research active?
4. Which typologies of embedded researcher model do recent activities (namely a scheme developed by the NIHR of Public Health Local Authority Research Practitioners (PHLARP)) follow and how are they implemented?
5. How does the influence of embedded researchers vary across different typologies?
6. What are the implications of our findings for the design of future embedded researcher interventions?

Focus and Methods: To investigate variation in embedded researcher practice and their role in enhancing levels of research activity within organisations, we drew upon four types of evidence:

- i. Existing published evidence synthesised through different approaches.
- ii. New data collected on the implementation of Public Health Local Authority Research Practitioner (PHLARP) posts. This scheme involved placing research practitioners, who facilitated research and conducted research, into Local Authority public health teams (we refer to these researchers as Public Health Local Authority Research Practitioners (PHLARPs); this was a scheme funded by the National Institute of Health and Care Research (NIHR) and delivered through the Clinical Research Network (CRN)).
- iii. New data collected on an allied scheme also intended to support Local Authority public health teams to become more research active – described here as the Public Health Leaders study.

- iv. New data to elicit the preferences of researchers around how such roles should be designed in the future.

Our methods are described further in the table below:

Component	Purpose
Systematic Map (SM)	To understand diversity in embedded researcher models
Logic Model and updated Logic Model (LM)	To articulate our assumptions on how we expect embedded researchers to activate change – drawn from the map and Advisory Group meetings initially and updated with findings from different components
Systematic Review (SR)	To synthesise what we know about the influence of embedded researchers in public health settings
Interview study (Contextual interviews) (SUI)	Conducted with those responsible for setting up the PHLARP and PHL-PRT schemes
Documentary analyses (DA)	Analyses of job descriptions, interim reports, and publication and funding metrics
Interview study 1 (I)	Conducted with PHLARPs – focus on activities and perceived milestones
Interview study 2 [follow-up] (I)	Conducted with PHLARPs – focus on understanding influence, perceptions of being ‘research active’, and evaluation strategies
Diary study 1 (D)	Conducted with PHLARPs – focus on granular activities
Diary study 2 [follow-up] (D)	Conducted with PHLARPs – focus on activities and enablers and challenges
PHL Interview study (PHL)	Conducted with Public Health Leaders with Protected Research Time to understand their activities and experiences
Survey (S)	Conducted with Potential future embedded researchers – those working in research settings who may have an interest in embedded researcher opportunities – to understand preferences and perceptions.

How we defined embedded researchers in this research

Rather than use a crisp, neat definition, we have contested throughout this research that embedded researcher activity may instead be more usefully defined through a set of characteristics which are summarised below and described in more depth later:

- i. **They enable research activity and research use.**
- ii. **They are co-located** – but not necessarily physically – in a defined policy, practice or commercial formal organisation while maintaining an affiliation with an academic institution or research organisation (dual affiliation).
- iii. **They are situated and/or are expected to work within the host team culture for a high proportion of their time.**
- iv. **Transformative ways of working:** embedded researcher activities entail continued engagement with a host team.
- v. **Relational and time-limited:** Embedded researcher interventions are long-term and seek to build relationships between organisations, including academia and policy/practice organisations; however embedded researchers are not permanent staff in the host organisation and maintain a dual affiliation.
- vi. **The host organisations will be able to influence and direct the work of embedded researchers.**
- vii. **Embedded researchers are experienced professionals** who contribute and build upon pre-existing skills and experience to the host organisation.
- viii. **Embedded researchers exemplify a two-way relationship where there is learning to be gained for both organisations.**

Through drawing on these principles, our understanding of embedded researchers may stand apart from narrower definitions that, for example, stipulate embedded researchers must actively generate research in-situ.

We present the following as key findings, and the notation used indicates the methods used to identify these findings:

1. **‘Embedded researcher’ is a term that describes a wide variety of activities that can help organisations become more research active** (SM, SR, DA, I). Embedded researcher interventions differ across several dimensions including the direction (researcher embedded in policy/practice setting versus policy-maker or practitioner embedded in research setting); the composition and balance of activities that help to foster a more research active culture (generating research, mobilising research, or facilitating research); as well as the type of embeddedness (for example, the extent to which a researcher was embedded through being physically present in the host organisation or whether they were embedded more remotely). We have developed typologies of how

embedded researcher activities take place (SM, DA), although recognise there is wide variation within these. Even among researchers embedded within the same PHLARP scheme, we have identified substantial variation in the activities they undertake, and even in the way they meet the criteria of an embedded researcher (I, D, DA). This has implications for measurement and evaluation approaches.

2. **Embedded researchers do activate precursors in research activity that could lead to culture change.** Throughout the review we identified several examples where embedded researchers have made early or incremental changes to the research culture in an organisation through growing networks, becoming a local expert and champion, and enhancing evidence fluency (the skills needed to source and interpret evidence) or curiosity about evidence and research (SR, I, SUI). For example, a researcher in the PHLARP scheme described how they helped to support colleagues as a local research expert: *“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”*. There were also signals of longer-term changes to organisational cultures with respect to research activity, with several documented examples where research was being used to inform decision-making. However, due to the length of follow-up and scale of embedded researcher interventions, systemic cultural changes were not observed. Embedded researchers help to move organisations towards being research active, although at this point we tend to observe this ‘upstream’ and not through ‘downstream’ instrumental measures of research activity (SR, DA, I). These upstream changes could include early or incremental changes where the environment for using or conducting research has been altered (for example, the development of a policy/process around ethics, or the establishment of a journal club) in contrast to ‘downstream’ measures where, for example, there is evidence of sustained behaviour change in the way in which practitioners and policy-makers use or contribute to research.
3. **An embedded researcher intervention can be viewed as a staged approach that requires an initial ‘embedding phase’.** This embedding phase includes activities that increase understanding of the organisation’s needs, that secure local influence, and maximise the visibility of the embedded researcher in the host organisation. A key enabler of this phase is developing trusting relationships with the host organisation. Trust can be viewed as setting the foundation for becoming embedded within an organisation (I, SR, LM).
4. **The aims of embedded researcher interventions tend to be ambitious** and not always commensurate with the scale of the intervention (both with respect to the length of the placement and number of embedded researchers), the status/power wielded by the researcher, and the existing level of research activity (SUI, DA, I, SR). Within the embedding phase described above, a further key (recommended) activity is to revisit and refine the expectations of the role based on other activities that take place as part of becoming embedded.

5. Our research underscores that **there is a latent demand for embedded researchers within organisations**, and across the PHLARP scheme that is a focus of this research, most were welcomed by LA colleagues (I). Our research also suggests that embedded researchers can build on substantial levels of curiosity about research and evidence within Local Authority public health teams (PHL). In addition, our results also suggest that there are substantial levels of interest in embedded researcher opportunities among academic researchers (S). However, we also identify concerns about the perceived value of applied research, misunderstandings among researchers about the impact of embedded researcher placements on career trajectories, and concerns about the sustainability of funding of posts, all of which are deterrents to more widescale adoption.
6. **Embedded researchers need support to create change at all levels.** In this research, a community of practice that formed among PHLARP practitioners was perceived as highly valuable by most in providing peer support (I, DA); senior support (including an allied scheme of Public Health Leaders with Protected Research Time) was crucial in securing local influence and building trust (PHL, I, SR); and support from home institutions was viewed as critical in helping to forge links between organisations, ensuring sustainability of the role, and in ensuring that the intervention remained an organisational-level intervention (I, S). In our research with PHLARPs, where these forms of support were absent, embedded researchers were less likely to activate the precursors in research activity that could lead to culture change (I).
7. **There exists a burgeoning literature on embedded researchers**, but this is challenging to identify and in several cases the activities are reported opaquely (SM, SR). In several cases, embedded researchers may publish reflections of their experiences, but often this is done retrospectively, and in several studies, we note a failure to collect data through the course of the intervention. This means that our review is likely to reflect a partial representation of embedded researcher activities: we may not have identified the extent of studies, and for some studies identified, we are unable to fully integrate their findings into the synthesis.
8. **Co-creation happens (or should happen) throughout an embedded researcher intervention** (I, LM, SR). Co-creation has been identified within the literature as a strategy for creating research that is more relevant to user needs and timely. Embedded researchers are ideally placed to facilitate co-creation as they possess relevant contextual knowledge around research production and around the context of use (how research should be described, when it is needed etc. (PHL, I)). Embedded researchers, therefore, co-create from within host organisations. In this research, we also see evidence around the co-creation of knowledge mobilisation strategies. Where embedded researcher posts are not co-created and co-designed, this has far-reaching implications including a persistent mismatch between the aims of the embedded researcher intervention

and what is actually possible to achieve. In addition, co-creation is a continuous process and should not simply be ‘frontloaded’ in interventions.

9. **Embedded researcher posts are often exploratory in nature but can lead to unanticipated challenges to embedded researchers themselves, and colleagues in the host organisation, without mitigation** (I, D, SR).

Mitigations can include developing and periodically revising a logic model for the intervention to clarify the expectations of the role, being clearer with embedded researchers themselves about the exploratory nature of the role, and being aware that becoming more research active can increase time and workload pressures on staff in the host organisation and planning accordingly.

10. **Becoming an embedded researcher is a rewarding career option for most researchers** (S,I) (although one that is misunderstood by many researchers without experiences of being embedded (S)). For example, in reflecting on their experiences, one PHLARP noted that: *“personally, it’s been a really fantastic development opportunity. I’ve learned loads and I really enjoy the variety it brings into my work and the way that my work with the CRN bleeds into all of my other work and means that I continue to work in an evidence-based way”*.

List of acronyms and key terms used

COM-B (model) – COM-B is a model that proposes that there are three components to any behaviour (B): Capability (C), Opportunity (O) and Motivation (M) (developed by Michie and colleagues 2009).

CRN – Clinical Research Network. The NIHR Clinical Research Network (CRN) ‘supports patients, the public and health and care organisations across England to participate in high-quality research, thereby advancing knowledge and improving care’. It is comprised of 15 Local CRN branches which ‘coordinate and support the delivery of high quality research’ in a variety of settings including the NHS, social care, and public health. Historically, however, the CRN has focussed predominantly on clinical health research, in contrast to much of the research focus here which is on public health (see <https://www.nihr.ac.uk/explore-nihr/support/clinical-research-network.htm>).

HDRC – Health Determinants Research Collaborations are intended to ‘embed a culture of evidence-based decision-making’ into Local Authorities (see <https://www.nihr.ac.uk/news/50-million-awarded-to-local-government-to-tackle-interventions-for-health-inequalities-through-research/31654>).

LA – Local Authority – a form of municipality in the UK. Within England, Local Authorities are responsible for developing local public health strategies and are responsible for delivering most public health services locally.

(LA) Public Health teams – Teams within the LA whose primary tasks are concerned with public health; while public health has a broad reach (for example housing, planning, transport, and leisure), much of our work focuses only on those teams and team members whose primary remit would be considered public health (see also below).

NIHR – National Institute for Health and Care Research – A major UK funder of public health research.

NIHR Portfolio – A portfolio of studies that are eligible for support from the NIHR CRN. For Local Authorities, registering studies on the NIHR Portfolio would result in access to support around methodological advice and access to training (see <https://www.nihr.ac.uk/researchers/i-need-help-to-deliver-my-research/crn-portfolio>).

PHLARP – Public Health Local Authority Research Practitioner – A scheme of embedded researchers that was developed by the NIHR and implemented mainly from 2021. We pragmatically refer to all PHLARPs as an example of embedded researchers, although some may more strongly align with the notion of an embedded researcher, while a small number of others may be weakly aligned with the expected criteria of an embedded researcher.

PHL – Public Health Leaders – in this research PHLs had strategic oversight for developing local policy and delivering public health services within Local Authorities. Most PHLs involved in this research were Directors of Public Health, but PHLs also included Deputy Directors of Public Health and Public Health Consultants.

PHL-PRT – Public Health Leader Protected Research Time – A scheme that was developed in part to support the PHLARPs that allowed PHLs to undertake research duties for half a day per week.

Public Health Settings/Organisations – Organisations that develop policy or guidelines, that develop strategy or commission research, or that commission or deliver services or interventions, involving organised measures (whether public or private) to prevent disease, promote health, and prolong life among the population as a whole. These organisations could include different forms of local government, national government, devolved organisations, research organisations, educational organisations, and third sector organisations. Although the definition of public health can be expansive, we focus on instances where the emphasis is on improving population level health and/or changing the organisation of health systems to include a greater focus on health promotion or prevention activities. We therefore do not focus on clinical health systems and/or social care systems in much of our work.

Research culture/research active culture – Previous studies have defined a research culture as “a system which facilitates transdisciplinary working, co-production and collaboration in evidence creation and harnesses the broadest range of types of evidence for local government decision-making relevant to improving health” (Cheetham et al. 2019a, p9). This is commensurate with our working definition of a research active culture – a culture which promotes and maximises the opportunities to: (i) use research to inform decision-making, (ii) to generate research to inform decision-making, or (iii) conducting enabling activities that facilitate the use or generation of research (for example creating networks or delivering training).

MAIN REPORT

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Introduction

Rationale for this research

Widespread concerns exist about whether the research produced within academic settings is useful or usable for decision-making, be this in developing policy and commissioning services, or in shaping day-to-day decision-making among practitioners. Several reviews of the evidence have illustrated that decisions are made without consulting the evidence base (Kneale et al. 2017, Lorenc et al. 2014), and that underutilisation of evidence takes place amidst an abundance of research evidence (Brownson et al. 2009, Fafard 2015, Orton et al. 2011). There are several factors that shape why evidence is used or not used (Langer et al. 2016), reflecting both cultures of decision-making within policy and practice (Weiss 1979) as well as how research is generated and its perceived salience to informing policy and practice (Kneale et al. 2017, Kneale et al. 2019). Much of the research in this report focusses on public health decision-making, and in England many of the decisions impacting local public health are devolved to Local Authorities (LAs). Unlike the National Health Service (NHS), where most clinical decision-making is informed by evidence, research evidence is thought to be underutilised in informing public health decision-making in LAs (Kneale et al. 2017, Kneale et al. 2019).

While many argue that research evidence isn't contributing as effectively as it could to decision-making, there is less consensus around what research evidence usage means and how it should be measured, and much less understanding around decision-making processes in policy and practice and where research evidence could make a contribution but is currently failing to do so. There is greater consensus that more passive approaches to increasing research evidence use, such as efforts to improve the communication of research findings and the delivery of didactic seminars, are not effective (Langer et al. 2016). Instead, more systemic changes are needed that develop organisational capacities and support organisational transformation (Orton et al. 2011). Such changes could involve reconceptualising the relationships between those who generate research and those who consume research. There may also be benefits for research organisations through maximising the impact of research that is produced.

Embedding researchers into policy and other settings may represent one way of radically changing the ecosystem in which evidence is generated and applied. Such roles could be a way of enhancing research capacity within organisations to enable them to become more involved in the research process either as consumers, generators, commissioners, influencers, stakeholders or a mixture of these roles.

Embedded researchers could address the issues outlined above in several ways including through:

- (i) actively conducting research that can contribute to decision-making processes;
- (ii) changing cultures around research engagement, including the indirect or diffuse influence of research (i.e. bringing 'enlightenment' through introducing new

ideas or new ways of seeing the world), direct research utilisation (instrumental usage), or research generation;

(iii) and helping to produce research evidence that matches the needs and priorities of decision-makers with regards to the research questions asked and their contextual salience.

Here we use the term ‘embedded researchers’ to describe a way of working involving individual researchers or research teams that disrupts the siloes between settings where research is generated (historically universities), and where research is needed to inform action. This activity is also known through various other terms including ‘placements’, ‘secondments’, and ‘researchers-in-residence’. Immersion and becoming embedded in another organisational culture to increase research activity can take several different forms. Consequently, the different ways of becoming embedded in organisations, and the various processes enacted, can differentially influence an organisation’s engagement in research and integration into broader research ecosystems. In this research we aim to reflect that there are different models of embedded researchers and ways of undertaking embedded research. This means that our definition and characterisation of what it means to be an embedded researcher may stand apart from narrower definitions that, for example, stipulate embedded researchers must actively generate research in-situ.

Research aims and background to the research

In this report, we aim to unpack the complexities of embedded researchers and understand the nature and influence of embedded researchers. We employ a range of methods, including (i) a critical review and synthesis of existing evidence from evaluations of embedded researcher schemes and (ii) an examination of a new cohort of ‘embedded researchers’, known as research practitioners, who have joined Local Authority (LA) public health settings as part of the National Institute for Health and Care Research (NIHR) Clinical Research Network (CRN) Public Health Local Authority Research Practitioners (PHLARPs) scheme (details are provided below).

Our research questions, which structure this report, include:

7. What are the aims of embedding researchers in decision-making contexts?
8. What different typologies of embedded researcher exist within public health decision-making settings and beyond?
9. How influential are embedded researcher activities in meeting their aims and helping organisations to become more research active?
10. Which typologies of embedded researcher model do recent activities (CRN-PHLARPs) follow and how are they implemented?
11. How does the influence of embedded researchers vary across different typologies?
12. What are the implications of our findings for the design of future embedded researcher interventions?

Focus of this research

This research aims to examine how embedded researchers could help policy/practice organisations to become more ‘research active’. The term ‘research active’, although more commonly used in clinical literature to describe individuals actively involved in producing new research (Luckson et al. 2018, Newington et al. 2022), is applied in our context to organisations. We use the term to describe policy/practice organisations that conduct, commission, support, and utilise research as part of decision-making. Therefore, organisations that are ‘research active’ do not necessarily need to be those actively generating research but can include those committed to using evidence to inform decision-making. Such organisations will support employees to actively seek, engage with, and appraise different sources of evidence in making decisions (Brennan et al. 2017), forging links with universities and research institutions, and potentially generating research in-house.

To investigate variation in embedded researcher practice and their role in enhancing levels of research activity within organisations, we drew upon four types of evidence:

- v. Existing published evidence synthesised through different approaches
- vi. New data collected on the implementation of Public Health Local Authority Research Practitioner (PHLARP) posts (see Box 1 below)
- vii. New data collected on an allied scheme also intended to support Local Authority Public Health teams to become more research active – described here as the Public Health Leaders study (see Box 2 below)
- viii. New data to elicit the preferences of researchers around how such roles should be designed in the future

While some parts of this research examine embedded researcher schemes across a diverse range of settings, the primary research considers the influence of embedded researchers in English public health contexts. At the time of writing (2023), it has been a decade since local public health leadership transferred to local authorities (LAs), whose public health remit includes commissioning services across most aspects of public health services delivered locally. While this transition was initially accompanied by continuity in funding levels, public health teams subsequently faced real terms cuts in funding allocations (Buck 2018, Kneale et al. 2019), and more recently were at the forefront of the response to the COVID-19 pandemic. This context is important as it will shape the role of evidence within LAs and the challenges that embedded researchers face in helping organisations become more research active. However, it remains unclear whether these dual pressures will have amplified the significance of research evidence in prioritising increasingly scarce resources or, alternatively, marginalised the role of research against other competing priorities. It’s also worth noting, particularly when considering whether the findings from this research are applicable to other settings, that public health teams are somewhat unique in comparison to many other policy and practice settings due to the existing high level of research ‘fluency’ among public health practitioners, a factor reflected in our underlying logic model (figure 1).

Box 1 – A description of the Public Health Local Authority Research Practitioner scheme

Background: The National Institute for Health and Care Research (NIHR) funded a programme of ‘embedded researchers’ as part of its Clinical Research Network (CRN). The NIHR Clinical Research Network (CRN) ‘supports patients, the public and health and care organisations across England to participate in high-quality research, thereby advancing knowledge and improving care’. It is comprised of 15 Local CRN branches which ‘coordinate and support the delivery of high-quality research’ in a variety of settings including the NHS, social care, and public health. This exploratory programme saw researchers – known as public health research practitioners (PHLARP) – placed across twenty-three diverse Local Authority (LA) public health settings in England (with some being placed across multiple LA settings and with multiple posts being supported through job-sharing arrangements in others). In most cases, these roles were co-supervised by the LA and the CRN and/or a university.

Aims: The intention of the CRN-PHLARP programme was to facilitate and enhance public health cultures of research activity within local government. More specifically, the posts were meant to enable public health teams to become more research active by, for example, supporting research projects through activities including sourcing data, recruiting research participants, and building capacity. Although the PHLARP roles were connected by overarching aims, they were meant to be operationalised with some flexibility across LAs. Indeed, LAs contributed to, and in some cases led, the construction of job descriptions to reflect local needs and priorities, typically in conjunction with an academic partner. As such, the CRN-PHLARP interventions provided an opportunity to identify trends across embedded researcher roles with shared aims but situated across diverse LA settings.

Implementation: The first two RPs started their posts in March 2020, with most of the remaining cohort joining the scheme in spring 2021. The positions were predominantly advertised as one-year contracts with a salary range of approximately £28,000-43,000, but this funding was extended, in most cases up to three years. Many of the LAs participating in the PHLARP scheme were also involved in an allied NIHR intervention that ran simultaneously, which is described in Box 2 (the Public Health Leaders Protected Research Time scheme – PHL-PRT). This involved other senior staff within LA public health teams receiving funding for protected research time. While there was considerable overlap, not all PHLARP and PHLPRT interventions took place within the same LA.

Even among researchers embedded within the same PHLARP scheme, we identified substantial variation in the activities they undertake, and even in the way they meet the criteria of an embedded researcher. We pragmatically refer to all PHLARPs as an example of embedded researchers, although some may more strongly align with the notion of an embedded researcher, while a small number of others may be weakly aligned with the expected set-up and function of an embedded researcher.

Box 2 – A description of the Public Health Leaders Protected Research Time scheme

Background: As part of the NIHR CRN scheme to fund public health research practitioners (PHLARPS) (see Box 1), additional funding was made available to buy out protected research time for staff working at a leadership level within Local Authority (LA) public health teams. This included, but was not exclusively limited to, directors of public health and consultants in public health with pre-existing roles within the LA. The protected research time (PRT) consisted of NIHR buying out half a day a week (0.1 FTE) of public health leaders' time so that they could focus on research-related activities. A total of sixteen public health leaders were awarded protected research time from across a geographically diverse range of local CRN networks.

Aims: Public health leaders' protected research time (PHL-PRT) was granted with a view of allowing them to focus on developing relationships with academic partners and the NIHR CRN; encouraging development of NIHR CRN portfolio research; and undertaking various activities to help build capacity and facilitate cultures of research production, engagement and use within their organisation. The broad aims of the PHL-PRT were closely aligned with those of the PHLARP placements and there was intended to be interaction between PHLARPs and those involved with the PHL-PRT, namely, to encourage a culture of public health research within local government. As with the PHLARP roles described above, once PRT had been awarded, specific, locally relevant objectives were often written and developed collaboratively between the LA and the local CRN.

Implementation: Public health leaders' protected research time (PHL-PRT) was first introduced in 2020, with other posts starting in 2021. As with the PHLARP roles, extensions to these roles were granted, on a yearly basis.

Methods

How this report works: Each of the components described below are supported by standalone papers that provide further details around the methods, and more thorough description of the findings and results. This is a ‘living’ report – the links and details of the status of these papers will be updated as they are published in journals.

Stage	Component	Purpose	Status
Developing conceptual understandings about embedded researchers from the literature	Systematic Map	To understand diversity in embedded researcher models	Findings shared with funder – undergoing peer review; further stand-alone glossary available shortly
	Logic Model and updated Logic Model	To articulate our assumptions on how we expect embedded researchers to activate change – drawn from the map and Advisory Group meetings initially and updated with findings from different components	Final iteration of our logic model is provided in this report (Appendix 2)
	Systematic Review	To synthesise what we know about the influence of embedded researchers in public health settings	Headline findings shared with funder – full draft available shortly
Understanding the activities, experiences, and influence of PHLARPs	Interview study (Contextual interviews)	Conducted with those responsible for setting up the PHLARP and PHL-PRT schemes	Headline findings shared with funder – full draft available shortly
	Documentary analyses	Analyses of job descriptions, interim reports, and publication and funding metrics	
	Interview study 1	Conducted with PHLARPs – focus on activities and perceived milestones	Findings shared with funder – undergoing peer review

	Interview study 2 [follow-up]	Conducted with PHLARPs – focus on understanding influence, perceptions of being ‘research active’, and evaluation strategies	Headline findings shared with funder – full draft available shortly
	Diary study 1	Conducted with PHLARPs – focus on granular activities	Headline findings shared with funder – full draft available shortly
	Diary study 2 [follow-up]	Conducted with PHLARPs – focus on activities and enablers and challenges	Headline findings shared with funder – full draft available shortly
Developing an understanding of how embedded researchers can be supported	PHL Interview study	Conducted with Public Health Leaders with Protected Research Time to understand their activities and experiences	Headline findings shared with funder – full draft available shortly
	Survey	Conducted with potential future embedded researchers – those working in research setting who may have an interest in being an embedded researcher – to understand preferences and perceptions.	Headline findings shared with funder – full draft available shortly

Registration and Ethics: This report provides a summary of multimethod research that sought to summarise and synthesise the existing evidence on embedded researchers as well as conduct new primary research on the PHLARP and PHL-PRT schemes. The primary research, which employed process evaluation methods (Moore et al. 2015), was pre-registered (Kneale et al. 2021) as were the evidence synthesis components (PROSPERO Registration Number: [CRD42023395809](https://www.crd.org.uk/CRD42023395809)). The research was approved by the UCL Institute of Education’s Research Ethics Committee (REC1485, REC1540 and data protection number Z6364106/2022/09/65). The research was supported by an Advisory Group with expertise as embedded researchers, as individuals who design or commission embedded researcher interventions, and/or as experts in broader implementation science.

How we synthesised the existing literature

To derive conceptual understandings of ‘embedded researchers’ we developed a **systematic map** on evaluations of embedding researchers to identify where systematic reviews and primary research are needed and to understand variation in ways of embedding researchers into organisations. To undertake this work, we developed a set

of defining principles for embedded researchers that incorporate elements such as the aim of activities, the types of relationships and learning involved, and the affiliations and identities adopted. The map involved identifying evaluations published across all sectors, searching across fourteen databases, other web sources and two journals for evaluations published between 1991 and spring 2021. Data were extracted using a coding tool developed for this study. We identified new typologies of embedded researcher intervention through undertaking Latent Class Analysis. The resulting map, which included 229 evaluations, identified that there was sufficient literature to support a systematic review of embedded researcher interventions taking place within UK and international public health organisations specifically. This focus aligned with the focus of other components in this research. Production of the systematic map also supported the first iteration of a **logic model** conceptualising how we theorise embedded researchers to activate changes in policy/practice settings.

Drawing on the studies included within the systematic map, as well as studies identified through updated and new searches of the literature, our **systematic review** of embedded researchers in public health organisations sought to understand: (i) how effective embedded researchers are at increasing levels of research activity within public health organisations; (ii) the core skills and strategies that embedded researchers draw upon to increase levels of research activity within public health organisations; and (iii) the barriers and facilitators and how the broader context shaped embedded researcher activities. To synthesise the evidence, we worked with a subset of fourteen (mainly qualitative) studies identified in the map and employed a form of thematic synthesis (Thomas and Harden 2008) to create a staged framework for how embedded researchers can create change within public health organisations. This framework was subsequently applied to another two studies considered to be full evaluation studies in a form of framework synthesis (Brunton et al. 2020), as well as a further thirteen studies that provided reflections from embedded researchers on their experiences.

How we collected data on PHLARP experiences

We undertook two waves of online **semi structured interviews** with PHLARPs at different time points across their appointments: wave 1 was conducted after PHLARPs were 0.5-1.5 years into the scheme (Winter-Spring 2022) and wave 2 was conducted after 1.5-2.5 years (Spring 2023). Wave 1 interviews averaged 49min and wave 2 interviews averaged 59min. In our first wave (N=17), we explored the process by which researcher practitioners became embedded, their activities, and early outcomes. The second wave (N=7) focused on longer term outcomes and explored potential strategies for evaluating the impact of embedded researcher roles; all those interviewed at Wave 2 had also been interviewed at Wave 1. We employed an inductive thematic analysis approach using NVIVO qualitative analysis software following the guidelines of Braun and Clarke (Braun and Clarke 2006). After transcribing our data, we identified a preliminary list of codes under each of our research questions. We then coded all transcripts using an inductive approach.

A weekly online **diary** survey (via Qualtrics) was undertaken in two waves to capture more granular detail about the day-to-day activities of PHLARPs and their perceptions, during Spring 2022 and Spring 2023 following piloting with one participant. Participants were encouraged to fill in an online survey towards the end of their working day for 10-15 minutes for five consecutive working days, with an additional ten minutes for the last day. The diary comprised closed and open-ended questions about the work activities undertaken during the day, feelings about the day, and any informal connections they had with LA colleagues. There was space to describe up to two activities each day. Additional questions at the end of the week prompted reflections on time spent on different activities, planned work that had not been achieved, interactions with LA colleagues and how participants viewed their job role. The format of the second survey was slightly adjusted to prompt more information to be given around working activities, and on the enablers and challenges of the job role. All diary entries were thematised using template analysis (King 2012), which involved developing a coding template based on an initial set of 4 diary entries from wave 1 and applying this to subsequent diary entries. The diary was completed by 9 participants in wave 1 (including the pilot), of who 5 completed wave 2.

How we analysed and contextualised documents and other secondary sources relating to the PHLARPs

Analysis of job descriptions: We obtained sixteen job descriptions for the PHLARP posts that were made available to the team by the funder, as well as those sourced through independent internet searches. The results were summarised descriptively and narratively, based on tabulations of the characteristics of the job descriptions, as well as exploring patterns and typologies based on these patterns.

Analysis of set-up interviews: Seven interviews were conducted with stakeholders who were responsible for overseeing and creating the scheme as a whole and/or being involved in the creation and design of individual posts who were mainly based in the NIHR CRNs (Autumn-Spring 2021/22). Interviews were semi-structured, with an interview schedule developed to understand broadly: (i) what participants understood were the aims of the PHLARP posts; (ii) the process of recruiting PHLARPs and designing the roles, including the autonomy that Local Authorities held in creating the posts; (iii) and the broad reflections of participants on the implementation of the PHLARP posts. Thematic analysis was used to analyse the transcripts. These interviews are used to further contextualise the job descriptions.

Analysis of LA socio-demographic characteristics: We explored how the characteristics of Local Authorities who hosted PHLARPs differed from those that did not through descriptive analyses using data from the Office for Health Improvement and Disparities (Office for Health Improvement and Disparities 2023). We focussed on indicators of the level of deprivation (index of multiple deprivation score), an index of inequality in life expectancy at birth for males and females, and the percentage of adults classified as obese.

Analysis of funding and publication trends: To examine whether we observed different trends between LAs hosting PHLARPs and those that did not we firstly, explored the extent to which Local Authorities who hosted PHLARPs became study sites on the NIHR Clinical Research Network portfolio of studies. Secondly, we explored whether sites where PHLARPs were placed were more successful in obtaining (further) research funding from the NIHR. We used webscraping approaches (a way of automating the extraction of data from websites), implemented through R, to gather data on the extent to which the contracting organisation (a LA) corresponded with one of the Local Authorities that hosted a PHLARP. We also augmented these data with data on Health Determinants Research Collaboration funding decisions which were announced for 13 Local Authorities (twelve in England), but are not (yet) included on the main NIHR funding database (NIHR 2022a). Finally, we conducted further webscraping and automated searching of the PubMed database to provide a snapshot of the extent to which authors based in, or with an affiliation to, Local Authorities were authors of peer-reviewed studies in Public Health. We ran automated searches through R to create a data frame that included the number of publications with a LA affiliated author by year, using ‘Public Health’ as an additional limiter. These data were analysed descriptively initially and then using regression models.

How we collected data on PHL-PRT experiences

One-hour **semi-structured interviews** were conducted with public health leaders (PHLs) who were a part of the PHL-PRT scheme between October 2022 and January 2023. Potential participants were recruited by way of one researcher (SL) presenting to the PHL-PRT network in early October 2022, and using a combination of the network mailing list and contact details provided by NIHR to subsequently invite PHLs to take part in the study. Twelve PHLs – out of a possible 16 – agreed to be interviewed.

All interviews were conducted using a video call on Microsoft teams. Checking and editing transcripts generated through Microsoft teams was the first step in data familiarisation. After initial checks, transcripts were uploaded to NVivo 12 where each of the main interview questions provided a framework from which to conduct inductive thematic analysis.

How we developed our recommendations through surveying potential future embedded researchers

To understand researcher preferences around how embedded researcher positions should be designed, we developed an **online survey** targeted towards those with an affiliation to a university or research organisation to explore experiences and attitudes towards embedded researcher posts among academic researchers. The survey accommodates responses from those with experience of being an embedded researcher and those without, and also accommodates responses from those without an interest in embedded researchers, while seeking to understand what could make embedded researcher opportunities more appealing to those with low levels of interest. In particular, we hoped to uncover what types of embedded researcher attributes would

be most attractive to those in academia. We have recruited academics through our own networks, Twitter, and various jiscmail lists – the results are based on a convenience sample of academics with the survey administered through Qualtrics. The survey was piloted by five respondents external to the team before being distributed more widely. The substantive questions were developed based on the findings from earlier components, informal discussions with the Partnership for Evidence and Equity in Responsive Social Systems team based at UCL (see <https://peerSS.org/>), and questions fielded in similar surveys in the literature where possible (Coates and Mickan 2020); the demographic questions were based on those used in the UK census 2021. The questions include several open-ended questions to add depth to the analysis if the survey elicits a low response rate. The survey will remain open for some time over Summer 2023 to generate further understanding, and our analyses are interim findings based on the first responses we received (N=55).

What are embedded researchers and what are the aims of embedding researchers into decision-making contexts?

What is an embedded researcher?

Rather than a crisp, neat definition, we have contested throughout this research that embedded researcher activity may instead be more usefully defined through a set of principles. The following principles were developed with the aid of an Advisory Group for the project, and operationalised in our systematic map to identify embedded researchers according to:

- i. **Purpose and activities:** they enable research activity and research use. For example, they may undertake research, facilitate the conduct of research (through sourcing data, creating data sharing arrangements or advising or training on research/policy processes), and support research use. Through their activities they have the potential to enhance cultures of research activity in policy/practice organisations and make universities/other research organisations more relevant to policy/practice;
- ii. **Dual affiliation:** they are co-located – but not necessarily physically – in a defined policy, practice or commercial formal organisation and they have an affiliation with an academic institution or research organisation, or their post is specifically funded by an academic institution or research organisation;
- iii. **Setting:** they are situated within a host team (physically or institutionally or culturally or through affiliation) and/or are expected to work within the host team's culture for a high proportion of their time as a team member working on and applying research to solve practical problems or build research capacity (this latter characteristic is shared with definitions put forward around researchers-in-residence, an allied term (Marshall et al. 2014));
- iv. **Transformative ways of working:** embedded researcher activities entail continued engagement with a host team (i.e. an embedded researcher is more than a notional job title but a different way of working for researchers and practitioners who

are embedded; this includes a commitment to co-production and understanding of evidence use *in context* for mutual benefit);

v. **Relational and time-limited:** the relational nature of being an embedded researcher necessitates that this is a longer-term activity, which distinguishes embedded researcher activities from other ways of enhancing research cultures and capacity (for example, providing short-term training sessions). However, embedded researcher activities are also time limited, and we recognise that there will be a point where an embedded researcher becomes indistinguishable from a (more) permanent researcher working within an organisation (for example, we might distinguish a time-limited relationship between organisations from an individual permanently embedded within an organisation even if they remain dual-affiliated).

vi. **Organisational-level intervention:** we expect that host organisations will be able to influence and direct the work of embedded researchers (i.e. embedded researcher activities are generally distinct from, for example, an ethnographic study of policy-making in an organisation);

vii. **Experienced professionals:** we view embedded researchers as experienced professionals who contribute and build upon pre-existing skills and experience to the host organisation. Therefore, we do not view most taught degree placements for dissertations and research projects as examples of embedded researcher activity; doctoral research is included if other conditions are met, for example the policy/practice organisation can influence the work as in condition vi;

viii. **Two-way organisational learning:** embedded researchers exemplify a two-way relationship where there is learning to be gained for both organisations. Our definition also leaves open the possibility of bi-directionality in that researchers could be embedded into policy/practice settings and that those from policy/practice settings could be embedded into research organisations (provided they meet the other principles).

For the purposes of this research, we also view embedded researchers as organisational-level interventions, aiming (explicitly or implicitly) to create change in research cultures within organisations (hosting and/or sending organisations). Our understanding of embedded researchers may stand apart from narrower definitions that, for example, stipulate embedded researchers must actively generate research in-situ or be physically co-located within the host organisation. But this breadth also means that we can include forms of embedded researcher interventions that seek to blur (rather than bridge) the boundaries between academia and policy/practice. This outlook is perhaps more closely aligned with broader debates that seek to shift perspectives among researchers towards an understanding of research and policy wherein they are mutually constitutive.

Box 3: Do PHLARPs constitute embedded researchers?

Using our criteria, most of the PHLARPs would meet our characterisation of embedded researchers. The scheme was set-up as an organisational level intervention to create more research active public health teams (criteria vi); where it was recognised among local CRNs that there was a need to work more closely with LAs and opportunities for mutual learning

(criteria viii). The job descriptions and all components of work with PHLARPs make it clear that they were highly experienced professionals (criteria vii) and the interviews and diary study revealed that most of their time was spent on research activities (criteria i) with continued engagement with LAs (criteria iv). Most were based in LAs (criteria iii) and there was widespread understanding that these were time limited posts (criteria iv).

However, there was more variation in the extent to which PHLARPs carried a dual affiliation per se (criteria ii) – some were clearly viewed as dual university and LA-based researchers, while other posts were deliberately set up to foster a sense of dual affiliation (for example, being jointly managed by NIHR-CRN and LA supervisors). Others had a weak affiliation with the CRN-NIHR (or a specific LA). Interviews with those involved in setting up the scheme also revealed that there were very different viewpoints on whether PHLARP posts were, in fact, embedded researcher posts; this in part reflected understandings of what an embedded researcher is and what they do. Conflicting viewpoints of being an embedded researcher similarly existed among some of the PHLARPs. Whereas several explicitly identified as such, one PHLARP conceptualised embedded researchers as synonymous with purely research generation and, therefore, felt that their role did not fit within the scope of the term: *“I was mistaken for an embedded researcher. Straight away when you mentioned research, they think that you're there to do research, not that you're there to assist or promote”*.

We regard the PHLARPs as embedded researchers, and view the variation (for example in their supervisory arrangements and in the activities they undertook) as emblematic of the heterogeneity in the way in which embedded researcher posts are developed. However, a limitation of our work is that there may be a small number of cases in the PHLARP scheme that do not meet all the criteria above. These cases are retained in the analysis however, and some may represent instances where embeddedness was sought, but not achieved.

What are the expectations of an embedded researcher intervention?

Analysis of the aims of schemes included in our systematic review showed that most embedded researcher interventions were accompanied by a set of high-level aims. These included ambitions to support the use of research and evidence across the team or organisation and/or to upskill the public health workforce. High-level aims were described even when the intervention consisted of a single embedded researcher entering a public health environment. For example, Langeveld and colleagues (Langeveld et al. 2016) describe an intervention consisting of a single embedded researcher (knowledge broker) being embedded in the Netherlands ‘to enhance the creation of evidence-based healthy public policies in a city district in Amsterdam’ to ‘address the lack of awareness and disregard for evidence concerning this policy approach’ (p2). Many embedded researcher interventions evaluated in the literature appear to be developed with ambitious goals that implicitly or explicitly involve enhancing skills and changing behaviours within teams.

Analysis of job descriptions for the PHLARPs showed that some of these posts were also developed with an ambitious set of aims. Seven of the posts described aims that were related to both LA and NIHR-CRN concerns jointly. These descriptions typically identified an ambition to increase levels of research activity within Local

Authorities and to increase the amount of research supported by the CRN and included on the portfolio as described in one example: *“This is a much-needed opportunity to place network funded staff to support local authorities and deliver some evaluation of the effects of such roles in terms of engaging LAs in research (number of Co-Is, recruitment sites, numbers engaging with research training, routine data linkage agreements and facilitation, sourcing and managing evidence and information), as well as the effect on Public Health portfolio development”*. In two of the descriptions, the aims were centred around increasing the level of research in Local Authorities and were not explicitly connected to the NIHR-CRNs, for example *“The role will support the development of Public Health research activity in the local authority”*; in another two descriptions, the aims were focussed more on broadening the NIHR portfolio: *“The post-holder will play a key facilitating role in developing the portfolio of NIHR studies, normally but not limited to their assigned Clinical Division, across the NIHR CRN”*. Finally, another three descriptions contained aims that referred to the development of research cultures across regions, or that supported specific strands of work. Given that only a small proportion of public health research that takes place within the UK is (currently) adopted onto the NIHR portfolio of public health research, several of the job descriptions therefore appeared to require, at least in part, what could be considered specialist knowledge of the NIHR, its structure, and the type of support it can offer.

The ambitious aims contained within the job descriptions were also reflected within interviews conducted with those responsible for designing or managing the scheme nationally or within local CRNs: *“So, the aims were, particularly, it is about growing public health research. Growing an infrastructure for public health research, primarily, that is the aim.”* [PHLARP set-up interview reflecting on the scheme as a whole].

Once in post, the findings from interviews with PHLARPs suggested that they struggled to understand the aims and expectations of their posts and how they were meant to be operationalised. For example, a PLARP discussed how, *“particularly at the beginning, it took a bit of time to get our head around exactly what was going on and what exactly the ask was and how we could achieve it”*. The posts were described as *“experimental”* and *“uncharted territory”* for Local Authorities and this lack of clarity was perceived with apprehension and a certain amount of frustration by many. However, a few PHLARPs discussed the value of the role’s flexibility. For example, a PHLARP described their role as *“initially nebulous, but I think there’s a great beauty in that, a great freedom in that it was a new role, so there wasn’t necessarily a clear sense of the specific”*.

How did we expect embedded researchers to create change?

We developed an initial logic model based on discussions with our Advisory Group and through developing the systematic map of the literature. The model (see [Appendix 1](#)) theorises how embedded researchers, through research activities involving a combination of generating research in situ, and/or brokering research, and/or facilitating or navigating research (the balance being tailored towards the

organisation's needs) would activate several outputs, short-term outcomes, and longer-term outcomes. A key short-term outcome theorised to occur was that a demonstration project or example of successful knowledge mobilisation would raise the profile of evidence informed decision-making and activate longer term changes. These theorised longer-term changes included creating systemic changes to generate a research active culture, which would lead to evidence being created, tailored and mobilised to inform decision-making in a sustained way, which in turn would lead to improved public health outcomes.

Critically reviewing the model (including with our Advisory Group) highlighted that: (i) the processes through which embedded researchers become embedded were underspecified, and in response, understanding these processes was a focus of the first set of interviews with PHLARPs and a consideration of the systematic review – see section on '[what did research practitioners view as incremental milestones and achievements?](#)'; (ii) the length of follow-up needed to observe systemic changes in research cultures, as specified in the model, was unlikely to be observed within any of the components; (iii) attribution of changes to research cultures would be challenging without a detailed consideration of context; and (iv) that the model did not include reference to the PHL-PRT, which could facilitate the work of PHLARPs, but may not constitute embedded researchers themselves (see section on '[what other forms of embedded researcher activity were conducted?](#)'). The model was iterated on this basis, and we have continued to iterate the logic model further to reflect new evidence from this research ([Appendix 2](#) presents our final iteration).

What different typologies of embedded researcher exist within public health decision-making settings and beyond?

We applied Latent Class Analysis to identify typologies of embedded researcher that were observed in the systematic map (N=229 studies in total across a range of disciplines) and generated four types of embedded researcher activity based on: (i) the profile of activities undertaken by the embedded researcher; (ii) the nature of the embeddedness; and (iii) the direction of embeddedness.

Classic Embedded Researcher Model: The largest class is one that we describe as a 'classic' embedded researcher model (45.4% of 229 studies). This type of embedded researcher intervention involves researchers from research (primarily academic) institutions being embedded into policy or practice settings (100% of studies assigned to this class followed this model), with a small number of studies also simultaneously embedding researchers from policy or practice settings into academic or research settings. All studies assigned to this class also involved researchers being physically embedded into new settings (for example, spending time or having a physical base in another setting apart from their usual setting); this tended to entail researchers also being embedded culturally, institutionally or procedurally, with some studies being additionally coded on these dimensions. Almost three-in-four studies assigned to this class involved researchers conducting research in situ in policy/practice organisations.

In addition, activities could also involve knowledge brokering activities (60.6% of studies assigned to this class) or research facilitation (31.7%).

Reverse Embedded Researcher Model: The second largest class of embedded researcher intervention identified is one that does not fit neatly into conventional definitions of embedded researchers, given that it usually involves people who work within a policy or practice organisation becoming embedded into an academic or research institution, or alternatively where there is a blurring of identities between practitioners or policy-makers and researchers. This type of embedded researcher activity accounts for just under a quarter of studies identified in the map (22%; n=51) with this form of embeddedness highly likely to involve research production. There was a range of ways in which researchers became embedded, with just under half of studies allocated to this class of intervention (45.1%) involving confirmed physical co-location, and instead a high proportion of studies allocated to this class (56.9%) involved researchers being culturally or institutionally embedded. Here, there was evidence of embedded researchers being integrated into host settings through, for example, being referred to as being team members or ‘insiders’ in the host setting/team (this could be formal team membership, or subjectively experienced by the embedded researcher or host organisation, for example as a sense of ‘belonging’), being described as being embedded in the team culture, and/or where institutional barriers were formally removed in some way (for example, through establishing a joint contract between institutions or joint oversight arrangements).

Remote Embedded Researcher Model: The third largest class consists of studies where there were low levels of physical co-location (n=46), and is one that is likely to be observed more frequently with the increasing shift to online or hybrid working. This type of ‘physically remote’ embedded researcher intervention was observed across a range of sectors and involved a high level of ‘procedural embeddedness’ (for example, attending meetings) and/or cultural embeddedness. Procedural embeddedness occurred when researchers were described as undertaking specific functions or roles within a host organisation (for example, a tutor, mentor or support role) or where there were references to embeddedness being sought through regular communications (calls, emails etc.) or meetings. All the studies allocated to this class involved researchers working in academic institutions becoming embedded ‘remotely’ in policy or practice institutions, with small numbers of studies also reporting instances where those from policy or practice institutions became embedded ‘remotely’ in academic organisations. Researchers embedded remotely nevertheless undertook a range of duties around research production, facilitation and knowledge exchange. An example study belonging to this class was conducted by Buckley and colleagues (2021) which examined the role of ‘Evaluation Capacity Builders’ (ECBer) who developed evaluation partnerships. Here one participant in a host organisation reflected that the absence of physical co-location was not a challenge in working together as a team: ‘there was that fear that the distance would make it difficult for us to be able to do it. And I never felt the distance, we never – it was like [ECBer] was there with us. You know?’ (p57).

Low Level Embeddedness Model: The smallest class identified was a small group of 28 embedded researcher interventions (12.2% of the total) where there were low levels of embeddedness, and while embeddedness was confirmed, its nature was not fully described or enacted. In this group there were lower levels of research production and higher levels of variation in job titles, with many simply referred to as ‘researcher’ or by their original profession. One example study falling into this class of embedded researcher intervention was conducted by Tran and colleagues (2017) whose study describe a blurring of identities between implementers and investigators in a programme of embedded implementation research across Latin American and Caribbean countries so that embedded researchers developed an ‘insider’ perspective. The existence of this class points towards the challenges of identifying embedded researcher activities given the wide heterogeneity in the intervention; and the multiple and overlapping ways in which researchers can become embedded in organisations, which can be challenging for study authors to report in detail, especially within the word limit of a journal paper.

Which typologies of embedded researcher model do the Public Health Local Authority Research Practitioners (PHLARPs) follow and how are they implemented?

What forms did PHLARP roles take?

PHLARP roles could be viewed as spanning at least three types of embedded researcher models described above, although share most of the characteristics of the ‘**Classic Embedded Researcher Model**’, being a scheme where researchers with an affiliation with the NIHR and/or a university moved to policy/practice settings to undertake a variety of duties. Unlike the ‘Classic Embedded Researcher Model’, in which conducting research in situ was the primary type of activity, analyses of job descriptions showed that research facilitation was the most commonly expected activity of the role, and particularly forming links between the NIHR CRN and the LA: *“we expect that the person interested in this role will be employed within Local Authority and be able to dedicate the time to build networks and increase and support research that addresses local priorities, being the conduit between the Clinical Research Network and Local Authority”* [text from job description].

Similarly, while there was an expectation that the roles would be based physically within LAs, this scheme took place during the COVID-19 pandemic and many PHLARPs started their posts remotely (mirroring elements of the **Remote Embedded Researcher Model**). Among those who were responsible for setting up and managing the PHLARPs, becoming embedded remotely was viewed as exacerbating what was already a challenging role:

“Nadia starting a new post during that phase of the pandemic must have found a real challenge. It’s a challenge for people that have been working in person, face to face, to go work remotely. Doing the kind of thing that she’s had to do from scratch, doing this kind*

of thing, introducing yourself, I think that's been quite a difficult thing." [*anonymised; PHLARP set-up interview].

Analyses of job descriptions show a high level of heterogeneity among PHLARP aims, the structure of the roles, and the intended activities. This diversity was intentional – PHLARP roles were intended to be developed jointly between local CRNs and Local Authorities to reflect the LAs needs.

How did the PHLARPs describe the structure of their role?

There was significant diversity across the 17 interviewed PHLARPs in relation to their role structure and affiliations. Approximately half worked part-time in their PHLARP roles (47%), with the remaining participants being full-time for at least some of their appointment. Five of the PHLARPs who were part-time split their role as part of a job share. Over half (59%) worked within a single layer of local government (for example, London borough, city council), but the remainder had a remit to work across several local administrative units (for example, a county council). Most PHLARPs worked alongside several different colleagues within 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 (some of whom were recipients of Protected Research Time).

While the nature of the programme meant that all PHLARPs had some level of dual affiliation across local government and a research institution (either a university or local 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 institution beyond a local 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 research institutions and local government.

How did the PHLARPs describe their main activities?

Through the initial 17 interviews, we identified seven categories of research activity delivered by PHLARPs. Five of these categories reflected a form of capacity building: facilitating research connections and opportunities, advising and supporting research, applying for research funding, providing training opportunities, and establishing research networks (within and outside the host organisation). Indeed, most PHLARPs placed significantly greater emphasis on research facilitation than generating research themselves. *"My job is to enable the research, not to do it for them"*, described one of the PHLARPs. In particular, almost all PHLARPs emphasised how developing and promoting research connections and opportunities was a prominent aspect of their role. In this regard, PHLARPs acted as institutional bridges through sharing research opportunities across their networks and fostering sustained connections among colleagues. For example, one PHLARP described how they *"bridge the local council to the research world so that they can increase research activity, increase research output,*

increase the research connections". The focus on capacity building is contrary to much of the wider literature on embedded researchers, and findings from our systematic review, which indicated that capacity building receives dual or lesser emphasis than research production (Cheetham et al. 2018, Ward et al. 2021). For a minority of PHLARPs, however, generating research was described as their primary activity. Applying evidence in decision making contexts was the final, but least prominent, category of activities undertaken by the PHLARPs.

Box 4: Activities described by Research Practitioners

Activity category	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... 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 for colleagues	<i>"We organised 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 ... 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

What are the day-to-day activities of PHLARPs and how were these perceived in diary entries?

Building links and maximising visibility as core activities: The diary responses from nine participants aligned with interviews in that they clearly showed how building linkages with others was a key part of day-to-day activities for PHLARPs, ranging from contact with LA and CRN staff, local councillors, researchers in academia, community stakeholders, practitioners, the public, as well as peers doing similar roles. Activities include participating or developing in networks, meeting individuals and teams with a view to developing opportunities or funding bids, and public event attendance. Two-thirds (n=6) reported involvement in public engagement activities.

However, building links can also be challenging, some participants found remote working a barrier to being embedded, maintaining connections, finding out what is going on, and the visibility of the role. Making contacts within an LA or gaining new contacts within academia for different research areas was a challenge. Having in-person days to connect with colleagues, and in-person events were appreciated by some though sometimes remote working meant reduced in-person working space and less frequent connections where teams did not overlap. Conversely, it was observed that working online can facilitate and widen attendance of meetings. One participant instigated a regular online 'meet-me' for colleagues to improve visibility and connection. A lack of influence on decision-making or difficulty in engaging colleagues with research and maintaining their commitment was a challenge partly owing to the context of the role. There could also be cultural differences in ways of working and expectations between research and LA needs and some highlighted particular challenges with time, resources, money, information systems, and issues in working with others. However, interactions with colleagues, and high skill levels of some LA staff were highlighted in the context of what was working well.

No two days are the same: Most participants undertook a variety of different activities during their working week, and engaged with different topics and people throughout. Most activities included: attending meetings; organising or requesting information; presenting evidence and data-preparation; collecting or analysing data; and providing information or research expertise. The proportion of time spent on these varied with attending meetings being the largest.

Of the activities described by the nine participants, eight reported attending a team meeting during the week and eight describe providing training or support to others, of which half also enabled others to use research. A majority describe undertaking an activity related to research bids (n=7) and on planning research, including setting milestones, developing protocols and participant recruitment (n=7) as well as other tasks as part of undertaking or facilitating research. Activities described by less than half include activities to support data or research use, data governance, data preparation, and self-development activities. However, it was not always possible to determine the nature of the research activity from the descriptions.

Frustrations and joys in the role: All participants reported positive feelings of satisfaction or enjoyment, and most commented on feeling connected and supported (n=8). However, the same number also reported some frustrations or disappointments and three described isolation. Overall, there appeared to be a positive expectation that the activities of PHLARPs make an incremental contribution to enabling research in public health; however, it was acknowledged that this would take time, and needed wider support and system changes (for example,, research focused posts in other LA teams and at higher levels within the LA, funding to allow their LA colleagues more time to engage with research, expressed support for research activity at all levels within the LA).

How did Public Health Leaders with Protected Research Time work alongside PHLARPs?

As part of the NIHR CRN scheme, additional funding was made available to buy out protected research time (PRT) for public health leaders (PHLs) (see Box 2). This comprised half-a-day, or four hours, a week (0.1FTE), to focus on research-related activities. The intention was to award protected research time in conjunction with PHLARP placements, although problems around recruitment and retention meant roles were not always aligned within the same local authorities at the same time. Still, most PHLs we interviewed (10/12) had worked alongside at least one PHLARP for some period during their PRT.

What were the aims of the PHL-PRT initiative?

An expression of interest form for the PHL-PRT role described the broad aims as generating evidence for local decision-making and encouraging a culture of research within local government. While some PHLs described how part of their PRT involved directing and managing the PHLARP, most participants (9/12) commented that they were unclear, on a wider level, as to what the CRN expected of them.

Because of the openness of the aims and the exploratory nature of the scheme, PHLs co-developed objectives with their local CRN representatives, sometimes on an ongoing basis. PHLs' self-described aims for the PRT included building up knowledge of research opportunities; forging relationships with research networks and collaborators; and getting LA colleagues interested in research and building up their research capacity.

In cases where Local Authorities were towards the research inactive end of the spectrum PHLs perceived few criteria to help them measure success: *"...I was never really given any kind of objectives or success criteria and I spoke with my CRN quite a bit about what did they actually want me to achieve? And the general gist of it was "anything" and we're so early in our pathway that, you know, this is just about raising the profile of public health research."* (Public Health Leader).

The expression of interest form described aims of the scheme as getting LA-led studies onto the [Public Health Research Portfolio](#), and building up links between Local Authorities and NIHR's Applied Research Collaborations. Interviews with local CRN staff also emphasised the importance they placed on these directives.

How did the PRT work in practice?

PRT was awarded not only to directors of public health and consultants in public health, but also to other members of staff occupying leadership positions within the public health team, as well as to some university-affiliated senior academics who worked closely alongside local government (hence the collective term ‘public health leaders’).

Participants described the PRT in categorically positive terms, although the extent to which it genuinely created more time in their dairies was largely disputed, with one participant stating, *“I don't feel like I've been gifted, you know, the gift of time [laughs]”* (Public Health Leader). PHLs highlighted a lack of slack in the LA system which prevented their roles from being backfilled when they were focussing on their research-related activities. Additionally, while a couple of participants described being able to dedicate a specific morning or afternoon each week to research related activity, the remaining participants (10/12) found their research time was widely dispersed over the course of the week on account of practical reasons, such as the need to be readily available for research-related events or meetings.

Regardless of the numerous practical difficulties, the PRT was highly valued because of the license it gave PHLs to pursue research opportunities that they may not have felt fully supported to do otherwise. The funding itself was crucial to secure backing, especially from senior management, but participants reflected how the signals the role sent on an organisational level were equally important: *“[it's] an explicit way of saying, actually we do care about thinking about research”* (Public Health Leader). At the same time, participants made it clear that despite this being a step in the right direction, there were numerous remaining challenges in securing the long term emotional and intellectual commitment to becoming a research active LA.

How did PRT interact with PHLARP roles?

Participants described the work of PHLARPs as fundamental to realising the research-related aims they were working towards within the LA. Participants referred to recruiting and managing PHLARPs workloads, and working alongside them to set agendas, carry out research training needs assessments and develop training, bids and proposals. PHLs worked at a more strategic level within the organisation so, often, when setting priorities and actions in tandem with PHLARPs, the onus would fall on PHLARPs to realise these plans on the ground.

How influential are embedded researcher activities in meeting their aims and helping organisations to become more research active?

What can the literature and documentary analysis tell us about the influence of Embedded Researchers?

Our systematic review of embedded researcher interventions in public health organisations shows that embedded researcher interventions are most effective in

helping to create incremental changes that could help organisations become more research active, although documented cases where these changes lead to more systemic changes in research activity within public health organisations are much more infrequent. As Table 1 shows, several studies provided evidence (qualitative and/or quantitative) around the influence of embedded researchers in creating a more research curious and/or more research fluent public health workforce. An example comes from a study by Uneke and colleagues (Uneke Chigozie et al. 2018), who report on a two-way secondment model in Nigeria which a policy-maker involved in the intervention described the way in which their own views of the importance of research and evidence had evolved: *“My involvement has revealed the inevitable need for evidence-informed policy much more than ever before, since before now I looked at research findings as purely an academic exercise.”* (p528). Embedded researchers were also reported to be successful in several studies in becoming a local expert and a source of advice on research matters. In some cases, this expertise also helped to shape the thinking within a public health team around particular policy or service delivery that could be made. For example, in an evaluation of embedded researcher activities in the Northeast of England, Cheetham and colleagues (Cheetham et al. 2018) reported that through meetings and informal discussions with colleagues, an embedded researcher was able to *“recommend changes to the assessment process for users of the integrated wellbeing service, to reflect its core aims and address the social determinants of health”* (p i66).

Signals of longer-term changes within public health organisations were less frequently reported. Although we noted that several studies provided (sporadic) examples where research was used to influence a decision-making process, and where the way in which research was generated changed so that research became more salient to policy/practice environments, the sustainability of these changes after an embedded researcher intervention had ended was unclear. Often, studies provided singular examples of these changes, rather than evidence of systemic changes. For example, in a study conducted by Young and colleagues (Young et al. 2018) in South Africa, while evidence was used to inform on specific ancillary components of a specific public health intervention, there was less opportunity for evidence to make a wider impact on decision-making. In this case, this was because the decisions had already been taken before the intervention had been fully enacted. Such evidence supports an argument made throughout the report that longer-term instrumental impacts of embedded researcher interventions are likely to take years to materialise, suggestive of a need to adopt a long-term approach in planning the evaluation of embedded researchers that maximises opportunities for understanding how embedded researchers activate more subtle but self-sustaining and meaningful changes to organisational cultures.

Finally, the review also illuminated that embedded researcher interventions are not necessarily ‘cost-neutral’. Hosting an embedded researcher does mean that organisations will have to adapt and change to accommodate the changes that embedded researchers can bring. Some studies noted that the changes that embedded researchers activate can introduce heavier workloads and added pressure on public

health staff. In addition, there were examples where embedded researcher interventions had failed to create anticipated changes, and even where planned activity was terminated early where a decision-maker had not been convinced of the added value that an embedded researcher brought (Langeveld et al. 2016).

Table 1: Overview of evidence from the systematic review of embedded researcher interventions in public health settings. Colours represent where studies provide evidence for the different forms of influence of embedded researchers with colours on the red spectrum reflecting where few studies provided evidence and colours on the green spectrum reflecting where higher numbers of studies provided evidence. Note, studies collected different types of evidence collected through different instruments.

Stage	Type	Studies providing evidence (n=13)
Early or incremental changes	Growing networks	6
	Becoming a local expert and champion	7
	Building trusting relationships	2
	Changing the infrastructure for research/evidence	3
	Enhancing evidence fluency, curiosity about evidence, and/or the value attached to research/evidence	11
	Personal skill development for Embedded Researcher	4
Longer-term changes (signs of cultural change)	Research used to influence decision-making	6
	Behaviour change: Staff become more active/fluent in using research/evidence	3
	Sustainable and/or trusting relationships between organisations involved	1
	Research created in a way that is more useful/applicable in policy/practice	5
	Policy/practice partner becomes embedded in research systems	1
	Sustainability – Host wants or enacts more Embedded Researcher activity	2

Box 5 – Did PHLARPs influence successful funding applications and publications... and would we expect them to?

In our documentary analyses, we focussed on three sources and indicators to measure an uptick in research activity, and that could hypothetically reflect the influence of the PHLARPs and PHL-PRT, using objective quantitative measures: (i) decisions on NIHR funding on the main NIHR funding database where the contracting organisation was a Local Authority (LA); (ii) data from the NIHR CRN portfolio on Public Health studies hosted in Local Authorities adopted by the portfolio; and (iii) data on publication trends drawing on public health studies indexed in PubMed where an author had a LA affiliation.

Successful NIHR funding led by Local Authorities: With respect to the first indicator, data for instances where the LA was a contracting organisation before 2021 (the same year in

which most PHLARPs were established) is sparse, and we focus on 2021 and 2022, and a separate model with HDRC data. In 2021, as PHLARPs were becoming newly established, there was little perceptible difference in trends based on whether a practitioner was in post or not; however, Incidence Rate Ratios show that the incidence rate of Local Authorities with a PHLARP reporting funding success was over three times higher than those without a PHLARP in 2022. While the results are suggestive, given the short time frame and the lack of data pre-dating the implementation of PHLARPs, the possibility that these Local Authorities were already more research active cannot be discounted.

Analysis of CRN Portfolio data provides further suggestive evidence that Local Authorities hosting PHLARPs were more active than those without PHLARPs in supporting Public Health research that was hosted on the Portfolio. Although most Portfolio Public Health research did not involve Local Authorities, descriptive data suggested that those with PHLARP practitioners were more likely to be sites involved in the conduct of Portfolio supported research, and the only example of LA sponsored Public Health research hosted on the Portfolio was supported by a PHLARP.

Publication data: We drew on data from PubMed to explore whether we could detect any difference in publication trends, and given the nature of the data we were able to explore baseline levels before the implementation of PHLARPs. Overall, we observe a trend where authors based in Local Authorities that had hosted a PHLARP were consistently more likely to publish than those that did not host a PHLARP. A second temporal trend was observed where there was a decrease in the number of studies published by authors with a LA affiliation after 2019 in settings with and without a PHLARP, a possible reflection of the COVID-19 pandemic and shifting priorities. Longitudinal analysis, equivalent to a difference-in-difference model, suggested that the drop in publications being authored by those with a LA affiliation may have been sharper in those Local Authorities that hosted a PHLARP than those without, although this was not a significant trend. Overall, with respect to publications, the analysis emphasises that those LAs that hosted a PHLARP were more likely to be research active before the implementation of PHLARPs, but that there was little perceptible impact after implementation of these posts.

Further interpretation: The documentary analyses of PHLARP research activity metrics corroborate the patterns observed in the systematic review, in that the impact of embedded researchers are more likely to be visible and tangible in terms of shorter-term outputs and forms of enlightenment. We see suggestive but not conclusive evidence that PHLARPs may have resulted in LA becoming more involved in (successful) research proposals, although the results around publications also emphasise that LAs that hosted PHLARPs tended to be more research active initially. Overall, these results also cast further doubt on the utility of relying *solely* on quantitative metrics of research output as appropriate evaluation measures for embedded researchers, and provide additional justification for including qualitative approaches to understanding the contribution of embedded researchers. Furthermore, indicators such as successful funding proposals and an increase in publications are long-term outcomes that can take several years to mature; not only are they beyond the reach of many full-time researchers in academic settings, but they are also likely beyond the timescales originally intended for the PHLARP posts. In addition, in the case of PHLARPs, given that many of the posts were created at a relatively junior level, with one person in a

team with varying skills levels, it is questionable whether these posts could ever lead to a detectable change in downstream outcomes in such a short period.

Finally, we were also interested in the sociodemographic characteristics of LAs that hosted PHLARPs and those that did not, although observed no systematic differences. This suggests that LAs with higher levels of deprivation or poorer health were no more or less likely to host an embedded researcher through the scheme than those with more advantageous sociodemographic profiles.

What did research practitioners view as incremental milestones and achievements?

Making sense of the role and its context

Becoming embedded: For the PHLARPs, much of their early success and progress related not to changes in research activity, but to the process of embeddedness itself. Within our initial wave of interviews, almost every PHLARP discussed how the initial phase of their role revolved around building trusting connections and networks, within the LA and beyond. This was a lengthy process, and in some cases took up to several months, particularly in cases where PHLARPs had few existing connections or experience within the LA. As such, being eventually perceived as a core member of their LA team was viewed as a significant achievement. Maximising visibility through maintaining a constant presence within the LA supported this process such as 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. Because “research practitioner” was an unfamiliar job title within LAs, PHLARPs also spoke about using this networking phase to foster an understanding of their role among colleagues. Endorsements and introductions from senior staff such as Directors of Public Health (many of whom were a part of the PLH-PRT scheme) further enabled the establishment of trust and increased PHLARP influence through providing PHLARPs an initial level of credibility and access to relevant meetings. Conversely, the Covid-19 pandemic presented a significant hindrance to this process as it severely limited face-to-face and more informal contact. Given the necessity of establishing trusted local networks, it is unsurprising that communication and interpersonal skills (for example, being empathetic, a strong influencer, the ability to communicate effectively with diverse audiences) were viewed as invaluable to success in these roles. Unfortunately, not all PHLARPs were able to establish themselves as a core member of a LA team. In particular, the task of achieving this level of embeddedness outside of a single LA was exceedingly difficult for those whose remit extended across several administrative units.

Situational analysis: A second early achievement for PHLARPs was establishing an understanding of the local research context. Knowledge of baseline levels of research activity within a LA, including associated barriers and opportunities, is essential to

developing logic models for embedded researcher interventions and thus shaping the roles and defining expectations. PHLARPs often gained this knowledge informally through discussions with colleagues. However, several PHLARPs also conducted more formal research needs assessments (for example, surveys drawing on behaviour change theory). Critically, the value of understanding local perceptions of research was emphasised. 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 said, “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”. With this knowledge in hand, PHLARPs were able to communicate more effectively and build a shared understanding. PHLARPs widely emphasised that an appetite for evidence informed decision making already existed within LAs, but that due to barriers such as severe capacity issues, research was often not prioritised.

One of the reasons why the word “research”, and academia more broadly, was not always viewed positively relates to the perceived value of academic research to the LA. While most PHLARPs had observed that their LA colleagues recognised the value of evidence informed decision making, the immediate value of research opportunities promoted by academics was not always apparent. For example, a PHLARP described how *“the mutual value isn’t always clear. So, it might be a really good piece of research, but in practice, what does it actually mean for the Council in terms of the resources they have to put in and the benefit for them? I think sometimes true collaboration can be something that’s a bit missing”*. As such, PHLARPs emphasised how, to enhance engagement and build trust with LAs, academics should clearly articulate how their research i) will benefit the local community and ii) is aligned with the LA’s strategic priorities. For example, an RP discussed how *“It’s not enough just to just to present things that are clearly fantastic or that have fantastic potential. [Research] needs to be very much tailored to the local context. It needs to be informed by specific local needs that you’re then demonstrably meeting”*. Co-creation was one opportunity that was described as enhancing the relevance of research and thus fostering local buy-in.

Early changes

In relation to early changes in LA research activity, PHLARPs identified two primary early achievements within their initial 1-1.5 years in post.

Raising the profile of research: Firstly, over three quarters of PHLARPs perceived there to have been a positive change in the local profile of research, with research becoming more centred within public health teams. 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 described 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, for example, of funding opportunities and other available resources, the types of research questions they could ask, the many ways in which research could add

value to public health services, and how the LA was already engaging with research (for example, through evaluations which were not often perceived as research). These claims relating to improvements in the profile of research were supported through the increasing number of research related queries and input PHLARPs received from colleagues over time.

Increasing levels of curiosity about research: Secondly, over half of the PHLARPs discussed how LA research involvement had increased since they began in post. Examples included strong turnouts for training opportunities, involvement in research projects conducted or facilitated by the PHLARPs, and investment in research. For example, an RP 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”.*

Demonstration projects: Connected to these two early changes in research activity, several PHLARPs described how demonstration research projects enhanced research involvement in a positive cycle of reinforcement, aligning with or original logic model. This relationship was most often identified in relation to funding applications (both successful and unsuccessful), but also to directly witnessing the applied value of research for services, and publications, all of which generated enthusiasm for research.

Signals of longer-term culture changes

As PHLARPs continued to progress in their roles, they discussed a highly varied range of outcomes reflecting longer-term and more expansive change relative to their LAs initial level of research activity. Many of these outcomes directly addressed barriers to research activity such as funding to build research infrastructure (for example, being awarded an HDRCs) and the establishment of formal relationships with research institutions (for example, through a Memorandum of Understanding). Other outcomes related to the generation of research, but these examples largely to referred to isolated projects rather than a widespread increase in research production. More broadly, PHLARPs continued to discuss change in their colleague's engagement with evidence production and use at all stages and scales. Examples included direct contribution to research production, signposting a research opportunity to relevant colleagues, and accessing evidence to inform a service. The PHLARPs tended to act as the connective fascia amongst this activity, providing a central point for research and evidence within their team. A PHLARP described this function, and the evolution of their role, in saying,

“Quite a lot of what I'd been doing in the early stages of the role felt slightly abstract. It was slightly nebulous. It was kind of engaging with people, having lots of conversations, raising the profile of things and all of that. But now it's sort of felt to have got to a point where people are thinking ‘Oh, well, here's a research opportunity, let's speak to [the

PHLARP]. Let's see if they can identify funding for this, expertise to support this'. So, after [...] two and a half years, it felt as though things have suddenly moved to a point of getting very tangible results”.

Given the pivotal role of most PHLARPs as facilitators of research activity within their team, it is questionable whether gains that had been made in relation to LA research cultures could be sustained in their absence without alternative injections of resource. Capacity barriers remain and it is unlikely that LA staff could maintain the momentum established by the PHLARPs without dedicated time for research. This underscores the value of opportunities such as HDRCs through which LAs can use and build upon the work of PHLARPs to address existing barriers and develop sustainable and more systemic change in research activity and use.

How did PHLs support organisations to become more research active?

What strategies did PHLs use to maximise the influence of their PRT?

Extending and splitting the role: Many PHLs (8/12) remarked on the impossibility of achieving anything transformative in just four hours a week, especially considering the limited resources of colleagues who did not have research as a core mandate. Participants described being able to leverage extra impact by way of accruing additional research-focussed roles (“*I actually have a number of other roles which are synergistic*” Public Health Leader), and delegating work to colleagues with research-focussed roles, such as PHLARPs or public health fellows. The importance of having someone on the ground acting as a touchpoint and engaging with staff on a day-to-day basis (for example, sending funding calls and training opportunities to colleagues “*to keep the idea that research is a thing in their inbox*”) was highlighted across the interviews. The PHLARP roles were described as being fundamental to efforts to build on any traction which had been generated: “*One of my main successes is bringing in the research practitioner, because that’s actually given us some more capacity, and by having more capacity, it means that we can keep encouraging people to participate*” (Public Health Leader).

Saying yes to everything: Other PHLs who were working in local authorities which were relatively more receptive to research described how they built up staff interest in research through being open and responsive to all research-related opportunities which came their way. As research infrastructure is largely underdeveloped in Local Authorities, this tended to be done in an opportunistic way – yet it was still a recognised route to creating an open learning culture and space for reflection: “*So it's a lot of it is me thinking I've got this role I need to maximize it. So it's saying yes to everyone [...] I just say yes to every single interview and then if people come with a proposal and it actually sounds interesting. It's just saying yes and exploring it, and even if we're not right for them, at least Council colleagues have had that conversation.*” (Public Health Leader).

Adapting Language: In the same way that PHLARPs described how the word “research” wasn’t resonating within the LA, PHLs also found the words research and evidence did not always land well with LA colleagues. PHLs described referring to

“innovation”, “intelligence” or “data”, as opposed to “research”, as these words held more sway within Local Authorities. As one PHL speculated, research was not always perceived by colleagues as having any direct benefit to residents.

“PHL: [...] research until fairly recently [has] been pretty much a dirty word in local authorities. Simply because it’s seen as something that’s not associated with an outcome that’s valuable for the population. That’s not my opinion of what research is, but that’s the feedback that I have had from colleagues, which is slightly worrying, obviously. But for that reason, whenever I talk about research within local authority, I tend to talk about innovation rather than research per se, simply because of the terminologies.”

Interviewer (SL): *That’s interesting. So you’ve adapted your language to try and...*

PHL: *Yes. Yeah, to, to try to avoid closing the doors before people have absorbed what I have to say.”*

What helps to enable research active Local Authorities?

Harnessing existing assets and skills: Within the context of increasing cuts to LA budgets, and the combined effects of austerity, COVID-19 and the cost-of-living crisis, the majority of participants described how research was perceived by LA colleagues as a luxury, and in some cases, an unnecessary drain on scant resources: *“people are so busy that there is no time for reflection, or actually doing any of the things other than the urgent”* (Public Health Leader). PHLs reflected that it was crucial that research was framed in the right way to colleagues, that it was *“very much about working with people, and not imposing research as something extra on top of what they’re doing, because we’re not going to achieve that in local authorit[ies] which are] strapped for cash”* (Public Health Leader).

The bleak economic environment was referenced by some PHLs as necessitating an evidence-informed approach to allocating scarce resources; the *“really difficult context [providing] even more reason why we need to make sure that we prioritise what we’re doing based on the best available evidence”* (Public Health Leader). PHLs widely acknowledged that, even in cases where there were numerous LA staff members equipped with both appetite for research and research skills, encouraging a research-active culture within a political environment with underdeveloped research infrastructure was a challenging balancing act. This was especially the case when advocating for a public health approach which prioritises preventive and proportionate responses and requires long timescales to pay off.

At the same time, over half of the PHLs (7/12) referenced the unique knowledge and reach that LAs had, and displayed a clear sense of pride in understanding the local needs of the population and being able to meaningfully engage with residents. One PHL described how tapping into their community links through a pilot research project with food bank users had challenged their thinking: *“We are a very service, boots on the ground, kind of organisation. We pick up people’s bins and we take away children whose parents are abusing them. So having that research lens, I think, is really helpful. It adds a dimension to... we just think about food banks as the place where people get food, who’s using them? We’ve never had an understanding of the people who use the*

food banks” (Public Health Leader). Research relevant to the local context was described as potentially transformative to how they thought about a problem and how services would be delivered.

Health Determinants Research Collaboration bids: In many cases PRT was spent overseeing applications for Health Determinants Research Collaboration (HDRC) grants, with nine PHLs being part of teams which applied (three of which were successful). Regardless of the outcome, the application process was described as setting out a vision of a research active organisation to work towards, aligning with how PHLARPs described such application processes as demonstration projects. In some cases, the bids helped to crystallise the aims of the PHLARP and PHL-PRT roles, while also being a useful way of gauging interest and generating enthusiasm for research “...actually HDRC or no HDRC we should all be aspiring to that” (Public Health Leader).

PHLs described the HDRC application process as a useful exercise in communicating to the rest of the council why it would benefit them to be more research active and helping to secure essential senior management buy-in: *“I obviously had to go to exec[utive] board and health and well-being board and a number of different decision-making fora with an overview of the type of things that we wanted to do. You know, to develop cohorts of evidence-savvy local government officers, to develop early career researchers, that those sorts of concepts, and they were well received. [...] You know, this idea that we might be able to benefit from more critical thinking skills and that we might be able to benefit from looking at what is already known on a topic and sort of derive our actions from research evidence it wasn’t, it wasn’t dismissed”* (Public Health Leader).

How do different typologies of embedded researcher influence decision-making contexts in different ways?

We had originally anticipated identifying whether different typologies of embedded researcher intervention were aligned with differential impacts and influences, drawing on some of the typologies identified within the [systematic map](#). However, in the case of the systematic review, while we did observe several of the typologies in the literature, the low number of studies belonging to each precluded identifying a particular effective typology. In the case of the PHLARP positions, as we discussed earlier, most would be aligned with the ‘Classic Embedded Researcher model’, although we have identified substantial heterogeneity within this model.

Based on the different strands of our research, we are unable to definitively identify one model as being more effective than another. Instead, we have explored some of the enablers and key processes, as well as some of the barriers and obstacles throughout the study components to create an updated logic model ([Appendix 2](#)). Some of these components are described in further detail below.

Co-creation and an iterative approach: Co-creation was an essential component within several studies and should be regarded as an ethos threaded throughout an embedded researcher intervention. Co-creation is used here to describe the way in which organisations and individuals (including the embedded researcher themselves)

developed new ways of collaborating to design, monitor, adapt and evaluate the embedded researcher intervention dynamically and innovatively (Messiha et al. 2023); this involves research organisations and policy/practice organisations working together as active and equal partners to understand and solve problems around low levels of research activity in a creative way (Grindell et al. 2022). Co-creation therefore involved mutually agreeing the activity and revisiting this at either planned intervals or ideally on a more continuous basis. While co-creation was intended to be integrated into the creation of the PHLARP posts, an analysis of the aims contained within job descriptions suggests that the aims often didn't reflect the needs of both the CRN and the LA. Of the 16 job descriptions analysed, we characterised seven of these as 'NIHR-LA balanced', where the roles required specialist knowledge of both NIHR/CRN systems and LA public health systems, and four as 'Public Health Research-led' where the roles focussed on expanding the CRN portfolio through generating/contributing to public health research and required knowledge of public health research methods. However, another three were characterised as an 'undefined profile' where the roles do not clearly state the desired skill or knowledge profile; and another two as 'NIHR-led' where the roles prioritised knowledge of NIHR systems over knowledge of public health research or systems. In the latter two groups, the risk was that PHLARPs failed to facilitate changes, or took longer to do so, as they failed to understand the expectations of the role or where the expectations surrounding the role were inappropriate and needed to be reset. The logic model also shows that a situational analysis on the research culture was a key stage of becoming embedded (this was reflected both in the primary research and the systematic review); this underscores the iterative and responsive nature of embedded researcher interventions.

Consideration of the sphere of influence: The design of embedded researcher schemes should be considered when scoping their potential influence. Participants spoke about the difficulty in establishing relationships, and therefore influencing research culture, outside of their immediate team due to a lack of regular contact. This emphasises the importance of having a designated supporter or mentor within a host institution, as exemplified with the PHL-PRT scheme which was in many cases implemented alongside the PHLARP scheme. For those PHLARPs expected to work across multiple administrative units, difficulties in establishing relationships were identified as particularly significant challenges. 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*". For similar reasons, PHLARPs also discussed a perceived lack of influence upstream or downstream of the team or network in which they were based within the LA. Many PHLARPs also felt that their lack of seniority reduced their influence. "*This can't all be done by one relatively junior person in each local authority*" described one PHLARP.

Incremental nature of change: As stated earlier, when considering the influence of embedded researchers in public health settings, it is important to view associated

change within the context existing research activity. We found that initial levels of research activity varied significantly across LAs hosting a PHLARP. This variation was described by a PHLARP who stated that “*There’s different levels of maturity in research across different public health [settings]*”. Most PHLARPs indicated that when they started in post, their LA was relatively research inactive, in many cases severely so. Those LAs earlier in their research journeys tended to face severe capacity constraints, infrastructure challenges (for example, lacking ethics processes and access to the literature), and in some cases a deficit of local research experience. Although funding opportunities such as the NIHR’s HDRCs are certainly a positive development and could address many of these challenges, funders must also consider how such opportunities could exacerbate funding inequities across LAs. Indeed, a few PHLARPs spoke about the difficulties they experienced when competing for research funding with capacity rich LAs who had more established cultures of research.

Considering the relative nascency of research activity across many LAs, and the associated barriers, organisational culture change should be viewed as long-term and incremental processes. “*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*” emphasised one PHLARP. As such, it is vital that the enormity and longevity of the task be accounted for within the aims and monitoring frameworks associated with embedded researcher roles. “*I don’t walk on water. My name’s not Jesus!*” described one PHLARP when reflecting on the magnitude of their remit. Several PHLARPs also discussed how being the only member of staff dedicated to research limited the extent of their impact within the LA. These findings highlight the necessity for sustained investment in embedded researcher positions and other such interventions.

Box 6 – An updated logic model

Our updated logic model – shown in [Appendix 2](#) – traces four stages that we theorise to occur across embedded researcher interventions that lead to sustained research active cultures, particularly those that occur within public health settings and that follow a ‘Classic Embedded Researcher Model’ where a researcher moves from a research setting to a policy/practice setting.

Stage 1 – In addition to any pragmatic considerations (for example, securing resources) several relational processes need to occur before the researcher is embedded. These include co-creation or host involvement in the design of the roles, and/or for interventions following an existing model, decisions about how the intervention needs to be tailored to the context/individual researcher.

Stage 2a – Before and alongside conducting research activities, embedded researchers will undertake a variety of activities to become embedded including undertaking a needs assessment or situational analysis (for example, drawing on tools described in later sections – see link [here](#)), taking steps to maximise visibility, and securing local influence. They will also continue to co-create the design of activities and refine the aims and understanding of the expectations of the role (in part based on the situational analysis).

Stage 2b – Embedded researchers conduct activities to support research activity including generating/producing research, knowledge brokering and mobilisation activities, and research facilitation activities including, for example, providing training.

Stage 3 – Next, we would expect embedded researchers to start to identify milestones or achievements that indicate early changes in research activity including developing networks with research stakeholders and building trusting relationships within the organisation. The embedded researcher would increasingly be able to cite examples where they have acted as a local expert or advisor on research, and will have taken steps to change the infrastructure for research/evidence (for example, developed policies to support research, routine algorithms for cleaning data, or helped to work on funding proposals). There will also be evidence of increasing fluency with evidence and interest in research evidence.

Stage 4 – At this stage, we would expect signals of long-term cultural changes to be visible in the policy/practice organisation through, for example, instances where research is used to influence decision-making or where staff in the host organisation are changing their behaviours with regards to the use of evidence.

Stage 5 (*Unobserved in any component of the research*) – At this stage would expect systemic changes to occur that signal the organisation is research active including that it is embedded in the broader research infrastructure.

The model also includes several moderators including contextual moderators (for example the available resources to support research) and individual/intervention moderators (for example how the insider-outsider status of the embedded researcher is negotiated). Finally, the model also identifies potential adverse impacts. These include high expectations placed on embedded researchers that can induce stress and consequent heavier workloads on staff in hosting organisations if additional time or resource is not made available to support research activity.

What are the implications of our findings for the design of future embedded researcher interventions?

Key findings

Legend for key findings: *The acronyms used below trace the components from which the evidence was generated:* Systematic Map (SM); Logic Model and updated Logic Model (LM); Systematic Review (SR); Interview study (Contextual set up interviews) (SUI); Documentary analyses (DA); Public Health Local Authority Research Practitioners (PHLARP) Interview study; PHLARP Diary study (D); Public Health Leaders Interview study (PHL); Survey of researchers (S)

1. **‘Embedded researcher’ is a term that describes a wide variety of activities that can help organisations become more research active** (SM, SR, DA, I). Embedded researcher interventions differ across several dimensions including the direction (researcher embedded in policy/practice setting versus policy-maker or practitioner embedded in research setting); the composition and balance of activities that help to foster a more research active culture (generating, mobilising or facilitating research); as well as the type of embeddedness (for example, the extent to which a researcher was embedded through being physical present or whether they were embedded more remotely). We have developed typologies of how embedded researcher activities take place (SM, DA), although recognise there is wide variation within these. Even among researchers embedded within the same PHLARP scheme, we have identified substantial variation in the activities they undertake, and even in the way they meet the criteria of an embedded researcher. (I, D, DA). This has implications for measurement and evaluation approaches (see [following section](#)).
2. **Embedded researchers do activate precursors in research activity that could lead to culture change.** Throughout the review we identified several examples where embedded researchers have made early or incremental changes to the research culture in an organisation through growing networks, becoming a local expert and champion, and enhancing evidence fluency or curiosity about evidence and research (SR, I, SUI). For example, a researcher in the PHLARP scheme described how they helped to support colleagues as a local research expert: *“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”*. There were also signals of longer-term changes to organisational cultures with respect to research activity, with several documented examples where research was being used to inform decision-making. However, due to the length of follow-up and scale of embedded researcher interventions, systemic cultural changes were not

observed. Such changes could be detected through longitudinal studies that include long-term follow up to measure sustained behaviour change in the way in which practitioners and policy-makers use, facilitate, or contribute to research. Embedded researchers help to move organisations towards being research active, although at this point, we tend to observe this ‘upstream’ and not through ‘downstream’ instrumental measures of research activity (SR, DA, I). These upstream changes could include early or incremental changes where the environment for using or conducting research has been altered (for example the development of a policy/process around ethics, or the establishment of a journal club) in contrast to ‘downstream’ measures where, for example, there is evidence of sustained behaviour change in the way in which practitioners and policy-makers use or contribute to research evidence.

3. **An embedded researcher intervention can be viewed as a staged approach that requires an ‘embedding phase’.** This embedding phase includes activities that increase understanding of the organisation’s needs, that secure local influence, and maximise the visibility of the embedded researcher. A key enabler of this phase is developing trusting relationships with the host organisation. Trust can be viewed as setting the foundation for becoming embedded within an organisation (I, SR, LM).
4. **The aims of embedded researcher interventions tend to be ambitious** and not always commensurate with the scale of the intervention (both with respect to the length of the placement and number of embedded researchers), the status/power wielded by the researcher, and the existing level of research activity (SUI, DA, I, SR). Within the embedding phase described above, a further key (recommended) activity is to revisit and refine the expectations of the role based on other activities that take place as part of becoming embedded.
5. Our research underscores that **there is a latent demand for embedded researchers within organisations**, and across the PHLARP scheme that is a focus of this research, most were welcomed by colleagues (I). Our research also confirms that there are increasing levels of curiosity about research and evidence within LA public health teams (PHL). In addition, our results also suggest that there are substantial levels of interest in embedded researcher opportunities among academic researchers (S). However, we also identify concerns about the perceived value of applied research, misunderstandings about the impact of embedded researcher placements on career trajectories, and concerns about the sustainability of funding of posts, all of which are deterrents to more widescale adoption.
6. **Embedded researchers need support to create change at all levels.** In this research, a community of practice that formed among PHLARP practitioners was perceived as highly valuable by most in providing peer support (I, DA); senior support (including an allied scheme of Public Health Leaders with Protected Research Time) was crucial in securing local influence and building trust (PHL, I, SR); and support from home institutions was viewed as critical in helping to forge links between organisations, ensuring sustainability of the role,

and in ensuring that the intervention remained an organisational-level intervention (I, S). In our research with PHLARPs, where these forms of support were absent, embedded researchers were less likely to activate the precursors in research activity that could lead to culture change (I). Beyond the PHLARP-specific group, other networks of embedded researchers that are known to exist within the UK in this space include the Embedded Researchers network hosted by FUSE (the Centre for Translational Research in Public Health: see website [here](#) and email address [here](#)) and a network focussed on embedded research for the improvement and redesign of NHS services (see link [here](#)).

7. **There exists a burgeoning literature on embedded researchers**, but this is challenging to identify and in several cases the activities are reported opaquely (SM, SR). In several cases, embedded researchers may publish reflections of their experiences, but often this is done retrospectively, and in several studies, we note a failure to collect data through the course of the intervention. This means that our review is likely to reflect a partial representation of embedded researcher activities: we may not have identified the extent of studies, and for some studies identified, we are unable to fully integrate their findings into the synthesis.
8. **Co-creation happens (or should happen) throughout an embedded researcher intervention** (I, LM, SR). Co-creation has been identified within the literature as a strategy for creating research that is more relevant to user needs and timely. Embedded researchers are ideally placed to facilitate co-creation as they possess relevant contextual knowledge around research production and around the context of use (how research should be described, when it is needed etc. (PHL, I)). The activities of embedded researchers, therefore, involve co-creation of knowledge from within organisations, rather than maintaining an external perspective as would be the case in conventional practice. In this research, we also see evidence around the co-creation of knowledge mobilisation strategies. Where embedded researcher posts are not co-created and co-designed, this has far-reaching implications including a persistent mismatch between the aims of the embedded researcher intervention and what is actually possible to achieve. In addition, co-creation is a continuous process and should not simply be ‘frontloaded’ in interventions.
9. **Embedded researcher posts are often exploratory in nature, but can lead to unanticipated challenges to embedded researchers themselves, and colleagues in the host organisation, without mitigation** (I, D, SR). Mitigations can include developing clear expectations about what is feasible in research and periodically revising a logic model for the intervention to clarify the expectations of the role, being clearer with embedded researchers themselves about the exploratory nature of the role, and being aware that becoming more research active can increase time and workload pressures on staff and planning accordingly.
10. **Becoming an embedded researcher is a rewarding career option for most researchers** (S,I) (although one that is misunderstood by many researchers

without experiences of being embedded (S)). For example, in reflecting on their experiences, one PHLARP noted that: *“personally, it’s been a really fantastic development opportunity. I’ve learned loads and I really enjoy the variety it brings into my work and the way that my work with the CRN bleeds into all of my other work and means that I continue to work in an evidence-based way”*.

How can we measure the influence of embedded researcher activities in the future?

We previously cautioned the use of exclusively quantitative metrics of research outputs to evaluate the impact of embedded researchers in public health settings. Particularly within the first few years of embedded researcher interventions, such concrete, quantitatively measurable change is unlikely to have occurred systemically within an organisation. As such, we advocate for the use of qualitatively driven methods to be integrated within long-term evaluation approaches which can provide an understanding of the more nuanced, subtle shifts that reflect early incremental change in research activity (for example, perceptions, awareness, and motivations relating to research). Such an evaluation approach requires careful planning, an understanding of the context at baseline, and a plan for repeated measurements during and beyond the intervention. Perhaps of even greater value, qualitative approaches can elucidate the processes underlying such shifts (or lack thereof) as well as barriers and opportunities. While we are not suggesting that embedded researcher schemes avoid documenting and evaluating quantitative measures of research activity (for example, publications, successful (and unsuccessful) funding applications, improvements in research infrastructure), but that given the complex systems in which these interventions take place, qualitative methods are also necessary to understand the embedded researchers’ contribution to this change.

There may be more justification for focussing on quantitative measures that reflect the precursors of a research-active culture, such as measures for understanding changes in research engagement or skills in appraising research, rather than more ‘downstream’ measures of research output. Within our systematic review, among the studies with a quantitative component, three administered questions developed solely for the evaluation in question (McCormick et al. 2014, Paradis et al. 2017, Uneke Chigozie et al. 2018), while three included measures used more widely in the literature including the ‘Is Research Working for You?’ (IRWFY) self-assessment tool (Kothari et al. 2009) (see (Kremer et al. 2017) for application); the Seeking, Engaging with and Evaluating Research (SEER) tool (Brennan et al. 2017) (see (Williamson et al. 2019) for application), and the Evidence Based Practice (EBP) and Implementation scale (Melnik et al. 2008) (see for (Dobbins et al. 2018) application). In general, study authors did not reflect on the utility of the scales used, although in one case Kramer and colleagues (Kremer et al. 2017) reflected that a potential reason why their intervention failed to create an observable impact was due to the IRWFY scale being used being inappropriate and not sufficiently sensitive to detect smaller organisational changes, such as those that could be indicators of early and incremental changes or signals of longer-term shifts (see stages 3 and 4 of our [logic model](#)).

Gathering baseline data on research activity and associated barriers and opportunities (i.e. a situational analysis) is essential. Not only does this analysis allow for an appropriate, relative assessment of change, but such information is necessary for the development of an evidence-informed logic model to guide the intervention. While the explicit use of logic models were commonly identified within this study, or theories of change were not, embedded researchers regularly undertook formal and informal situation analyses to inform their work. Indeed, gaining this understanding was a key early achievement. Developing a logic model (Kneale et al. 2015) based on this initial situational analysis would present a valuable approach for directing embedded researcher activity in a more systematic way through tracing embedded researcher activities and projects through to the research behaviours they aim to influence (see also our own logic model in [Appendix 2](#) which provides a framework theory of how embedded researcher interventions are theorised to create change that can be subsequently adapted).

The Capabilities, Opportunities, Motivations, Behaviour (COM-B) model could also prove particularly useful given its alignment with the primary determinants of research activity (barriers/opportunities) in public health (Michie et al. 2011). The COM-B model conceptualises behaviour (B) as being driven by three interrelated components, Capability (C), Opportunity (O), and Motivation (M), which appear to holistically capture these determinants. For instance, research skills, research capacity, and appetite for research align with the C, O, and M dimensions respectively (Figure 1). Indeed, the model has already been applied in the context of an embedded researcher intervention in Cheshire and Merseyside, UK, to evaluate the influence of a Public Health Research Hub (Collaborative 2022). An added benefit of this model is that it is likely to be somewhat familiar to both embedded researchers and public health practitioners given its prominence in the field.

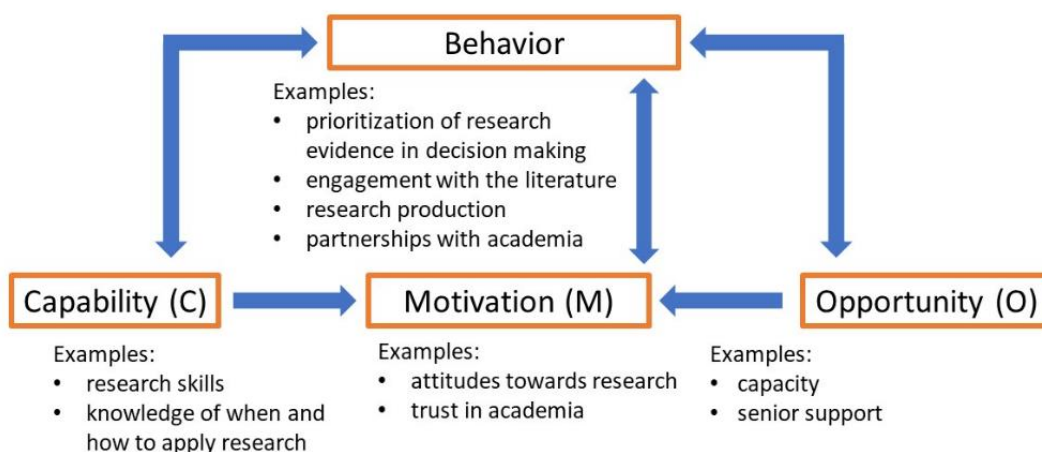


Figure 1: The COM-B model conceptualised in the context of embedded researcher interventions.

In our second wave of interviews with PHLARPs, we tested the potential of Contribution Analysis, a flexible, evaluation approach to measuring the contribution of an intervention to activate changes within complex systems in which both the intervention and external factors are likely to contribute to change (Mayne 2019). This

approach relies on a strong theory of how each component of an intervention can effect change – effectively taking a much more granular approach to a logic model – which are then conceptualised as interrelated contribution stories.

During our interviews, we found that elements of contribution analysis were useful in tracing the pathway from an PHLARPs activities/projects to a particular outcome. However, given the complexity of the LAs in which they were based and their diverse range of activities, the pathways of these activities were often interconnected and challenging to unpick. For example, a project that an PHLARP discussed with senior figures in the LA failed to materialise, but the connections made during this process facilitated a fruitful collaboration for a separate project months later. Given the potential of Contribution Analysis, combining it with an additional evaluation approach which incorporates a form of systems mapping could prove useful. One potential approach is Ripple Effects Mapping, a qualitative, participatory method that relies on input from programme stakeholders during workshops, subsequently producing “visual outputs (i.e., maps) of the programme activities and impacts, which are mapped along a timeline to understand the temporal dimension of systems change efforts” (Nobles et al. 2022). Given the complexity and long-term nature of systems change within local authorities, such an approach may hold promise.

Finally, it is also worth noting how the process of interviewing PHLARPs and teasing apart their diverse and interconnected activities and outcomes brought to light new insights that the PHLARPs has not previously reflected upon. This finding was exemplified by a PHLARP who said, *“If I’m honest with you, it’s not until I speak to somebody that I realise what I’ve done. Because you just do it”*. As such, we suggest that some form of peer dialog and exchange might aid embedded researchers in monitoring their own contribution stories and identifying valuable connections and opportunities (see #6 of the earlier implications of the findings).

How should embedded researcher activities be designed in the future?

Interim results from our survey based on the first 55 responses show some interesting trends that can inform on how future embedded researcher schemes should be set up in the future to benefit both the organisations in which they are embedded and the careers of the researchers.

One of the glaring discrepancies to emerge from these interim results was the positive impact those with experience of being embedded viewed these roles to have had on their career trajectories compared with the hesitations that those with no experience of being an embedded researcher held over the impact such a placement would have on their career. For example, one of the seven participants with experience of being an embedded researcher described the change that this experience had on their career: *“[it’s been] positive: it has personally transformed and opened horizons (the more I know the less I know); I had a very varied career and it never gets boring”*. Similarly, another participant expressed that far from having a detrimental impact, becoming an embedded researcher was a strategic choice in response to the demands made on researchers in academic settings: *“Extending my interest in [my subject] and*

preventing burnout by having alternative career options". In contrast those without experience of being embedded often expressed concerns about the impact such a position would have on their careers, some expressing worries that spending time away from academia would be 'career suicide'. Others also expressed concerns that the low value placed by academic institutions on applied research conducted in situ within policy or practice settings could be harmful for future prospects. Again, this was not borne out in the responses of those with experience of embedded research.

Despite reservations about the potential impact on careers among many respondents, most respondents were "quite" or "very" interested in taking on the role of an embedded researcher in the next two years (83%). Among the benefits cited of an embedded researcher post was the possibility of creating more impactful research and changing the wider evidence ecosystem, as articulated by one participant: *"As stated, I believe that roles such as these can produce more impactful and useable data. I also believe furthering the links between policy and practice is key. Moreover, I believe the quality of evidence is significantly improved through roles like this. Often, we see organisations with little, or no, research training/knowledge trying to monitor, capture data and evaluate programmes – often data quality is poor and inaccurate conclusions are drawn. This is not a criticism, as often practitioners do not have the adequate skills, knowledge or resources to conduct sound evaluations or research (depending on the organisation/sector). Rather, it is a call for this type of collaboration to become far more common."*

In terms of expected duties, there was as much emphasis placed on advising on research matters within policy and practice organisations as there was on generating research in situ. When respondents were asked to design their own secondment, the choice of setting varied considerably and included national and local government, schools, and NHS settings. There was also considerable variation in the length of post, with approximately a third of respondents preferring placements that were under a year; a third for approximately a year; and a third for 2-5 years. Most frequently, respondents preferred to commit to the host setting for a large proportion of their time (i.e. on a full time basis or 75% of their time spent in the host organisation) although there was an expectation that much of the embeddedness would take place remotely, with a preference to spend 1-2 days per week physically in the host setting. To support embedded researchers, participants frequently identified that host settings (policy/practice organisations) should provide induction and mentoring support to new embedded researchers. However, the support expected from home organisations (usually universities) was more complex and participants were keen to seek reassurance that workloads would be managed appropriately, that contracts would be extended, that home organisations would invest in relationships with host organisations, and that home organisations would recognise and value the impact of applied research. These perceptions perhaps reflect the challenges that may arise more within a 'classic embedded researcher' model where dual affiliation and having two sets of priorities for different organisations can lead to tension and competing priorities.

What are the limitations of this work?

We outline the limitations of the different research components within the companion papers that report on these approaches in depth. These papers are under peer review and this report will be updated as these papers are published to guide readers.

However, some overarching limitations are also worth noting that represent caveats to the findings:

- Firstly, the high levels of heterogeneity we observed among embedded researchers presents challenges in generalising the findings across the range of different models of embedded researcher interventions. Our logic model, which does incorporate learning from across different components of the research, aligns more closely with a model of ‘Classic Embedded Research’, and was developed based mainly on evidence from public health settings.
- Second, with respect to our evaluation of PHLARP posts, our work started after most practitioners had been recruited into post. This limits our understanding of how the scheme was set-up, although our documentary analyses and interviews with those responsible for setting up and managing the scheme were intended to go some way in addressing this limitation. Crucially, we were not able to examine the Local Authorities involved at the baseline to assess their research activity and culture before the intervention.
- Third, as we have noted throughout, changing an organisational research culture to become more research active takes a substantial amount of time. This length of follow-up within our own study or within most studies included within the systematic review are unlikely to have included a sufficiently long follow-up period to observe this change.
- Fourth, our own positionality as researchers who have worked within policy settings and within research settings, but not simultaneously as embedded researchers, meant that it took some time for us to grapple with the notion of the concept of an ‘embedded researcher’ and its ‘fuzziness’. However, we were supported in doing so by an experienced Advisory Group and our position allowed us to approach, and sometimes challenge, the boundaries of ‘embedded research’ from a critical perspective.

What are the implications of this work?

Based on the findings presented in this summary, we have identified several principles or values that hold implications across stakeholders around how embedded researcher activities should be perceived, organised, and measured in the future.

Principle 1: An embedded researcher is a form of exploratory and contextually bound intervention that works best when tailored to individual organisations.

Embedded researcher interventions that involve researchers becoming embedded physically and/or culturally into organisations are contextually bound and cannot be regarded as a standardised or manualised intervention. Therefore, in many ways, most embedded researcher interventions represent exploratory or pilot interventions that necessitate developing an understanding of the organisational context with regards to research activity before identifying how this can be changed. This has implications for

the way in which embedded researcher interventions are planned and evaluated and makes having standardised goals or benchmarks for change inappropriate. Instead, the following emerge as potential considerations in planning future embedded researcher activity:

- Understanding the local research context and **constructing a logic model or theory of change** should be explicitly named as an aim for embedded researchers.
- It is important to recognise the limitations of what a single individual can achieve within a complex system.

Principle 2: Although embedded researcher interventions in public health settings ultimately aim to increase the uptake of research in practice and thereby improve health outcomes, these outcomes are unlikely to be systemically observed for years and without sustained investment in research capacity.

It is important for all stakeholders involved with embedded researcher interventions in public health to keep in mind why interventions like embedded researchers seek to improve cultures of research and evidence use – to improve health outcomes. However, as discussed throughout this report, systemic changes to evidence use and, ultimately, to health outcomes, are not likely to occur for years. Therefore, while remembering these desired, long-term benefits, it is necessary to frame embedded researcher interventions within appropriate timescales and to consider the shorter-term precursors to research activity (for example, research fluency and curiosity of the public health workforce) in their design and evaluation. These variables reflect signals of longer-term change.

- Demonstration projects which illustrate the value of research to public health services can galvanise enthusiasm and support for research activity in the shorter term and act as incremental milestones to more systemic change.
- Widespread sustainability of changes in research activity is unlikely to be achievable beyond the end of an embedded researcher post without an additional injection of funding. Therefore, helping public health teams reach a point where longer-term funding to build research capacity is attainable (for example, where they could submit a strong application for an HDRC) presents a valuable aim for embedded researchers, particularly those based in less research active local authorities.

Principle 3: Embedded researcher interventions require a change in mindset towards co-creation.

Embedded researcher interventions entail a degree of co-operation between those who generate research and those who use research that goes beyond ‘involvement’ towards co-creation. We use the term co-creation to signify that embedded researcher roles entail bringing research organisations and policy/practice organisations together as active and equal partners to understand and solve problems around low levels of research activity in a creative way (Grindell et al. 2022). Such an endeavour can

disrupt historical power relations between producers and consumers of research. However, incorporation of co-creation holds implications for the way in which embedded researcher posts are developed:

- While co-creation may lead to a more successful intervention, it usually requires additional time to build relationships. This should be factored into planning and timelines.
- In the case of PHLARPs, there was evidence that, while the intention had been for all posts to be created jointly, the needs of LAs were not always represented. We could regard such instances as ‘faux-creation’ where there was little evidence of developing a mutual understanding of worlds. In addition, for some of the posts, the position was not co-created given that no participating LA was identified at the outset. Where co-creation was not enacted, PHLARPs were more likely to lack clarity around their aims which could have long lasting impacts on the degree to which PHLARPs became embedded. The implications of this research are around the need to further emphasise the importance of co-creation in developing and implementing these interventions in the future.

Principle 4 – Embedded researcher interventions can change the power dynamics between research producers and research users.

Embedded researchers can be viewed as presenting a challenge to a power dynamic which perpetuates the unhelpful belief that well-conducted (but often de-contextualised) research should automatically inform decisions, and that this happens in a linear and unidirectional way. Mutually beneficial, respectful and reciprocal relationships between academia, policy and practice organisations are needed to promote an open learning culture alongside opportunities for collaborative work at all stages of research-policy processes (from agenda setting through to dissemination). Embedded researcher interventions should be aware of the competing pressures and incentives, and assets and opportunities which exist across different policy, practice and academic boundaries and consider how best to harness existing skills, knowledge and wisdom in forging new research cultures. The following potential considerations emerge:

- **Availability and accessibility of opportunities:** Opportunities to support those working in policy or practice organisations to gain research experience, or for researchers to gain practice or policy experience should be made widely accessible. Advertisements and application processes should be careful not to assume prior knowledge, avoid unnecessary organisational, clinical or academic jargon, and ensure that modes of applying are not exclusionary (for example, requiring access to specific databases, administrative platforms or reference details). Further advertisements could also include a description of the contribution that embedded researcher positions can bring to individuals’ career trajectories.
- **Challenging received wisdom of what research is:** Demonstration projects of applied and embedded researcher work can help people develop understanding of what research is, what it is for in ways that challenge existing ideas around

research and generate discussion of the added value embedded researchers can bring. This may be especially valuable where there are examples of organisations who have been involved with embedded researcher(s) over longer time periods. One example is a recently funded large research study examining the health impacts of Universal Credit that involves both academic organisations and policy and practice organisations (see NIHR (2022b)). This project builds in part on previous embedded researcher work conducted with organisations in Gateshead, that was commissioned by the Local Authority Public Health team in Gateshead (see Cheetham et al. (2019b)). Among other benefits, this example demonstrates the way in which embedded researchers can help policy and practice organisations become embedded within the broader research ecosystem.

Principle 5: Applied embedded research can be impactful in changing organisations to become more research active, although applied research is not always highly regarded within universities.

Becoming an embedded researcher can be a rewarding experience for researchers, although many academic researchers perceive that applied research that can be transformational on a local level is not valued highly. Measures of research impact, such as the Research Excellence Framework, that are widely used to assess the performance of research institutions implicitly devalue research that is highly transformative when the impacts occur locally rather than globally. Meanwhile within academic institutions, there is little transparent support and few case studies that can act as a roadmap for future embedded researchers that showcase the value of embedded researchers to academic organisations, policy/practice organisations, and individual researchers (see <https://www.embeddedresearch.org.uk/> for some exceptions that reflect mainly NHS settings). In addition, HR and workload management systems within academic institutions are rigid and often fail to support flexible career pathways at the interface between research and policy/practice. This is particularly concerning given that within policy and practice settings, as has been shown in this research, a strong case still needs to be made around why decision-making should be informed by research. The implications are that:

- Academic institutions need to provide guidance to potential embedded researchers.
- HR systems within academic institutions need to reflect the possibility of embedded researcher positions within career pathways and to accommodate jointly managed and funded posts within their systems.
- More dedicated funding by Research Councils to support academics at different career stages to undertake embedded researcher posts could help to broaden the appeal and illuminate the flexibility of the model.

Principle 6: Embedded researchers require support at all levels to maximise the potential benefits of their roles for both host institutions and their own career trajectories.

Embedded researchers require support at multiple levels to maximise their influence and ensure the positions are personally beneficial. Peer support provides embedded researchers with an opportunity to share learnings, collaborate, and openly share in the joys and frustrations of these highly experimental roles. Support from senior colleagues is also critical to success in the roles and future schemes should seek to emulate the paired PHLARP – PHL-PRT model. Finally, support from research institutions is essential for the development of networks, building infrastructure, and ensuring research practitioners maintain (or build) links with academic colleagues and processes.

- An online learning/community hub could offer embedded researchers a flexible way of collaborating with colleagues in a way they felt was most useful. Mighty Networks is just one of many software tools that could be used for this purpose.
- Embedded researcher roles and careers could greatly benefit from mentorship opportunities with both public health leaders and academics involved with these interventions.

Principle 7: Embedded researcher interventions are challenging, but not impossible, to evaluate

- **Embedded researcher interventions are theorised to follow a staged model which includes a stage involving undertaking activities to become embedded;** evaluations need to understand the success of this stage to understand if/how further progress is achieved
- Measuring change through embedded researcher activities is challenging to quantify. For larger interventions, measures such as SEER (Seeking, Engaging with and Evaluating Research; (Brennan et al. 2017)), can provide some indication around changes in skills and attitudes (which correspond with stage 3). However, for many embedded researcher interventions, **gaining a more processual insight into which changes happen, and how, is likely to be more useful than quantitative metrics.** Approaches such as contribution analysis (Mayne 2019), used in this research to unpick the processes that PHLARPs put into place to create change (see Edwards et al forthcoming), or ripple effects mapping (Nobles et al. 2022), can help to capture the impact that embedded researcher have (or why they fail to create impact) within organisations more clearly.
- Future evaluations could also focus on some of the potential adverse impacts of embedded researcher interventions and how these could be mitigated.

Principle 8: Improve discoverability of embedded researcher evidence to improve understanding and inform practice.

The systematic map is a potential starting point for collating research in this area across different contexts and research fields. However, the map includes 108 different descriptors for the roles, activities or schemes that imply an embedded researcher, and our experience of developing search strategies and screening research literature in this area shows the research is challenging to identify. Author keywords and controlled vocabulary for database indexing could improve discoverability of research studies in

this area, as well as consistent adoption of terminology in general. A glossary, produced as part of this work and published alongside the systematic map may also provide a useful source for future researchers carrying out bibliographic searches. While the map shows an increasing trend of studies being published, it is likely that some evaluations of embedded researchers do not reach the public domain, as they may have been commissioned for a particular audience or undertaken by those who do not routinely make their studies available in the public domain or in academic literature. Furthermore, we expect that published evaluation studies of embedded researchers are likely to be more positive or contain clearer findings than those with indeterminant outcomes, based on generally recognised publishing biases. Triangulation through a variety of evaluation methods is important to mitigate bias of perspectives. An additional hurdle is that some ‘embedded researchers’ themselves may not self-identify as such, nor perceive it as an intervention to be reflected upon and evaluated. There appears to be a need to:

- Establish a core set of umbrella terms to describe embedded researcher roles and schemes.
- Promote dissemination of evaluations of embedded researchers to allow practice-sharing and wider scrutiny by stakeholders.
- Support embedded researchers and related roles to document and critically evaluate their work to a high standard.
- Facilitate an open-access portal containing embedded researcher evaluations, tools and other information.
- Encourage stakeholders involved with embedded researcher interventions to engage with relevant literature or tools that could support these roles.

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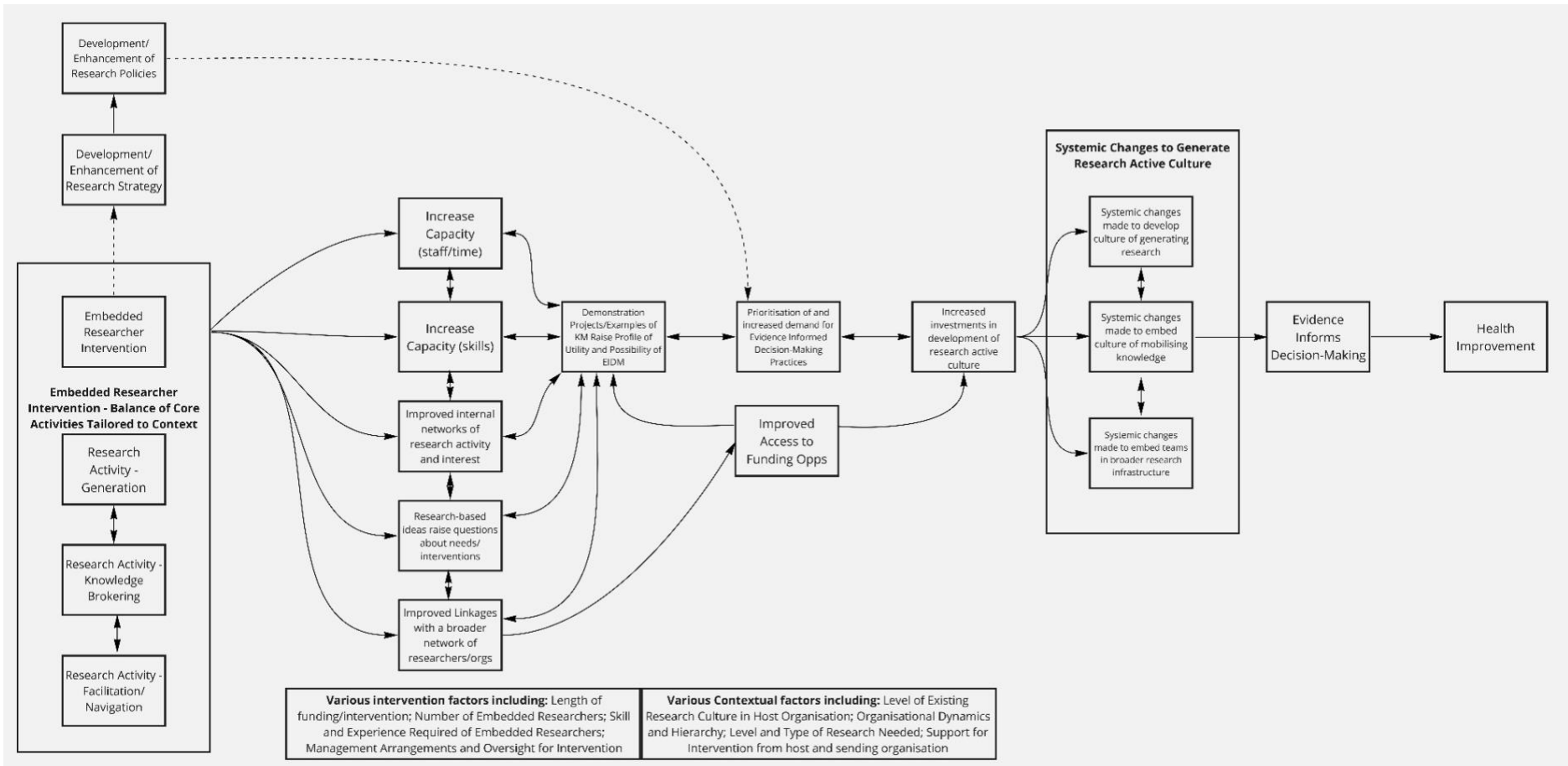
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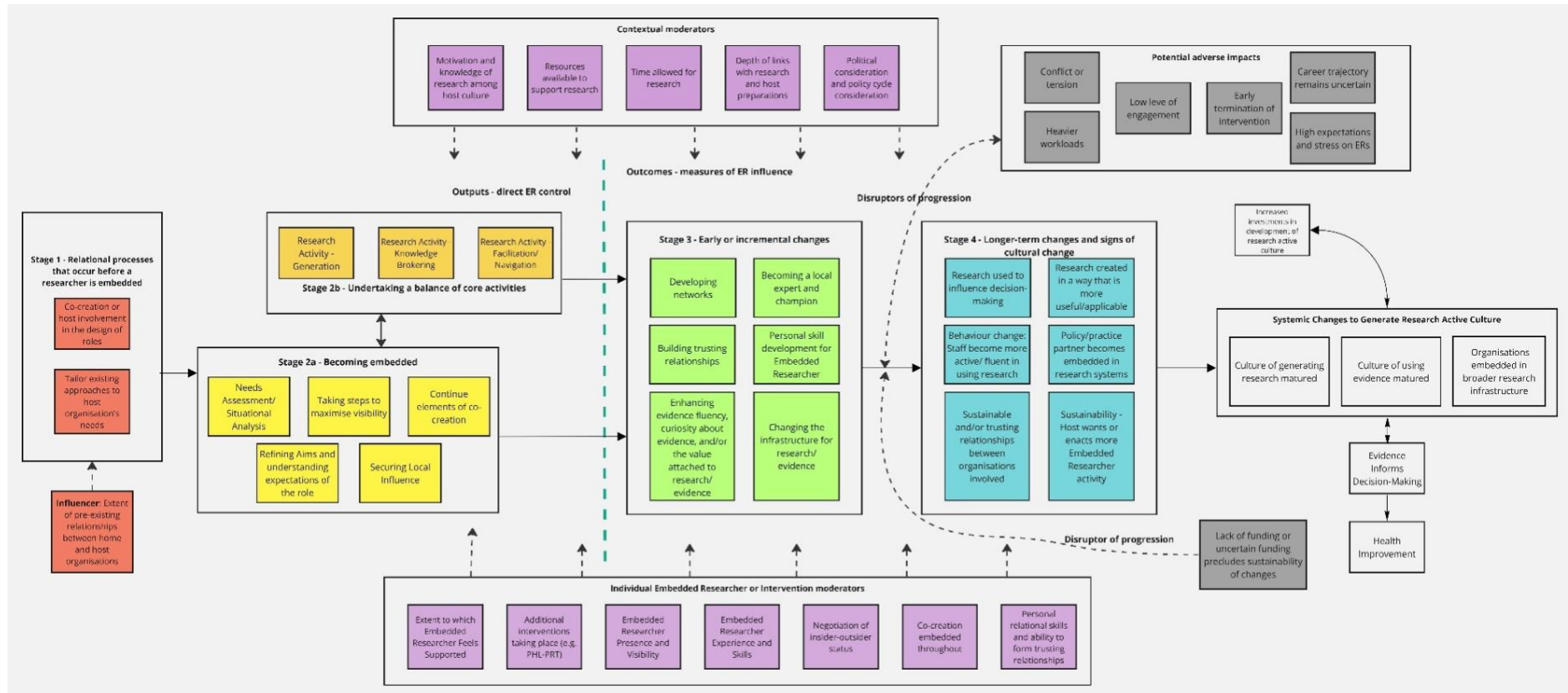
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Appendix 1 – Initial Logic Model



Appendix 2 – Revised Logic Model based on inputs from all components



The NIHR Policy Research Programme Reviews Facility puts the evidence into development and implementation of health policy through:

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