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Examining Research Systems and Models for Local Government: A Systematic Review

Abstract

Background: Local authorities (LA) are key in improving population health, and LA public health decision-makers need support from appropriately organised research capacity; however, few models of LA research systems are known to exist.

Aims and objectives: To explore potential and existing models of LA-based research systems.

Methods: This mapping review and time-constrained systematic review synthesises conceptual and empirical literature from 12 health and social science databases, grey literature and reference/citation tracking. Three reviewers screened titles, abstracts and full texts of retrieved records, and extracted key data from included papers. Evidence was synthesised based on characteristics of research systems and quality-assessed for relevance, rigour and richness.

Findings: Nine models were examined in-depth. From these, we developed a typology of research systems. Few models were specifically designed for LA research activity; as a Whole System approach, the Local Authority Champions of Research model offers a potential blueprint. Useful lessons may be learned from UK Collaborations for Leadership in Applied Health Research, Academic Collaborative Centres in the Netherlands, local Research and Development units in Sweden, and generic University-Community partnerships.

Discussion and Conclusions: An optimal research system requires the co-existence of multiple systems including Centre, Partnership, Collaboration, Network and Community types. The review is UK-focused, but the models appear to have wider relevance. Our classification offers those planning an LA research system the opportunity to choose an approach that meets their requirements and resources. A Whole System approach is optimal, with egalitarian input from the LA and academia.

Keywords:

Research capacity, local authorities, mapping review, university-community partnerships, research systems

1. Introduction

Increasingly, local government[1] is seeking to engage in collaborative research-led approaches to policymaking. Within England, members of the Local Government Association acknowledge an imperative for "evidence informed" decision-making, especially within traditional areas of influence such as education. At the same time, the transfer of responsibilities for public health from health authorities to local authorities (Kelly et al. 2017) has seen an injection of evidence-based models into the local decision-making arena (Armstrong et al. 2013) while acting as a catalyst for debate over what constitutes evidence and how it should be evaluated. Research activity demands infrastructure within and owned by local government, learning from and accelerating adoption of a culture of research that has been acquired over many years by the National Health Service (NHS). Increased political involvement in local public health decision-making has influenced evidence preferences in diverse ways (Kneale et al. 2019). This imperative for evidence-informed decision-making is mirrored in the other constituent countries of the United Kingdom (UK).

Evidence-based decision-making requires a supportive infrastructure, not simply for the transfer of knowledge from research into practice but also in generating locally-sensitive research findings. Fynn et al. (2021) remark upon the potential for improved collaborative partnership models and systems to support sustainable processes and practices for research and knowledge exchange at institutional and interorganizational levels. Cheetham and colleagues similarly advocate a system-wide approach to promote evidence use in local government to address public health priorities (Cheetham et al. 2019a).

In 2022 the UK National Institute for Health and Care Research signalled its commitment to enabling local government to become more research-active on a systematic and sustainable scale by commissioning the first in a series of Health Determinants Research Collaborations. The purpose of such collaborations is to enable local authorities to become more research-active, using evidence to inform their decision making by undertaking research and evaluation relating to their activities,

[1] By 'local government', we are referring to the administration of a particular local area, whereas we used the term 'local authority' to refer to an administrative body in local government.

including synthesising and mobilising local and research evidence. As these initiatives are recent, no synthesis and classification of local government research systems has been undertaken previously.

What should a local government research system look like? While no single model is likely to apply equally across different contexts, it is clear that the UK can learn much from published examples derived from high-income countries. Our research team, based at the School of Health and Related Research (ScHARR) at the University of Sheffield and previously experienced in synthesising lessons on research capacity development, was approached to contribute to a wider scoping project aimed at identifying a potential framework for a local government research system for Bradford, West Yorkshire. To fulfil our contribution, we were required to conduct a time-constrained review (14th September 2020 - 2nd October 2020) of existing models of local authority-based research systems including cost, capacity, skills and support required as documented in studies from high income countries. The project is identified by the title **Research Capacity at a Local government Level (REC@LL).** This review aims to map evidence on interventions and approaches that seek to enhance research capacity development in a local government context, with particular reference to the UK.

2. Methods

2.1 Review Design

A systematic mapping review methodology was used initially, to guide the review process and explore the breadth of the evidence base. Systematic mapping does not attempt to answer a specific question, but "collates, describes and catalogues [diverse] evidence relating to a topic or question of interest" (James et al 2016). A systematic mapping review starts by establishing the review team and gaining a clear picture of the information needs and purpose of the stakeholders in relation to the topic. Technical processes start with setting the scope and question and then setting inclusion criteria for studies; undertaking a preliminary scoping stage; protocol development; evidence retrieval; screening and selecting evidence; coding; production of a systematic map database; describing and visualising the findings; and producing the report and supporting information. Unlike with a systematic review, the team does not focus effort on assessing study quality. In this case evaluation

sought to test the relevance of different research capacity models to a UK local authority context. Once relevant models had been identified through the systematic mapping processes, we used focused systematic review methods to explore the models in-depth to form the main focus of this paper.

2.2 Identifying relevant studies

We conducted a systematic mapping review of the literature, drawing upon six general health and social science databases: PubMed (MEDLINE); EMBASE; PsycInfo; Scopus; Social Science Premium Collection and Social Sciences Citation Index. We also searched six UK-based databases or library catalogues with a focus on health and/or social care (Applied Social Sciences Index and Abstracts (ASSIA); Health Management Information Consortium; Health Services Management Centre Online (University of Birmingham); Health Management Online; King's Fund Library Database and Social Care Online (Social Care Institute of Excellence)). We also undertook Google and Google Scholar searching (the latter using Publish or Perish software), follow-up of references and citation tracking. Studies for the systematic review were drawn from 61 studies identified in the mapping review by applying additional focused inclusion criteria.

2.2.1 Search Strategy

We ensured a sensitive search strategy by using a comprehensive string of terms relating to local authority identifiers and of local government functions generated from an indicative list of local government functions on the Website of the Local Government Association, irrespective of territorial governance. Local government terms were then combined with terms relating to research functions; terms simply indicating research were omitted in order to retrieve papers relating to research infrastructure, not simply examples of research. No filters were applied for study design. Language limits (English only) and date limits (25 years from 1996 to 2020 inclusive) were applied. Table 1 summarises the overall search strategy. All searches were conducted by an experienced qualified information professional (AB).

<<Insert Table 1 here>>

2.2.2 *Inclusion and exclusion criteria*

Study selection was conducted using explicit inclusion and exclusion criteria (Table 2). Three experienced researchers conducted the study selection process, applying a two-stage sifting process of title and abstract followed by full text screening, with discrepancies being resolved through consensus. Included studies were published 1996-2020 and were focused on research systems with local government or local authority involvement. All included studies presented a model, framework or textual descriptive outline of a research system, either at a practical or conceptual level. Studies from Low- and Middle-Income countries were excluded as well as studies from High-Income countries considered to be of limited relevance to the UK (e.g., Japan, South Korea). For the systematic review, studies needed to include a model of a research system.

<<Insert Table 2 here>>

2.3 Quality Assessment

No appropriate evaluation criteria exist for the formal assessment of the quality of reports of research models or systems. The initial mapping review was characterised by its descriptive function and had not required quality assessment. For the subsequent focused systematic review, as a basis for structured reporting, evaluation and critical analysis, we assessed included studies according to relevance (to a UK setting), rigour (quality of evaluation) (Pawson et al. 2005) and richness (level of detail of individual models or initiatives) (Glenton et al. 2018). Categorisation is relative (to the available models) and, although consensual within the team, necessarily subjective. Rigour and relevance are typically prioritised in reviews such as realist syntheses (Pawson et al. 2005) whereas richness is commonly used to judge the quality of qualitative literature (e.g., CASP, GRADE-CERQual) (Glenton et al. 2018). Relevance (to the context of interest) is more difficult to judge, however, once decided, rigour and richness can be examined. This review focused on a UK context, by virtue of its purpose, which was to contribute to a wider scoping project aimed at identifying a potential framework for a local authority research system for Bradford, West Yorkshire. Thus, the 'relevance' criterion, and our judgement of it, was focused on this local context.

2.4 Study selection, extraction and analysis

Full texts for included studies were divided between the three reviewers. Following piloting on four candidate studies and charting using a purpose-specific Google Form each reviewer independently extracted data for their assigned studies. At this point individual reviewers made a final decision on inclusion/exclusion. Inclusion of each study was agreed by two of the review team, with queries referred to the methodologist for a definitive verdict where not otherwise possible. Data extracted from the Google form is available at: https://doi.org/10.15131/shef.data.23899131.v2.

Data was sought for the following variables Ref Id; Author (Year); Publication Type; Geographical Location (Region and Country); Collaborating Partners; whether the paper describes a Model or Framework; a brief textual description of the Model/Framework (with accompanying comments on Model/Framework); Described Local Government Functions; Core Activities; Subsystems; Principles; Comments on Article; Follow Up References; Type of Initiative (if identified); Name of Initiative (if not on specified list and identifiable). Following piloting, the data item 'a classification of research capacity principles' was omitted. The review team decided that the presence of core activities would provide a more reliable guide to the characteristics of each research system.

For models being evaluated within the systematic review, data was sought for the following variables: Research Model/Initiative; Partnership and governance structures; Geographical context; High-level aims and key objectives; Core Activities (Gee and Cooke 2018); Research Capacity Subsystems (Jo Cooke et al. 2006, J. Cooke et al. 2018); Research and implementation themes; Expected outputs/outcomes; Challenges; Lessons Learned; Model/Framework; Strengths and Weaknesses; Supporting References. This data extraction template was based on a template for UK Collaborations for Leadership in Applied Health Research (CLAHRC) descriptions and logic models from a report for the National Institute for Health Research (Soper et al. 2015). Data extracted in this way from the models is available at: https://doi.org/10.15131/shef.data.23899131.v2.

Studies were characterised as UK-based or Other Countries. Models of research systems were further assigned descriptors relating to whether they are considered instrumental (e.g., logic models), symbolic (e.g., conceptual models) or hybrid (combining both instrumental and symbolic elements). The descriptions of models were examined and characterised according to an emerging typology according to structural features and the relationship between the local government and academic partners. Within health care there is no specific reporting guideline for systematic maps and review teams typically follow the related guidance of PRISMA-Sc for scoping reviews (Tricco et al. 2018).

3. Results

From a total of 2,479 records identified through searching, after duplicates were removed, 2,510 were excluded at title and abstract screening and 329 full texts were examined (see Figure 1). The team inspected a higher proportion of full texts than is typical for time-constrained reviews to ascertain local government involvement and establish whether a model, framework or system description was present. Of the full text articles assessed for eligibility, 268 articles were excluded and 61 were judged eligible for inclusion and further data extraction. The main reasons for exclusion were "No Model described"; "No explicit Local authority/government involvement"; and "Low- and Middle Income or Excluded Countries". Brief characteristics of year, country, model type and topic area are presented in Supplementary Table 1.

Included papers described local government involvement from eight different countries (see Supplementary Table 1, available at: https://doi.org/10.15131/shef.data.23899131.v2). Twenty-one included papers examined the UK, 21 reported from the US, one from Canada, one from Australia, eight from Sweden, eight from the Netherlands and one each from Belgium and Israel (these numbers include one paper that covered both the US and Sweden). Three literature reviews were included.

Topics examined within included papers also varied. Nineteen papers reported generically on the local authority without narrowing the topic. Seventeen papers reported topics broadly pertaining to social work/social services, 16 reported topics relating to public health (including health promotion), two

reported on occupational therapy, and one paper reported on each of the following topics: civic engagement; conservation and development; education; housing; local planning; public involvement; social action; and social justice and education research.

<<Insert Figure 1 here>>

3.1 Models of research reported in the literature

The 61 included papers were examined to identify those that reported models of research systems. Thirty-seven papers were retained for further analysis (12 of these were variants of university-community partnerships) (see Supplementary Table 2, available at: https://doi.org/10.15131/shef.data.23899131.v2). We classified systems within six different types, as described below. We also examined the type of research relationship described within each of the reports. Despite our initial intention, we were unable to find information on cost in any of the literature relating to models of research systems.

3.1.1 Models of local government involvement

From the final list of 37 included studies listed in Supplementary Table 2, nine models of research with local government involvement were selected for in-depth analysis. The nine models were selected to optimise our three quality considerations of rigour, richness and relevance (see Section 2.3 and Table 3).

<<Insert Table 3 here>>

The nine models of research systems with local government involvement which were selected are listed in Table 4 below, and an overview of each is provided.

<<Insert Table 4 here>>

These nine models are all instrumental models of direct relevance to UK local government. Instrumental models offer a practical working model as a pragmatic template for similar contexts (Amara et al. 2004, J. Cooke et al. 2018, South and Lorenc 2020). They contrast with symbolic or conceptual models where applicability is applied at a higher level of abstraction through what is done, rather than specifically how it is done. The academic literature tends to favour conceptual/symbolic models because of their greater applicability. One instrumental model draws upon recent local authority interview data and was therefore singled out as *highly* relevant to our research question. This model was the Local Authority Champions of Research (LACoR) Logic Model (Cheetham et al. 2019b) as explored in section 3.2.

3.2 Local Authority Champions of Research (LACoR) Logic Model

The most useful example of an instrumental model with particular relevance to a UK context was the LACoR Logic Model (Cheetham et al. 2019b). The LACoR model was produced following a literature review and stakeholder interviews and focus groups. The model is contemporary (the report was published in late 2019), and has an instrumental rather than a conceptual focus. The aim of the LACoR study, funded by the Health Foundation, was to explore how a culture of research and the use of evidence to improve population health could be embedded in local government. A report sets out findings from five work packages undertaken from January to October 2019, with implications for local government, academia and research funders (Cheetham et al. 2019b). In addition to the logic model (see Figure 2) the report also seeks to visually depict systems thinking. The LACoR model is explained in Box 1.

<<Insert Figure 2 here>>

<<Insert Box 1 here>>

3.3 Classification of research systems used in models

In addition to identifying models of research systems across the included studies, we identified overarching types of research systems, exemplified across the models. Multiple systems can co-operate within research models, or models may be based on a single research system.

3.3.1 Types of research systems

The six types of research systems, as exemplified across the 37 included studies that report models of research, are:

1. **The Centre-based system** – typically hosted by a University/academic department with local government partners/stakeholders (Guest et al, 2018; Hoeijmakers et al, 2013; Jansen et al, 2012, 2015; Martinez et al, 2013; Molleman & Fransen, 2012; Steens et al, 2018; van Koperen et al, 2014; Wehrens, 2014; Wehrens et al, 2010, 2012; Winokur et al, 2009) [3 examples, 13 papers].

2. **The Partnership-based system** – a bi-lateral accord between major academic and local government partner(s) perhaps with other local organisations (e.g. industry, voluntary sector, public and resident groups). The academic partner is typically presented first (Adamuti-Trache & Hyle 2015; Bowers, 2017; Buys & Bursnall, 2007; Clapton & Daly, 2015; Clark & Sinclair, 2008; Doe & Lowery, 2013; Drabble et al, 2013; Hart & Northmore, 2011; Hope, 2016; Jagannathan et al, 2011; Kaufman et al, 2017; Kelly & Lloyd-Williams, 2013; McCall et al, 2019; McEwen et al, 2018; Miao at al, 2011; Miller et al, 2012; Nocon & Nilsson, 2009; Strier, 2014; Suarez-Balcazar et al, 2004, 2005, 2017) [19 examples, 21 papers].

3. **The Collaborative-based system** – a federation of organisations that make long-standing commitment to undertake joint working on diverse problems and issues as they arise, mobilising expertise and resources as required (Alexanderson et al, 2009; Austin et al, 1999; Berg-Weger et al, 2013; Börjeson & Johansson, 2014; Carmichael et al; 2013; Leeman et al,

2015; Mawson, 2015, 2019; Nyström et al, 2015, 2018a, 2018b, 2020; Percy-Smith et al, 2002; Rämgård et al, 2017; Sanderson et al, 2001; Ward et al, 2020; Wilkinson et al, 2012) [11 examples, 17 papers]

4. **The Network-based system** – topic-, discipline- or problem-based grouping of local or regional organisations with shared interest (Allen et al, 2015; Cooke, 2002; Curtis et al, 2018; Flora et al, 2000; Mazzucca et al, 2020; McNeish et al, 2012; Power et al, 2009; Wilson & Lilly, 2016) [8 examples; 8 papers].

5. **The Community of Practice based system** – a looser, more democratic grouping of organisations with shared interests that draws on interested parties as required and available (Euerby & Burns, 2012) [One example, one paper].

6. **The Whole System approach** – a whole system, where the taxonomic distinctions above are less important, and the interconnectedness in itself represents an important feature of the research system (Cheetham et al., 2018; 2019) [One example, two papers].

These different types of systems operate under different assumptions relating to the power and governance structures within the system, the degree of location/co-location, physical presence and ownership of each system and the respective roles of academia and local government. Within the first five variants, further variation relates to whether the system type relates to a specific programme of work, work within a particular sector or discipline or generically to all local government activities. The above systems can co-exist – for example, where an overall collaboration is underpinned by key themes that are operationalised as networks (e.g., CLAHRC priority areas) or where time-limited communities of practice spring up within a wider centre, network or collaboration. Similarly, evolutionary development can take place, as when a Centre evolves more multi-partner interests and becomes a hub for a wider collaboration. Finally, systems can be research-specific or, particularly as in the case of university-community partnerships, can relate to a spectrum of activities – for example, research, teaching and service learning.

The Whole System framework can be considered conceptually different from the prior five types of research system, as this functions as a complete research system, where some of the above taxonomic distinctions become less important. In such cases, working across localities, disciplines or functions recognises that the interconnectedness in itself represents an important feature of the research system that defies being pigeon-holed. Thus, the Whole System approach represents the most appropriate response to the complex systems characteristics of local government systems and of research systems, compounded when both are combined, due to its completeness in functioning as a research system.

3.3.2 Types of research relationship

As alluded to earlier, the Whole systems framework is seen as the most appropriate type of research system in this context. When viewing the systems as a whole, and the potential power dynamics captured in the assumptions underpinning each system, we found it helpful to invoke an existing classification of three types of research partnership (Sibbald et al. 2014). First, the relationship with a local authority may be **researcher-dominant**, alternatively labelled, the **token** partnership. A second type of relationship is the **asymmetric partnership**. We found that some of the university-community partnership examples did not realise the implied equality of their label. This was also an issue in the analyses of the Academic Collaborating Centres and the Knowledge Transfer Partnerships. Finally, comes the **egalitarian partnership**, embodied in the consultation for the LACoR report (Cheetham et al. 2019b), where the two cultures of university and local government are recognised with the associated need to acknowledge the cultures, organisational constraints and drivers of both parties.

Few of the featured case studies were authored by local government staff and even where they were involved their contribution was a supporting role. The overall narrative that emerges from the Models review is therefore not one that represents egalitarian partnerships. As mentioned above, the exception to this is the LACoR logic model (Cheetham et al. 2019b), which is an example of a Whole System framework and, correspondingly, a more egalitarian partnership between university and local authority. In addition, our review focused on the UK context/setting, and the LACoR logic model thus

has high relevance to that setting. Therefore, this model is described in further detail, to exemplify this optimal type of research system and partnership.

4. Discussion

Our systematic mapping review of existing models of local authority-based research systems in high income countries has identified nine models of research with local government involvement and six types of research system. The Whole System approach represents the most appropriate response to the complex systems characteristics of both local government and research systems, and thus can circumvent the limitations of each of the individual system approaches.

Recent years have witnessed increasing interest in applying a complexity lens and systems thinking to public health systems (Rutter et al. 2017). Not only do whole system approaches play an important role in tackling health inequalities in connection with issues such as obesity (Bagnall et al. 2019, Stansfield et al. 2020) but they also extend to research system characteristics such as stakeholder engagement, co-production and empowerment (Taft and Bandyopadhyay 2011). A whole system approach is defined as 'responding to complexity' through a 'dynamic way of working', bringing stakeholders, including communities, together to develop 'a shared understanding of the challenge' and integrate action to bring about sustainable, long-term systems change' (p.17) (Buck et al. 2018). Complex system thinking in research systems can help in understanding the interaction and interdependence of research elements, going beyond simplistic conceptions in terms of input, processes, activities and outputs to a responsive system that can adapt to meet new challenges and imperatives.

Few of the models reviewed here were authored by local government staff and, in the main, their involvement in the research was supporting - either with the **academic researcher(s) singularly dominant** or where an **asymmetric partnership was described** (Sibbald et al. 2014). Even some "university-community partnerships" did not reflect the parity implied by their label. Unequal relationships were also apparent in the analyses of the ACCs and the Knowledge Transfer

Partnerships. In contrast the LACoR model proposed an **egalitarian partnership** (Cheetham et al. 2019b), where the two cultures of university and local government are recognised together with an associated need to acknowledge the cultures, organisational constraints and drivers of both parties.

Potential ways for local government to better inform practice and decision making within an egalitarian partnership include the embedded researcher (ER). Evidence suggests (Homer et al. 2022) that the ER model can bridge divides between institutions and help with both the development of research relationships to support research capacity and the development of local authority staff. Other responses are to recruit researchers from academic backgrounds to work directly for the local authority, thus supplying a workforce with appropriate research skills in methodology, analysis and evaluation (McGee et al. 2022).

A particular strength of the nine featured models was that they all represent instrumental models of potential relevance to UK local authorities. Instrumental models offer a practical working model as a pragmatic template for similar contexts (Amara et al. 2004, J. Cooke et al. 2018, South and Lorenc 2020). Several papers described models within a specific context, addressing issues pertaining to social work/social services, public health topics (including health promotion), occupational therapy, civic engagement; conservation and development; education; housing; local planning; public involvement; social action; and social justice and education research. Localising and tailoring research evidence within specific public health decision making contexts (Van Der Graaf 2018) may therefore indicate some utility in translating models used in response to specific questions to similar questions in other local authorities.

4.1 Strengths and limitations of the review

A key strength of this review is the broad approach initially taken, which enabled a mapping and classification of research systems. This broad approach allows others (e.g. policymakers) who are planning to develop a research system to consider the merits of each type of system, and select a system that most closely matches their aims and available resources. We engaged with diverse literature, searched broadly across multidisciplinary databases, processed a large number of articles,

and reached saturation through cross-referencing of included articles, so we are confident that we have identified a comprehensive set of included studies. Search strategies were based on previous similar projects and were conducted by an information specialist with topic expertise. Incorporating grey literature into the searches made the review comprehensive. This approach also allowed us to identify additional unpublished literature, which may be more likely to contain instrumental models, for instance, the LACoR model (Cheetham et al. 2019b). The use of mapping methods enabled us to make decisions about typologies and aided the selection of cases. We drew upon pre-existing frameworks (Jo Cooke et al. 2006, Gee and Cooke 2018) as a structure for our synthesis and to allow us to make connections between our review and previous research literature on the topic, to ensure a coherent contribution to the field. Our review is UK-focused, but the models appear to have wider relevance, given that they typically demonstrate generic structures and features.

As mentioned above, the specific context for the commissioning of this review may limit its applicability to other contexts. However, we believe that this review offers a starting point to inform further work to identify relevant models for other contexts, for instance, in other countries. Nationally, we have already seen our report being used by at least one NIHR Health Determinants Research Collaboration when planning its organisation and activities. A further limitation is the challenge of finding, interpreting and classifying models and systems of research within or relating to local government. Compared with a proliferation of models within health services, for example, accounts are much more sparse.

Much of the information on research systems within the literature is represented graphically, which presents a challenge to interpretation and synthesis. Central to the successful delivery of our review was time taken in agreeing a consensus within the team on how to recognise what exactly a research system is, and how it is defined. Additional limitations include our decision to limit the review to English language and the intensely short timescale within which we completed the work. Some may question our inclusive approach to ‘rigour’ when making decisions about inclusion. However, we believe it is difficult to argue that the value of each conceptual model correlates to the rigour of the

study/studies that examine it. Indeed, Pawson et al. (2005) argue that synthesis requires that different primary studies contribute different understandings to an overall picture; thus, including all studies regardless of rigour can enhance rather than reduce the validity and generalisability of findings.

4.2 Limitations of the evidence base

This review was methodologically challenging to conduct, due to the abstract nature of the concepts involved and our broad definition of a 'research system', in the absence of a standardised definition in the literature. We examined the articles retrieved and made decisions about whether or not each article reported a 'research system'. The criteria of rigour, relevance and richness used to appraise the models reported in the literature, drew upon concepts developed within other synthesis contexts (Pawson et al. 2005; Glenton et al. 2018; Dada et al. 2023). The 'relevance' criterion was tailored to a specific local context, reflecting the purpose of this sub-project, namely, to contribute to a wider scoping project aimed at identifying a potential framework for a local authority research system for Bradford, West Yorkshire. A lack of reporting detail made it challenging to judge rigour, particularly where models are reported in journal articles (e.g., rather than in more extensive grey literature reports), driven by the word limits and need for conciseness inherent in this type of publication.

As discussed above, the academic literature favours conceptual/symbolic models for their greater potential applicability, therefore the evidence base for instrumental models tends to be more limited. Lcal authority research is poorly funded in comparison with a national emphasis on healthcare research. Work on further improving funding is required to fortify the prospects for public health, local authority and community research (West et al. 2022).

4.3 Implications for research and practice

We have identified the potential for further research that explores and synthesises research systems for different, and potentially diverse, contexts to augment the current body of evidence. Likewise, future primary research could usefully describe and evaluate local government research systems through a more co-productive and egalitarian lens. Data from the LACoR report (Cheetham et al.

2019b) amplifies the local authority "voice" but the prevailing meta-narrative remains dominated by the academic perspective of research systems. Definitions of 'research systems' in local authorities could also be elucidated, as the lack of a definition proved an initial challenge when reviewing the evidence from this field.

We believe that our classification of nine models of research with local government involvement and six types of research system, carries implications for policy and practice in enabling those seeking to implement a local goverment research system to select an approach to meet their requirements and resources. The current review highlighted the importance of a Whole System approach, with egalitarian input from local authorities and academia. By surfacing prevalent inequalities in this way, local authorities may feel more empowered to articulate their preferred role within the relationship, and, in turn, academic partners may recognise the importance of a more egalitarian partnership. Where evolution to a Whole System approach is not imminently possible, for instance, due to resource constraints, our classification provides an informed choice of options based on the needs, aims and current state of development of the parties involved.

4.4 Evidence of impact

As mentioned in the Introduction, this review was conducted to inform the development of a local authority research system. On the basis of our classification, a subsequent report (Wright et al. 2021) recommends a local authority research system model that conforms to the LACoR logic model (with documented specific details relating to inputs, activities, outputs and impact) (Cheetham et al. 2019b), while allowing for some adaptation to a local context, to incorporate existing structures, networks and activities.

5. Conclusion

Overall, findings from this review outline that many models of research systems exist, yet few are specifically designed for the requirements of local government research activity. Whole systems approaches to local government research systems (as explored in the LACoR review (Cheetham et al.

2019b) seem to offer a realistic response to the complex requirements of local government and research systems.

Such a whole system approach may be built up from the simultaneous co-existence of multiple types of contributing research systems including Centre, Partnership, Collaboration, Network and Community types. More evidence is needed on whether such a whole system approach should relate exclusively to a *research* system or whether more powerful synergies might be achieved by synergistically factoring in approaches related to teaching and service learning.

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* Indicates Included Study

Research Ethics Statement

The author(s) of this paper has/have declared that research ethics approval was not required since the paper does not present or draw directly on data/findings from empirical research.

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AB conducted the database, citation and grey literature searching. All authors conducted study selection, reference handsearching, data extraction, synthesis and drafted and revised the manuscript.

Conflict of Interest Statement

The authors declare that there is no conflict of interest.

Data Availability Statement

Data extracted from the publications included in the current study are available at: https://doi.org/10.15131/shef.data.23899131.v2.

Figure Legends

Figure 1: PRISMA flow diagram (Shamseer et al 2015)

Figure 2: Logic model of the LACoR (adapted from Cheetham et al(Cheetham et al 2019))

Figure 1: PRISMA flow diagram (Shamseer et al 2015)

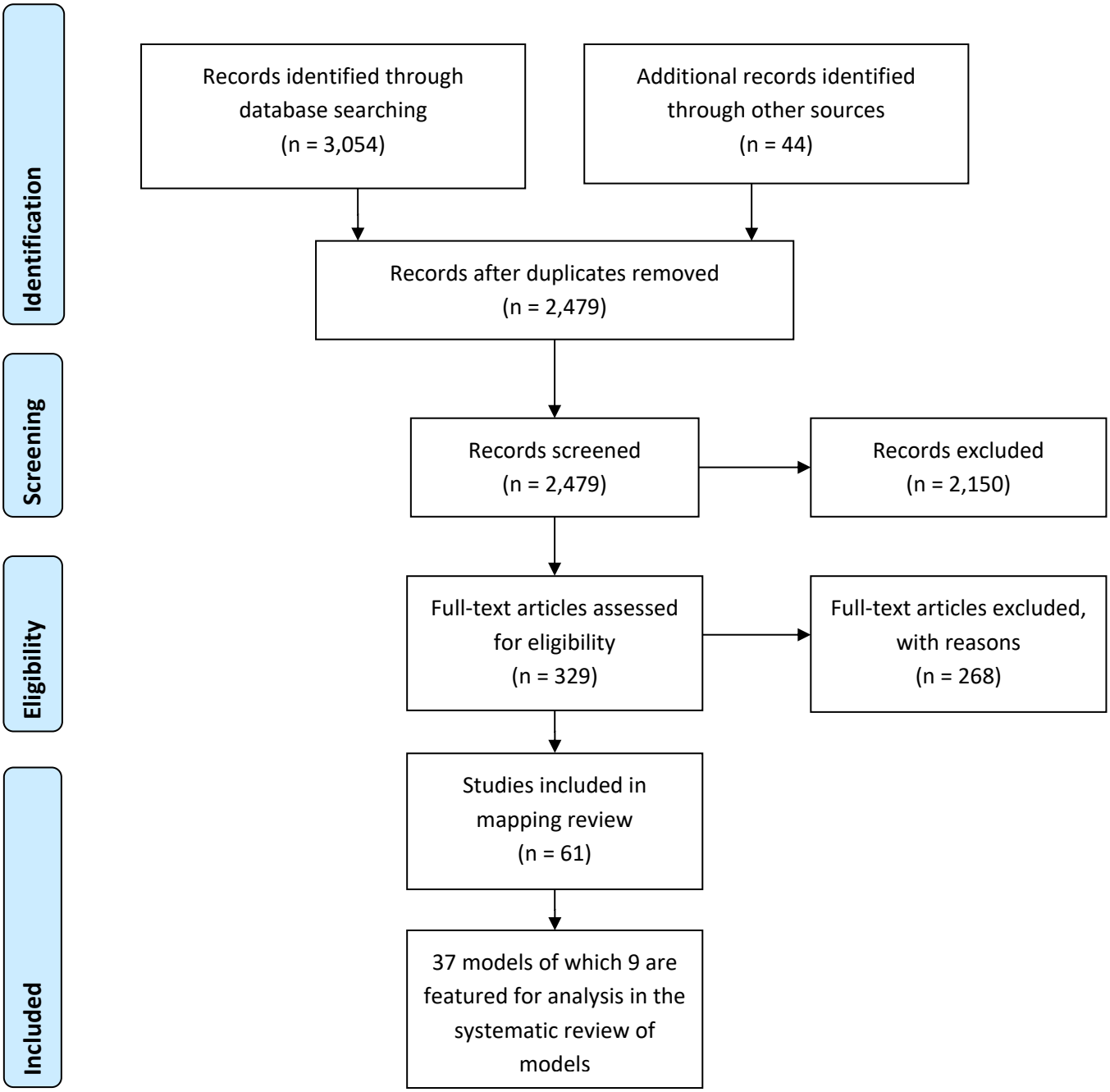

Figure 2: Logic model of the LACoR (adapted from Cheetham et al(Cheetham et al 2019))

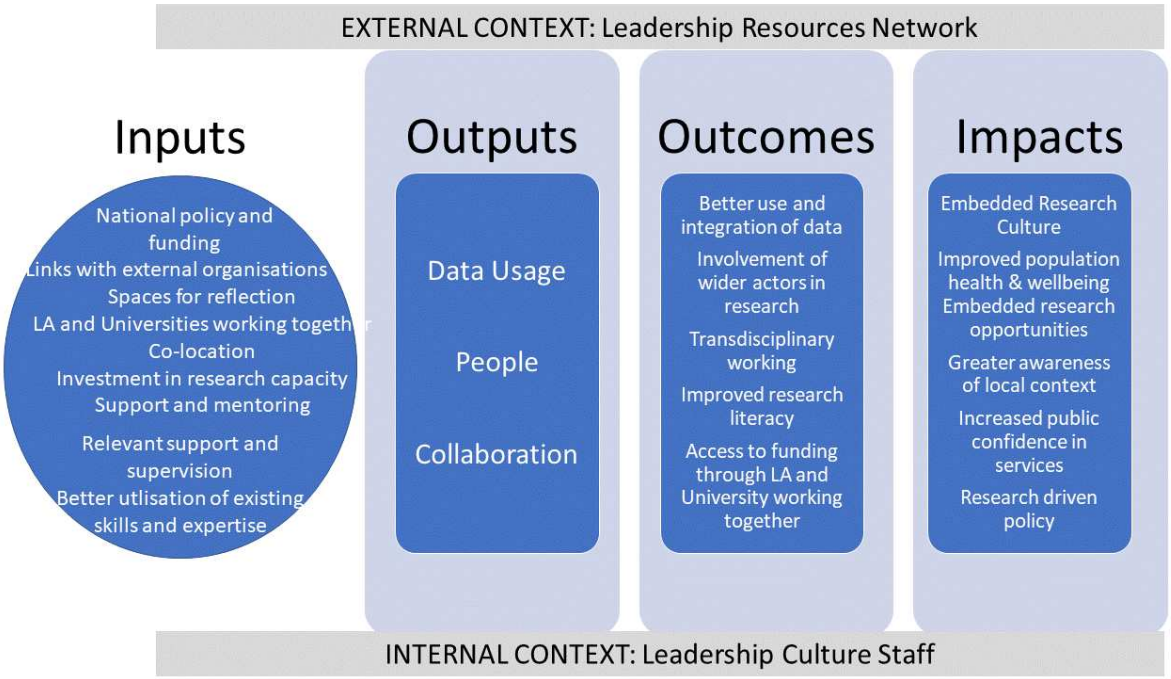

Table 1: Search Strategy

Context	"r&d unit".mp. OR "university-municipal collaboration*".mp. OR "university community partnership*".mp. OR "Academic Collaborative Centre*".mp. OR ((research adj1 development) or R&D or research capacity or research unit or research units or research governance or community based research or research collaboration or research OR strategy or research policy).mp.
AND	
Setting	(Local authority or local authorities or local government or local governments or local governance or local council or local councillor or local councillors or local councils or locally based).mp. OR (elected members or municipal or district council or district councils or district councillors or district councillor or county council or county councils or county councillors or county councillor or borough council or borough councils or borough councillors or borough councillor or town hall or town halls or civic health or municipalities or municipality or metropolitan).mp. OR (((social services or social work or children) adj1 families) or family services or Children services or childrens services or social care or public services).mp. OR (((Education or transport or planning or fire) and public safety) or libraries or waste management or trading standards or refuse collection or recycling or Council Tax or housing or planning applications).mp.
AND	
Language and Date	limit to (english language and yr="1996 - 2020")
Databases	Six general health and social science databases: PubMed (MEDLINE); EMBASE; PsycInfo; Scopus; Social Science Premium Collection and Social Sciences Citation Index plus six UK based databases or library catalogues with a focus on health and/or social care (Applied Social Sciences Index and Abstracts (ASSIA); Health Management Information Consortium; Health Services Management Centre Online (University of Birmingham); Health Management Online; King's Fund Library Database and Social Care Online (Social Care Institute of Excellence)).
Timeframe	14th September 2020 - 16th September 2020
Field	Keywords in title, abstract and other fields and subject terms in indexing.

Note: Search strategy: PICoS search terms and parameters.

Table 2: Inclusion and exclusion criteria

Exclusion criteria	
Sources	Books; book chapters; conference proceedings
Language	Papers published in languages other than English
Timeframe	Papers published before 1996
Geographical location	Papers from Low- and Middle-Income Countries
Types of studies	Secondary research; Systematic reviews
Inclusion criteria	
Sources	Primary research; published in peer-reviewed journals or in grey literature
Language	English language papers or English language abstracts only
Timeframe	Publication dates: 1996-2020. In the absence of an agreed landmark, an arbitrary period of 20 full years plus January-September 2020 was determined.
Geographical location	UK and Ireland, Europe (High Income Countries only), Australia and New Zealand, Canada and USA
Types of studies	Empirical research; conceptual papers; Case studies
Types of settings	Local government; Academic organization or network.

Note: Inclusion and exclusion criteria for search strategy.

Table 3: Characteristics of rigour, richness and relevance for the nine included models

Model	Rigour	Richness	Relevance
1. Local Authority Champions of Research (LACoR) Logic Model(Cheetham et al 2019)	✓✓	✓✓	✓✓✓
2. Local Government Knowledge Navigator(Allen et al 2015, Wilson and Lilly 2016)	✓	✓✓	✓✓✓
3. Knowledge Transfer Partnership	✓	✓	✓✓
4. University-Local Government Research Collaboration	✓	✓✓	✓✓
5. Academic Collaborative Centres	✓✓	✓✓✓	✓✓
6. Locally based research and development (R&D) unit	✓✓	✓✓	✓✓
7. Systems-focused research collaboration	✓	✓	✓✓
8. Communities of Practice	✓	✓✓	✓
9. University-Community Partnership	✓	✓✓✓	✓

Table 4: Overview of the models

Name of the Model (country)	System Type	Key Aims and functions.
1. Local Authority Champions of Research (LACoR) (UK) (Cheetham et al 2019)	Whole System	To develop a proof of concept to embed research and evidence use in local government. Researcher embedded within local government. Identified the components, developments needed, challenges and facilitators to support choosing, using and producing research in a local government context.
2. Local Government Knowledge Navigator (UK) (Allen et al 2015, Wilson and Lilly 2016)	Network-based	To build research and development capacity in local government. Partnership between academia and local government. Focused on shared interest areas with two-way conversations supporting choosing and using of research, research also produced by academic partners but shaped by local government.
3. Knowledge Transfer Partnership (UK)	Partnership-based	To develop a culture of evidence informed practice in local government. Partnership between academia and local government. Focused primarily on understanding local government research needs and academia finding and making available relevant evidence which is then used to inform practice.
4. University-Local Government Research Collaboration (UK)	Collaborative-based	To act as a brokering service between academia and local government. Partnership between academia and local government. Focussed on using research to support the needs of the local system with the research agenda and production of academic partners set by local government to address system needs.
5. Academic Collaborative Centres	Centre-based	To improve knowledge transfer and exchange between academia and local government for mutual benefit. Jointly appointed staff (by academia and local government) embedded across both organisations. Focussed primarily on choosing and using research, elements of producing research also exist though tendency for this to be undertaken by academia in partnerships with local government.

Name of the Model (country)	System Type	Key Aims and functions.
6. Locally based research and development units	Collaborative-based	To produce high quality research and build some elements of research capacity within local government staff. Co-funded (by academia and local government) units which sit outside of both organisations. Focussed primarily on producing research (e.g. local evaluations).
7. System-focussed research collaboration	Collaborative-based	To facilitate interaction of stakeholders with different perspectives and world views for a particular topic/area of interest. Partnership including range of stakeholders including researchers and local government. Focussed on shared interest areas with practitioners and researchers sitting alongside each other, supporting choosing and using of research, research also produced by academic partners but shaped by local government.
8. Communities of practice	Community of Practice	To facilitate interaction of stakeholders with different perspectives and world views for a particular topic/area of interest operating with a degree of independence.
9. University-Community Partnerships	Partnership-based	To increase civic engagement. Partnership including a range of stakeholders with a strong community focus and including researchers and local government. Focused on place-based production of research.