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The Four Paradoxes That Stop Practitioners from Using Research to Change Professional Practice and How to Overcome Them

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Abstract: This study addresses the puzzle that despite significant policy efforts, research-use in practice remains rare in education even when practitioners are keen. Healthcare has encountered similar problems, and we know little about the nature of the challenges that stop practitioners from developing new research-informed practices. The literature on cross-sector research utilisation, professional learning and practice change all highlight the role of practitioner agency, collaboration and sociocultural norms in research-use, but we lack theoretical insights into how these play out in practitioners' research-use. Moreover, the risks involved are rarely addressed. This study contributes to developing intermediate theory about the mechanisms influencing practitioners' success at using research to develop new practices in education and healthcare. It develops a novel methodological approach, utilising the dialogic difference-within-similarity method, to enable the analysis and synthesis of findings from five close-to-practice studies of research-use in education and healthcare settings in order to generate conceptual insights into the mechanisms at play when practitioners use research to change practice. It finds that four key mechanisms function in a paradoxical manner to hinder research-use, theorising these as the paradoxes of agency, people, norms and risk. I conclude by proposing a conceptual model for overcoming these paradoxes to facilitate research-use at scale.

Keywords: evidence-based education; evidence-based healthcare; research-use; professional learning; medical education; transformative agency; cultural–historical activity theory; dialogic theory; difference-within-similarity method; sustainability

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1. Introduction

Researchers and policy-makers alike now see using research as critical to improving practice across public services [1,2]. In policy discourses across the US and the UK, utilising research findings to develop effective new practices counts as one of the key expected solutions for addressing 'wicked problems' in education, such as attainment gaps [3–5], and significant policy efforts have gone into applying research to practice. Bodies such as What Works Clearinghouse (WWC) in the US and the Education Endowment Foundation (EEF) as the designated What Works Centre for education in England have promoted the development and synthesis of evidence around educational practice, primarily through the use of randomised control trials [3,6,7], and advocated for practitioners to use that evidence to improve their practice and student outcomes [8,9]. More recently, other countries, such as Germany [10] and Scandinavian countries [11], have adopted educational research clearinghouse-type evidence syntheses.

In healthcare, where evidence-based approaches originated to develop effective and safe clinical treatments, research-informed professional learning interventions to develop frontline practitioners' non-clinical skills (such as leadership and communication) are now also seen as key in policy discussions on addressing healthcare's wicked problems, such as sustainability [12]. A wealth of evidence reviews have recently been undertaken to develop an evidence base for professional learning interventions (PLIs) to support continuous improvement [13–16].

However, in practice research-use remains rare. Evidence shows that most schools do not engage in highly research-informed practice [17–19], and we know little about how practitioners can use research [1,20–23]. In particular, we lack theoretical insights into the nature of the challenges that stop practitioners from developing research-informed practices [20,24,25]. Despite a strong history of evidence-based medicine, healthcare has encountered similar translational problems, with research-informed insights failing to inform frontline practice change, particularly regarding non-clinical aspects of doctors' work [12,26,27]. This study is motivated by my observation from years of research on research-informed professional learning interventions across education and healthcare that, in both these fields, problems related to the implementation and development of new research-informed practices persist even when practitioners are willing and relevant, accessible research is available. This puzzle is the focus of this paper: I am interested in how practitioners can use research to improve practice, and what stops them from doing so.

Researchers and (UK) policy-makers are increasingly recognising that traditional linear models of research-use in practice do not accurately reflect the complexities involved [2,28–32]: attempts to impact practice through research have at times relied on oversimplified views of how research influences practice, assuming research-informed practices can be easily implemented by practitioners, leading to improved outcomes. Contrary to the original intentions of research-use to question and improve existing practice, linear models have been associated with adherence to 'to do' guidelines [2,27,29]. The development of practice is hereby channelled into tightly structured research-based packages to be adopted by practitioners [27,31,33,34]. These authors point out that while these efforts are worthy, such approaches usually do not 'work' in changing practice. I highlight possible key reasons for this.

Using research requires professional learning.

Scholars reviewing research on research-use across sectors highlight that using research is not merely bringing new information to bear on professional practice but is an active professional *learning* process [1,2,27,35]. However, the linear model of research-use is not in line with the literature on how professionals learn [2]. I suggest that professional learning literature may help to better understanding how practitioners can (learn to) use research to develop their practice.

Using research involves changing practice.

Additionally, using research inevitably involves changing practice in ways that are not fully predetermined by the research itself. Rather than 'applying' or 'adopting' ready-formulated and ready-packaged actions, using research to improve practice involves developing new practices [27,32]. Scholars studying research-use across sectors have called for the use of theory on how professional practice can be changed [20,27]. I engage research informed by sociocultural and cultural–historical practice-based theory on practice change in professional settings [36,37], which can help better understand the change mechanisms involved in research-use (cf., [25,29]).

Using research is challenging across professional sectors and cross-sector insights are beneficial.

Authors of evidence reviews on research-use across the public sector have called for more cross-sector (cross-profession) research, arguing that to better understand the 'wicked problem' of why research is not being used in practice requires learning from multiple professional fields [1,2,25,34,38–41]. In this literature review, I lastly draw on high-quality research on research-use from across multiple sectors.

Literature Review

Meta-reviews of research-use in practice have identified that many evidence reviews tend to present 'lists' of individual features suggested to facilitate/hinder research-use, rather than theoretical understandings of how professionals can use research [26,42–44]. These syntheses have found that features like 'collaboration' sometime are, and sometimes are not, effective. I suggest that such features are rather like 'houses': broad types of activities which may or may not contain the kinds of engagement with research, colleagues

and practice that fosters professional learning and research-use (cf., [25,45]). Along with these authors, I argue that we need to move past broad concepts of practitioner learning, and study in more detailed and precise ways the nature of the work practitioners are engaged in when engaging with research-based change efforts, to understand how research is used and how such processes can be supported [25,43].

We therefore need to focus on the processes and mechanisms by which practitioners can engage in research-use to change their practice. If we want research to be useful to changing practice, we need theory to understand how practice does or does not change to understand how research-based change could be facilitated [46]. In this paper, I develop intermediate theory about the mechanisms influencing practitioners' success at generating and implementing new research-informed practices following professional learning.

So, what do these studies tell us about the mechanisms that might impact whether and how practitioners use research to change their practice? In what follows, I outline and discuss three dimensions which I consistently identified in these studies as playing a key role in research-use. Moreover, I want to highlight a fourth dimension which I will argue is implicit in these dimensions but has received too little attention in all these fields.

Research-use requires practitioners' agency and openness in interpreting and changing their practice

Scholars across sectors have highlighted that research-use is not about applying generalisable/universal 'to do' packages; it is a complex activity in which practitioners need to adapt research-based interventions to their local practices [2,26,29,31,32,41,47]. Practitioners' interpretation of their practice and its needs is hereby central to research-use. Ruthven [48], theorising research-use in schools, argued that teachers' change efforts are motivated by the problems of practice they perceive in their work, which was supported by Edwards' [37] work across education, healthcare and social work. Kennedy's [43] seminal review highlighted that professional learning programmes focused on teachers interpreting events and responsively adapting teaching interventions to their circumstances were more effective than prescribing specific teaching moves based on research. Similarly, meta-analyses of research on teacher coaching [45] and evidence-use in clinical settings [26] showed that tailoring research-based interventions to local practice is required for effecting change.

This highlights a key feature of research-use in practice. In this interpretation process, research is perceived not so much as an instruction for how to act but rather a tool to 'think with' [41,49]. Practitioners using research, hence, "need to be understood as active agents rather than passive recipients" [1]. The results of such a process are not fully predetermined; agentic research-use involves what Engeström [36] calls 'learning what is not yet there'. Rickinson et al. [1] found that open mindsets, tolerating uncertainty and ambiguity are important for research-use; similarly, Lau et al.'s [26] meta-review found dealing with uncertainty salient for successful research-use in clinical practice. However, research on teacher learning in school reform contexts has consistently found that practitioners' decision-making is geared towards avoiding uncertainty and ambiguity, preferring quick solutions and closed conceptualisations of learners and practice. This has been shown to limit their ability to see their practice as changeable, and themselves as agentic, in directions suggested by research [43,50,51]. Lau's [26] meta-review also found that practitioners' feeling that they cannot effect change impeded their use of evidence. Yet, it is coming to 'see' opportunities for change that Kennedy's [42,43] reviews on professional learning identified as central to effectively changing practice based on research. This illustrates the significant potential challenges related to practitioner agency in using research to change practice.

Using research to change practice requires working effectively with others

Cross-sector evidence of research-use further highlights that research-use is social and relational [1]. It requires *relational expertise* [37]: negotiating shared understandings of the problems of practice to be addressed, identifying key stakeholders and working effectively with others [25,32]. Learning-oriented interactions and relationships with col-

leagues/stakeholders are hence increasingly understood as central across sectors to how research is used in practice settings [25,26,34,35]. Edwards [37] emphasises that, as a capacity, relational expertise is learnable. Yet empirical research on professional learning around teachers' use of research has shown that practitioners do not always have such expertise, making effective relational work on research-use challenging [35]. Similarly, in medical settings, resistance or a lack of interest from stakeholders has been found to stop research-use [26]. Rickinson and Edwards [25] call for more research specifying what is involved in high-quality research-use relationships.

Research-use to change practice intersects with norms of professional practice

Tomkins and Bristow's [2] study on research-use in policing, Lau et al.'s [26] meta-review in healthcare and Rickinson et al.'s [1] cross-sector review all highlight how research-use intersects with organisational norms in consequential ways whereby existing organisational norms can hinder more open ways of using research. Research in medical settings [27,52] and schools [42] highlights how changing practice through research-use inevitably involves the abandonment of previous practices and breaking away from well-established practice habits. This requires deliberately articulating existing norms to facilitate breaking away from those and developing new ones [53] and a context that supports the disruption of existing habits.

Changing practice norms in established communities of practice is profoundly challenging. Individual practitioners may not be aware of the norms governing their practice, and even when they are, those can be hard for individuals to change: the explicit and implicit conventions which influence how practitioners carry out their work have wide social and historical origins [54–56]. Sociocultural norms regarding teachers, doctors' and other professionals' practice regulate not only practitioners' own, but also colleagues and stakeholders' (students, patients, families and the wider public), actions and interactions in, and expectations of, particular activities, and have been shown to hinder the utilisation of new clinical/educational practices [26]. Yet the role of norms in research-use is under-researched [27,55].

Disrupting and breaking away from existing practices is risky

The social and cultural nature of norms raises the final point I wish to highlight, and which is often curiously absent from discussions of research-use in practice: the risky nature of attempting to change practice. The issue of risk is inherent in all the above discussions of research-use, yet rarely explicitly addressed. Breaking away from well-habituated practices, which are expected by colleagues and stakeholders, can be difficult and even threatening [27,42]. Tomkins and Bristow's [2] work on research-use in policing is rare is explicitly discussing this: they showed how, while following prescriptions made outside the local practice was often not helpful for the practice, it was 'safer' for the practitioners themselves in that it adhered with organisational norms and accountability systems, compared with developing new responses that broke away from established norms. Similarly, research on teacher coaching showed that (even when personally supported), teachers could choose not to experiment with new practices as a strategy of self-preservation (if they perceived that their institution might sanction unsuccessful efforts) [45]. However, most of the discussed evidence reviews on research-use in education and healthcare alike make little or no reference to risks to practitioners themselves using research to attempt to break away from and change the norms of existing shared practices.

Summary and developments

The review of the literature on research-use and associated professional learning illuminates key dimensions involved in practitioners using research to change their practice. It highlighted that across the public sector, including, particularly, education and healthcare, research-use requires adapting research to local practices and practitioners' agency and openness in seeing opportunities for developing new practices, using relational expertise to work effectively work others, addressing practice norms and negotiating risks involved in breaking away from existing practices. It also highlighted that we know little about how theseplay out in professional practice(s), what mechanisms are involved, what the

challenges are and how they might be overcome. This study therefore asks the following questions: *How does practitioners' research-use play out in practice in education and healthcare settings? What mechanisms are involved in using research to change practice and what is the nature of the challenges involved in research-use?* This study contributes to our understanding of what stops keen practitioners from using research to develop new practices and how those challenges could be overcome.

To answer this question, the literature reviewed here calls for cross-sector research on research-use, particularly across education and healthcare, to increase the conceptual insights that can be achieved [2,32,38–40]. This study takes up this challenge. In doing so, I am not suggesting that teachers' and doctors' work is similar in a general sense; the two professional cultures are distinct and create different contexts for learning and action [57,58]. However, the mechanisms through which practitioners learn have been shown to be consistent across professional fields, and these studies' authors have consistently argued that joint analysis of both fields is mutually beneficial [57,59–63]. Moreover, the focus here is specifically on the mechanisms identified as potentially central to using research-informed ideas to generate and implement new practices. The literature discussed above identified significant cross-sector similarities in the potential research-use mechanisms, as well as in the challenges that practitioners need to overcome to use research.

I build on these authors' insights and recommendations and further the literature on teachers'/doctors' work practices to outline key similarities and differences, *relating specifically to the mechanisms identified above as key dimensions in research-use*. The identified similarities and differences are detailed in Table 1. Along with the above authors, I suggest that key similarities relating to the mechanisms of research-use (Column 1) make a joint analysis of these two sectors relevant and enable an exploration of whether those mechanisms play out in similar ways in different sectors. This may help us understand deeper conceptual mechanisms affecting how research can be used to change practice [25,41,62,64]. I further suggest that the differences between these professions with regard to the mechanisms (Column 2) make such an endeavor fruitful for gaining conceptual insights (cf., [65]): we might expect fewer challenges to be identified among doctors, possibly identifying ways in which teachers might overcome challenges too [64], which might also be visible in some schools as weak signals. Indeed, a joint analysis may particularly open learning opportunities for exploring signals that are weak in the existing literature on research-use but that are potentially highly consequential for policy and practice, such as those around risk.

Table 1. Similarities and differences in teachers' and doctors' work with regard to the identified dimensions involved in research-use to change practice.

Dimension	Similarities	Differences
Developing new practices	Despite policy emphasis, research-use is actually fairly rare [17,18,26,27] Time, workload, political and psychological pressures are similar [2,17,18,26,52,66] Practitioners find it hard to translate research to their local practice and its needs [22,64,66] There are similar identified mechanisms of practice change involving critically reflecting on the problems of practice and trying to 'see' change opportunities [67,68], as opposed to accepting problems and seeking quick solutions which would also facilitate research-use	Doctors have higher levels of autonomy than teachers [26,64], which could facilitate experimenting with new practices

Table 1. *Cont.*

Dimension	Similarities	Differences
Working with others	Work is described as relational [31,37] There are commonalities in the relational skills required and challenges observed: need to be able to communicate with and integrate research and new norms with the perspectives/expectations of lay people [26,57] Personal–professional knowledge is often not well articulated [62,64], making it less available for shared interrogation and development with colleagues	Working with individual patients (as opposed to classes of students) [58,64], and greater opportunities to collaborate [40] could facilitate doctors' relationality required for research-use
Norms of practice	There are highly established communities of practice with set practice norms [26,27,54] Professionals are influenced by the normative expectations of lay people (patients/students/families) [26,57] and strong institutional norms, which create challenges for using research to generate new practices [54,69]	The knowledge base and discourse in healthcare are more strongly oriented towards 'evidence-based practice' than in education [31,41,64], which could facilitate doctors' development of new practices based on research-use
Risk-taking	They carry out work in which they intervene in others' lives, requiring their work to be highly ethically responsible [2,18] They work in highly risk-averse high-accountability cultures [18,27,31], which have been shown to not encourage engagement in attempting change to improve their service [70]	Doctors' work on patients involving direct safety issues is a key factor shaping their work [58], which could make risk-taking harder; however, research shows that many risks involved in practice change are not related to patient/student safety, but to personal/reputational risks in change efforts [2,27,71]; the extant research base offers few detailed insights with regard to risk perceptions in research-use

2. Materials and Methods

2.1. Generating Intermediate Theory about Mechanisms and Challenges of Research-Use to Change Professional Practice

Many large-scale studies, including RCTs, evaluating the effectiveness of research-informed educational interventions now aim to include a focus on assessing the implementation of interventions (e.g., [30]), yet they often generate limited conceptual understandings of the nature of change processes associated with research-use [22,28,72]. On the other hand, many studies focused on analysing research-use processes close-up are local and small-scale and, in turn, have the challenge of generalisability as they often investigate single cases [23].

To better understand and capture what stops keen practitioners across settings (and not just in a single unique case) from enacting change to utilise new research-informed practices, this research develops what Engeström calls 'intermediate concepts/theory' about research-use in practice. Intermediate theory refers to concepts that are informed by more general theories of learning and change, but that are data-driven and specific to certain types of activity (research-use). Intermediate concepts are grounded in data of concrete practices but "can be used in other settings as tools in the design on locally appropriate new solutions" [73]. In this study, three particular factors support the theoretical generalisability of the findings and their contribution to intermediate theory development about research-use and practice change: the analysis and synthesis of multiple sources of evidence (cf., [23]) from five study settings, the inclusion of two different professions (cf., [60]) (education and healthcare) and the utilisation of an analytic method focused on investigating practice change. In this section, I will explain the cross-profession design, the settings and studies included, and the method used in this study's analysis.

2.2. Generating Boundary Discourses through a Cross-Profession Analysis

Studying professional learning across both settings, Watling et al. [58] and Gartmeier et al. [57] argued that while teachers' and doctors' work is distinct in obvious ways (teachers teach students in classrooms while doctors diagnose and plan treatments for patients) and should or could not mimic each other, these differences, they say, should not prevent us from using a comparison to critically question each profession's own status quo. Hargreaves [64] and Foertsch et al. [62] argued that jointly analysing the similarities and differences in the role of research in the medical and teaching professions helps advance a more generic conceptual understanding of the role of research and offers indications of what each profession might learn from the other. While their focus was on the role of research in professional knowledge, mine is on research-use in professional practice; hence, practice-based theories of work further illuminate how more 'generic' understanding and reciprocal learning may be achieved through cross-professional analysis (cf., [41]).

The practice-perspective highlights that work is not a mere container of (distinct) activities; rather, work practices are resources for interpretation and, therefore, action [58,74,75]. The professional work and knowledge of teachers and doctors are unique and may seem set (and we saw above how this habituated 'set-ness' poses challenges for change). However, the practice-perspective highlights that all work contexts, as resources for interpretation, contain 'reservoirs of differences' which can become resources of action—if practitioners can 'see' them [74]. Hence, whether and how practitioners interpret their practice as a resource for research-use is of interest. The literature review suggested that both teachers' and doctors' research-use can be hindered by them not 'seeing' opportunities for change. It further highlighted that practitioners are not always aware of the norms that limit their actions within their own (over-)familiar practice. Conceptual lenses that can help practitioners see such differences of consequence [76] in one's own work context, and discourses which enable them to discuss those, can help practitioners utilise their work context as a resource for action to change practice. This research aims to contribute to such conceptual tools that may help a "discursive mobilization of cues for action" [74] (p. 25) for research-use in both professions.

Drawing on Wenger's [77] theoretical work on boundary learning, I argue that exploring this phenomenon across a professional boundary offers unique innovative learning opportunities to develop such tools that can enable each profession to 'see' their own practice and its opportunities for change in new ways. For those insights to be helpful, they do not have to include all the detail of each profession's work; rather, this requires one to identify concepts that play out in different professional communities and that offer enough contextualisation—access to meanings recognisable by different professions—for people in each profession to know how to apply them (cf., [77]). This is the aim of this study. The links of the identified research-use mechanisms with the studies from both professions suggest the recognisability of the proposed mechanisms across the two professions. During the writing of this paper, I also repeatedly exposed the findings to profession-member checking, presenting them to and discussing them with teachers, doctors, central government leaders, 'What Works' research teams and other public sector practitioners, who consistently strongly identified them in their own professional sectors. In this research, I aim to develop intermediate concepts that can act as a boundary discourse [77], a common conceptual language that allows practitioners to identify and connect their experiences, communicate within and across professional boundaries [74] about research-use, and learn from one another, while offering a conceptual lens for gaining new insights into their own practice [36].

2.3. The Overall Design and the Studies

All the studies included involved practitioners—teachers or doctors—taking part in professional learning interventions (PLIs) which were informed by research in the Learning Sciences and aimed at the practitioners developing and implementing new research-informed practices in their workplace, based on the research-based interventions presented

and discussed in the PLIs. They therefore offered a potential opportunity to study research-use to change practice across multiple settings. In line with the cross-sector approach discussed above, four design principles informed this study, as detailed in Table 2: triangulation across studies [78]; grounding in concrete settings while enabling comparison through focusing on learning/change mechanisms [79]; studying research-use interventions with potential to support and, hence, explore the phenomenon of interest [78]; and selecting study settings with enhanced learning opportunities for policy/practice [80].

Table 2. The overall research design, decisions and rationales.

Objective	**To Develop Deeper Conceptual Understandings of the Phenomenon**		**To Enhance the Practical Relevance of the Findings**	
Principle	Triangulation across studies [78]	Grounding in concrete settings while enabling comparison [79]	Ensuring opportunities to explore the phenomenon of interest [78]	Selecting study settings to enhance learning opportunities for practice [80]
Design features	Inclusion of several studies with different settings/participants Although the exact focus of the target research and practices varied, all were in line with the understanding of research-use as outlined above by the literature and focused in some way on improving their institutional practice using the research-informed interventions as a starting point	(i) Focus on participants' perspectives (ii) drawing on key dimensions of institutional practice from the literature (norms, communities, relationality) (iii) examining whether I could recognize a change mechanism identified in one setting in another setting (cf., [79])	Inclusion of studies in which the participants were participating in professional development aligned with research-identified effective features (collaboration, dialogue, peer learning and critical reflection) [43,81] and opportunities for action to experiment with [63], and not only learn about, research-use, which offered a strong likelihood of research-use	Inclusion of studies portraying '*ideal-typical*' cases: *typical* in the sense that all the studies took place in publicly funded education/healthcare institutions, which are non-selective and resource-limited; '*ideal*' in the sense that the participants were keen to use research to develop their practice and had, in principle, institutional support to do so (both known to be important in supporting research-use)
Benefits	Overcoming the challenge of much existing qualitative research on research-use (individual small-scale studies) [23,47] Understanding commonalities and differences across manifestations of the phenomenon [78] of research-use in practice	Understanding how/why actors did what they did in their wider institutional practice setting Ensuring there was *analytic value* in analysing these studies together (cf., [79])	Ensuring there was a strong 'best practice' possibility of effective research-use in these settings, to ensure there was empirical value in analysing them	Ensuring what is identified as *possible* in these settings should be possible in other typical settings (since 'typical') Identifying ambitious but realistic future policy/practice objectives: if these practitioners struggle, others are likely to struggle too (since 'ideal') [45,80]

The studies included and their aims, designs, participants, contexts and data are described in Table 3. All the studies had ethical approval via the ethics process of the Faculty of Education, University of Cambridge. To enable extensive inclusion of significant amounts of qualitative data from across five studies, data is included as within-sentence and lone-standing quotations to warrant and illustrate analytic interpretations.

Table 3. The studies analysed.

Study	Study Aim	Study Team and Context	Study Design and Context	Methods, Data and Participants	Original Publ. *
Study1	To understand how the research-based dialogic teaching intervention can support practice development and student learning and engagement and what the challenges are	RH led the research team at the University of Cambridge which conducted the study in East England	A year-long qualitative multi-school intervention study with primary and secondary teachers Practitioners were introduced to and utilised, in ways of their choosing and design, a research-based teaching intervention on dialogic teaching to develop their teaching to improve student learning and engagement	N = 15 primary and secondary teachers from 5 non-selective state-funded schools serving non-privileged communities 4 focus groups (N = 15); 4 interviews	Study1a: [82]
Study2	To understand how the research-based change-laboratory and deep learning intervention can support practice development and student learning and engagement and what the challenges are	A Finnish research team led the study [83], which was co-analysed with RH	A qualitative study of a year-long school-based multi-dept. change laboratory intervention in a middle school Practitioners were introduced to and utilised, in ways of their choosing and design, a research-based teaching intervention on deep learning approaches to develop their teaching to improve student learning and engagement	N = 30 teachers in one non-selective state-funded middle school serving a non-privileged community 9 teacher planning meetings and discussions facilitated by a research team member	Study2a: [84] Study2b: [85]
Study3	To understand how the research-based interactive teaching intervention coupled with open digital resources can support practice development and student learning and engagement and what the challenges are	A [RH's University] research team, of which the author was a member, led the study in Southern Africa	A qualitative case study of a year-long school-based multi-department professional learning programme Practitioners were introduced to and utilised, in ways of their choosing and design, a research-based teaching intervention on interactive teaching and open digital resources to develop their teaching to improve student learning and engagement	N = 35 teachers in 3 non-selective state-funded schools serving a non-privileged community; in the follow-up stage: N = 26 repeat interviews, focus groups and observations in staff planning meetings throughout programme	Study3a: [86] Study3b: [87] Study3c:[88] Study3d:[89]
Study4	To understand how the research-based clinical leadership intervention can support practice development and outcomes and what the challenges are	RH led the research team at the University of Cambridge which conducted the study in East England	A mixed-methods study of a research-informed clinical leadership professional development programme with a service improvement project component offered by the regional health education authority and a university team Practitioners were introduced to research on leading service improvement and carried out a service improvement project	N = 226 doctors-in-training and GPs from multiple NHS (public) hospitals Open text responses in a survey (N = 226); interviews (N = 39)	Study4a: [90] Study4b: [91]

Table 3. *Cont.*

Study	Study Aim	Study Team and Context	Study Design and Context	Methods, Data and Participants	Original Publ. *
Study5	To understand how the research-based clinical training intervention can support practice development and outcomes and what the challenges are	RH led the research team at the University of Cambridge which conducted the study in East England	A qualitative case study with participants of the professional development programme utilising the research-based intervention Practitioners were introduced to an evidence-based clinical intervention (FICE) to utilise to support clinical practice (Focused Intensive Care Echocardiography or 'Echo')	N = 55 doctors-in-training and consultants from multiple NHS (public) hospitals In-depth interviews (N = 28); focus groups (N = 27)	Study5: [92]

* Throughout the article, findings/data extracts stemming from these original publications will be indicated through these references.

2.4. The Analysis: Dialogically Interanimating Findings across Studies to Generate New Conceptual Insights

Some challenges of research-use, such as time and workload, are commonly expressed and easily understood. However, simply offering more time does not automatically lead to practice change; on the other hand, some practitioners succeed in developing new practices despite such pressures [93]. It is essential that we come to understand not only what practitioners themselves perceive as the challenges with utilising research-informed practices, but the nature of those challenges, how they do their hindering work and what helps overcome them. I therefore utilised an analytic method that seeks to investigate the change processes when practitioners are using research by empirically examining what different things can emerge from situations that are the *same* in some key aspect, and how/why. This approach is called the *difference-within-similarity* method [94].

This approach is not simply about labelling chunks of data (often referred to as 'coding' in qualitative analyses) and then comparing those across situations and contexts. It aims to analytically *simulate the possibility of change* in the data to develop insights into the nature of the change mechanisms and challenges. To do this in a systematic and theoretically founded way, this method draws on established methodological principles from activity-theoretical (CHAT), dialogic and abductive theorisations of qualitative research.

To analyse how practitioners overcome challenges to effect change, I needed to identify and analyse *contradictory situations or tensions* in the professional practices, highlighted by CHAT methodologies as the key drivers for change [36]. To understand what enables, or stops, practitioners from overcoming these contradictions/tensions to effect change, I brought together the different outcomes of those challenges and closely compared, '*interanimated*', them with each other as highlighted by dialogic methodologies, as opposed to treating them separately or alongside each other [95,96]. However, I argue that another step is needed to precede these steps in the analysis of challenges. We already know that many challenges associated with research-use are hard for practitioners to overcome, and that identifying lists of challenges is not helpful. I therefore argue that starting the analysis from the identified challenges is not the most helpful strategy for understanding how practitioners overcome those challenges. Instead, I followed the principle of 'working backwards' from abductive methodology [97]: instead of starting from practitioner-articulated challenges, I began the analysis from identifying *successful* occasions, where there was evidence of change. I then moved temporally *backwards* from those observations to identify the challenges that had been overcome in each occasion to achieve change, in other words, what had generated the observed success (cf., [98]).

Identifying the origin situations (the original challenges) of those successes enabled me to utilise the analytic *simulation* of the possibility of change. I utilised those challenging origin points as the new starting point, the 'similarity' from which to gaze into the data from. I identified further such challenges across multiple data points for comparison, including ones where change had not happened, and compared them with instances where they had been overcome. This enabled me to identify the different things that could happen from each starting point and explore the processes/mechanisms that may have led to different (more or less successful) change outcomes.

Going through this processes utilising multiple study settings, as a novel approach in this study (but inspired also by the work of Grossman and colleagues [60]), I was able to identify mechanisms and challenges involved in research-use that play out across contexts and professions. I argue that this suggests they form elements of an intermediate theory about the challenges to change through research-use that are grounded in data from concrete contexts but that can be used in other settings in the future as tools to help understand and overcome such challenges elsewhere (cf., [73]).

3. Results

Reviewing theory, earlier findings and fleeting observations or initial 'hunches' from across the studies, in the data analysis [99], I first focused on identifying recurring features of

the accounts/observations of facilitating mechanisms of practice change in the practitioners' research-use efforts. I systematically gathered and examined examples of particular features across the studies to test these initial observations and hone my definitions of them. In this process, I began to identify repeat examples of a consistent set of phenomena. I identified four key concepts—related to surprise, support from colleagues, reflecting on norms and managing risks—associated with change mechanisms as the practitioners were utilising the research-based interventions.

I could have stopped here and considered these as the findings, providing data as evidence of them as facilitators of change towards research-use. However, the theoretical framework called for a deeper exploration of the mechanisms behind these phenomena. It suggested that these phenomena are more complex that typically 'meets the eye' at surface level, highlighting the need to consider the expertise required for effective collegiate support, the hidden underlying layer of norms, and the lack of nuanced exploration of the way risk plays a role in implementing new practices. So, instead of taking these at face value as the supporting factors for research implementation, I utilised these observations as what Blumer [100] referred to as 'sensitising concepts': concepts that lack the specificity to directly capture the content of empirical phenomena in their complexity but which instead 'sensitise' to key phenomena in the world and the data. As sensitising concepts, these offered general guidance in approaching instances in the data, suggesting where to look. And so, I looked deeper into the data associated with these ideas to understand how they had been arrived at in the educational and healthcare practices. I systematically sought to identify and analyse examples of these phenomena across the studies, following them backwards to understand what had to be overcome to achieve change (identifying, for example, that 'other people' had originally been discussed as challenges to using the research). I then used those original challenges/circumstances as a new starting point to follow forwards from in the data. This enabled me to identify the different changes (or none) that had followed and how/why. This led me to develop more 'definite concepts', concepts which were able to illustrate more precisely how a particular challenge/facilitator to research-use worked (Blumer 1954 [100]), to help identify and understand the underlying mechanisms at play. During this analysis, I began to observe that a *paradoxical* process underlay all the change mechanisms identified—agency, other people, norms and risk-taking—that I observed. I hence came to call them the *paradoxes of professional change in research-use*. In this article, I draw on data from across all the studies in both professions to conceptually define and develop the principles at play.

3.1. The Paradox of Agency

A consistent and persistent observation across the studies was participants' *surprise* after attempting to implement the new research-informed practices. Practitioners "were very surprised indeed" (Study2b), trying the new practices "really surprised" them (Study2b), "it was a surprise" (Study3b), they "were, 'I can't believe what's going on'" (Study1), they "couldn't believe it, I was really surprised" (Study3a), and "[t]here was a massive surprise" (Study1) during implementation which "led to real surprises" (Study1), with practitioners "realising individuals can change systems" (Study4).

It is striking how consistently practitioners articulated significant surprise when trialling new research-informed practices. The surprise participants articulated about their capability to successfully implement new research-informed approaches suggested that this sense of agency is an unexpected, emergent experience, not just for the individual practitioners but for their colleagues too. In Study2(b), the teachers recounted a story of a student "who is not interested in school going normally" actually taking initiative to join the new project; they tell the story collectively, highlighting their joint surprise (since "we all know our students"), describing this as

> *"this extraordinary event. I mean [student's name] would never do anything like this normally. So, we were very surprised indeed."* (Study2b)

The collective surprise was also articulated in Study1, where teachers in the focus group repeatedly expressed surprise at their colleagues' accounts of students whom they all know showing engagement when trialling the new practices, as illustrated by the following exchange:

> *"Teacher5: For some of my kids, for some of the students who can be absolutely vile to each other were encouraging, and I didn't understand it at all, massively not at all, because they can hurl abuse in a normal lesson, and they choose to work with that person who they have hurled abuse within a normal lesson. Weird. And then actively encourage each other. So, talking about [Student1's name]-*
>
> *Teacher 6: Oh god!*
>
> *Teacher 5: Yes, [Student1], in maths, was as quiet as-*
>
> *Teacher 1: She was in English too. She didn't speak-*
>
> *Teacher5: -because her confidence was so through the floor. But [Student2's name] was the one doing 'You did really well [Student1's name]. Come on, keep going', and I'm like, 'What's happened? What the hell has happened to you?'*
>
> *Teacher6: All lesson?*
>
> *Teacher5: Yes.*
>
> *Teacher1: She [Teacher5] came into the office, and we were, 'I can't believe what's going on.'"* (Study1)

The language used by the practitioners in these conversations illustrated the strength of their surprise: they spoke of being 'massively surprised', 'astonished', and 'thinking what the hell happened', how they 'could not believe it' or 'did not understand it at all', 'did not imagine the students would be able to do it' or 'did not expect it', as it was 'really strange'. Analytically following backwards from these participant observations, both temporally and within the participants' accounts, supported this interpretation that even though the practitioners engaged in the change efforts while participating in the research study, they did not expect those change efforts to be successful. Earlier, Study2(b) teachers discussed change towards the given new research-informed student-led teaching practices as impossible in their classrooms. They reported that "none of our efforts so far of using entertaining methods and whatever and trying this and that have helped at all to make the students notice how they could improve their own learning or study techniques." The impossibility of change was initially discussed as inevitable given the kinds of pupils they have: because the "answer to everything in [their] village is always social benefits", their students do not "bother doing anything themselves", and therefore a new teaching approach "has to be clearly limited, because otherwise it goes all over the place, certainly with this lot". The teachers' initial rejection of a new student-led way of working was described as inevitable, claiming that it is a "fact that if there is—a weak class, it demands a very teacher-led approach" (Study2b).

A similar conceptualisation of their pupils as too weak to be taught through other than traditional teacher-led methods and teachers as unagentic to change this was initially articulated in Study3(a). The teachers suggested that teaching "is supposed to be child-driven but that depends on the type of children that one has, if they are able to organise themselves, to make sure that learning takes place, not like our children". Like in Study2, the practitioners suggested that "we are saying lessons should be pupil centred. But . . . sometimes we say, this topic is too hard for the pupils, I cannot just leave them to do it alone". The same early assumptions are visible in Study1, whose teachers stated that they initially expected a "car crash" when asked to introduce dialogic student-centred teaching:

These 'starting point' observations resonate with the literature: teachers have been found to often define themselves as unagentic vis-à-vis their students' learning and change, leading to stabilising practices and limiting practitioners' sense of what is possible [50,101]. However, in all the studies analysed, the practitioners' surprise demonstrates that when

practitioners trialled the new practices, they came to see that it was possible for them to change practice despite the challenges.

> *"There were some massive surprises because there is a child in that group who has very little confidence, at all, in their ability, has an amazing amount of time off school and doesn't really like anybody asking her questions. They all chose what groups they wanted to be in, and the group that she went in, the other kids were encouraging her, and she had chosen to work with somebody and I just thought, 'It's going to be car crash.' And, actually, it wasn't."* (Study1)

Their surprises led to the teachers acknowledging that they had previously "underrated [their] children—without giving them a chance to think on their own" (Study3a) and their change efforts "taught us as teachers that we shouldn't make presumptions or judgements as well, because that can guide your planning and maybe you are not being fair to some students, making those judgements." (Study1).

The teachers' initial assumptions about why the proposed new research-informed practices 'won't work' in their setting were usually related to their limiting conceptualisations of their pupils. I identified that limiting assumptions also acted as mechanisms impacting doctors' research-use. However, their limiting assumptions were typically linked with other practitioners' (dis)engagement, originally also described as outside the practitioners' own influence. Study4 doctors expressed assumptions that "there are some places where [support of new attempts] always happens, and some places where that never happens, and so I think that there is a culture sometimes which, you know, presumably is something that can be changed, but I imagine is very difficult as a new consultant coming into that place to change the culture". Many Study5 doctors also articulated reasons defined as outside their influence for why implementing the new scanning practice (FICE) did not work in their setting, suggesting a closed circle whereby "surgeons only remember the wrong ones [attempts] and not the right ones", resulting in senior doctors becoming "angry" and losing "faith" in FICE, with the consequence that trainees lost "the confidence to make the call" and "stopped voicing my concerns because nobody listens" (Study5). As with the limiting conceptualisations of pupils, these challenges were initially discussed as an insurmountable barrier which the doctors themselves had no power to change.

> *I think if you're going to get a cardiologist to police your echoing you wouldn't get very far. Because I've found it's been antagonistic rather than facilitatory most of the time.* (Study5)

Colleagues' views on trialling new practices were described as set and unchanging by the doctors: "that is the way it is" (Study4).

> Some consultants are very open to that and very willing for that to happen, and some consultants are less open and less willing for that. (Study5).

While doctors were thought to have higher autonomy than teachers, which might offer them better opportunities to trial new practices, this in fact resonates with how teachers talked about students' engagement and learning ability: unchanging and outside their own influence.

As with the teachers, many of the doctors, particularly in Study4, also went on to be surprised, finding that their PLI-participation and trialling new practices "changed the way I think and it's changed my belief in how much I can change things and processes around me", learning that they "do have it [power]". I will further elaborate on these observations in the next section discussing the role of other people in change efforts.

Based on these findings, I argue that the identified opportunity for and challenge of using research to change practice interact in a paradoxical manner: if practitioners assume that new research-informed approaches 'will not work' in their setting for reasons they assume are outside their influence, they are less likely to try those new approaches in the first place, and then they do not find out that those might actually work and that they do have agency to effect change. I term this challenge the *paradox of agency*. While the target of the limiting assumptions that led practitioners to assume they do not have agency to

use the research was different based on the content of their work (students for teachers, colleagues for doctors), the underlying paradoxical mechanism was present for both.

The studies give some indications regarding what might enable practitioners to overcome this challenge. A Study3 teacher leader discussed peer modelling to overcome teachers' assumption that practices cannot work in their setting (suggesting that "If we practise in our classes, even as they are passing they will be seen; 'This guy teaches differently, look at him'" (Study3d)), also highlighting clear advance planning as a trialling framework, with Study1 teachers emphasising the role of structured planning tools to support it as a protective element:

> *"We may have carried out group discussion in group tasks previously, but not within the set guidelines and using your toolkit to guide them and make it more purposeful and meaningful, and, to have that structure has enabled us to bring that into lessons and ensure that when we do group tasks that involve discussion and the promotion of dialogue between students, it is given more purpose so it is more effective and it has given a real structure to it."* (Study1)

Doctors also described the importance of having others to observe and turn to in their setting.

> *I kind of grew in confidence while I was [in another hospital where] you have the advantage of having quite a few people with echo skills there so again there are people you can turn to and say 'I don't know but this looks to me like that' and you can get immediate feedback.* (Study5)

The practitioners suggest that having the research framed as a tool helped them recognise what in the research ideas was actually new and identify small opportunities to doing things differently in impactful ways:

> *"So, when I personally heard about the dialogue in maths, I must admit I was thinking that would be useful, but at the same time I was thinking, well, we do it all the time anyway: we are always talking to the kids. How can this be of any kind of benefit to be using dialogue in maths? However, the difference between using the 'dummy run' [with no tool], where we practised without any kind of guidance, and then the second one where we had all the structure and the skills to be able to do it properly was massive, and that was a big surprise to me, because I thought, well, talking is talking: you just give them some work and they can get on with it in a group."* (Study1)

Doctors also highlighted research-based tools as helping overcome this challenge.

> *I am more motivated and more encouraged that next time a project I need to get off the ground, I'll be able to do it, just because I've got better tools to use.* (Study4)

The other observed facilitating mechanism links with normative expectations and safe risk-taking, which will be further elaborated below. Study4 practitioners suggested that being part of a PLI whose requirements meant that they 'had to' trial the new approaches for accreditation enabled them to do so.

> *"What the [PLI] allowed me to do was to go through that journey in a safe way, where the reputational risk wasn't there for me because I could say it was a 'Chief Residents' [PLI] service improvement project that I was doing."* (Study4)

In both cases, this trialling then enabled practitioners to 'see' that they had agency to change their professional practice and implement the new ideas that they had previously considered impossible in their institutional setting, acknowledging the PLI course.

> *[It] isn't necessarily giving people that power, it's just showing them that they do have it.* (Study4a)

This highlights that we must theorise risk-taking as a key dimension of research-use. I will return to this below.

3.2. The Paradox of People

Another observation I made consistently across the studies was talk of 'other people' as a support in successful efforts using the research to change practice.

Above, a Study5 doctor highlighted the importance of having 'someone to turn to' in their attempts to utilise new research-informed practice. They emphasised the opportunity to "communicate with someone else who is FICE-accredited to just see if you're on the same page". Similarly, Study3(a) teachers highlighted how "as teachers, we are able to consult each other, 'oh on this point, what can I do' 'How can I go about this lesson' We consult among our group", continuing, "when [named colleague] is teaching, I go there, I observe when she has the problems, I help her. She also comes to my class"; several teachers suggested that drawing on colleagues' support has helped "improve [their] interactive teaching". Study1 teachers described how "it is someone's turn every week to bring a problem to the table" and they "all sit around as teachers, to see how we would work out" the problem, to help them prepare for dialogic teaching in their own classrooms, while Study2(b) teachers discussed the importance of the "planning stage in close collaboration together with the group—that all teachers who are part of the team have to be part of it". Similarly, some Study5 trainee doctors described how they "grew in confidence [because] there are people you can turn to and say 'I don't know but this looks to me like that' and you can get immediate feedback."

Leaders/Seniors are an important support. Study1 teachers from multiple schools highlighted them currently having a "dynamic and responsive senior team to try new initiatives" who are "quite excited to hear about what we had been doing", working with their staff in developing new approaches. Study4 doctors too spoke of leaders as a key factor supporting their change efforts, suggesting they feel positive "because every interaction I've had with management processes has been very positive and I've actually been able to achieve what I've wanted to do"; they suggest that contact with management colleagues "certainly made it a lot easier to get projects started".

It is clear that some of the practitioners work in contexts with supportive leaders and collaborative working cultures already, and are consistently described as a key support for change efforts. Some Study5 doctors worked in such environments and described them as essential for the implementation of new research-informed practices (FICE/Echo):

> *"Every week there will be echo teaching, where they will take one or two people usually to a bedside and there's usually a couple of echo trainers there and you will do an echo and get talked through it. There's different levels of skill there so again, there are people who are just learning and finding views and there are those who are more experienced and you can have a collegiate discussion about your findings. You really need that because if you're not training your people to do echo, you really can't expect them to do it."* (Study5)

This is both about concrete support and about a "sense of camaraderie" (Study5). Some of the Study1 teachers also described their leaders as "really encouraging" of trying new things, similarly to the above doctors stating that "You are never going to get the best out of your staff if you don't give them some flexibility and allow them to move with the times."

However, while supportive leaders were highlighted by both professionals, knowing that some institutions have supportive leaders does not in itself function as a scalable cross-contextual mechanism facilitating research-use and change; practitioners need to be able to work in the contexts of their organisation. Additionally, the analysis demonstrates that supportive cultures and 'camaraderie' do not emerge from nowhere. Working backwards analytically in the data to see how participants used to see other people, I identified that other people in the practitioners' organisations are in fact often considered significant challenges to change.

Study3(d) teachers reported being "told off" by colleagues and leaders for engaging in interactive classroom teaching [the research-based intervention of the study] because it was 'noisy' and senior leaders and colleagues wanted 'silence'. Some worried that colleagues

would think they were 'wasting time' or 'lazy' when conducting enquiry activities outdoors (Study3a). Study1 teachers acknowledged that engaging in change efforts to implement the new research-informed practices "is difficult if people don't want to do that", if they "are [not] willing to give up the time and lesson time", or if leaders "don't give them [staff] some flexibility and allow them to move with the times".

Among the studies on doctors, accounts of other people as a barrier were also common in early implementation. Study4(b) doctors reported they were "unable to implement [their] project as clinical lead did not [support it]". Study5 doctors similarly commented that as for the new research-informed practice, some seniors do not "allow time for it, because they don't see what the point is".

As with teachers, the doctors highlighted that this perceived challenge not only concerns senior leaders:

> *"I think the biggest thing is trying to get people motivated and to try to make change because I feel like there is resistance to change—as there is a tendency to stick your head in the sand and say 'this is how we do it we'll continue to do it this way, there's no money to change anything anyway so this is what we are going to do'."* (Study4)

In Study5, colleagues and seniors in their own and other specialties were frequently discussed as a challenge, for example, in settings "where cardiology isn't interested in us having a look at the heart with an echo", which stops implementation because "to get a cardiologist as a barrier to echoing would stop more people from echoing". The same can apply to ICU consultants; for example, in district general hospitals, if ICU consultants "don't necessarily see the value of scanning, it can be difficult if you are an enthusiastic trainee in that hospital to try and progress your skills, because there is no one who can help you do that, or can allow time for it, because they don't see what the point is." (Study5). This applies to nursing staff too, with trainee doctors describing how "the moment a trainee starts turning up, people—nursing staff particularly—start tutting and putting a lot of pressure on" to do things the traditional way (Study4).

While senior leadership support is widely acknowledged as a key factor in enabling the use of research-informed practices [85,93,102], it is not in itself a scalable solution to facilitate change towards research-use; we cannot simply swap institutions' existing leadership or staffing situations. The key question in terms of change mechanisms is how practitioners can work with others in their organisations in ways that support the development of new research-based practices. The analysis suggests, in line with the theorical notion of relational expertise, that this is a learnable capacity:

> *"I think it's still quite daunting because it is difficult and I'm more aware of the barriers now, but I'm also aware of how to get around them and how to, who to talk to and I guess how to get things done. I think I am more motivated, and more encouraged that next time there's a project I need to get off the ground I'll be able to do it just because I've got better tools to use."* (Study4)

As highlighted by the literature, this involved learning to understand others' "priorities and how to align with those" (Study4):

> *I understand more, probably, about the reasons why some things succeed and other things do not. I think I know more about things needing to align with the wider department or Trust priorities, maybe to have the support that is needed.* (Study4)

To understand this, I analysed differences and shifts in the talk of 'other people' in change efforts.

Much of this talk was about what we have previously referred to as the 'How' of other people: ways of getting people on board and collaborating effectively [90]. Study1 teachers discussed how they "now use [the evidence Toolkit] in the staffroom as well—to make our discussions more purposeful both in class and in our team", suggesting how "working with the Toolkit has had a positive impact on our whole department". A Study4 doctor suggested that their improved perception of engaging with others often thought

of as challenging, such as managers, is "partly because of the [professional development] course"; another suggested that while engaging with resistant others "was touched upon in the [PD]-course—maybe more of that might be useful". Another Study4(b) doctor explained that while their first attempt at implementing their improvement project failed due to resistance, "the skill I learnt on the [PD]-course have helped me be more successful the second time round."

Considering ways of engaging with stakeholders as a learnable capacity central to research-use resonates with the literature [25]. However, a more complex and nuanced picture, resonant with and extending the theoretical notion of relational expertise [37], emerged from analyses of Study4(a), suggesting that effective engagement with others also involves the *Who, When, What, Why and Whither* of other people. I call these the '5Ws' of leading agentic research-informed practice change.

Drawing on the 5Ws involved learning *who* "to get the information from", "who were going to sort of champion me and be on side" and "who don't really need to be involved but need to be informed at a certain point" to avoid "slow[ing] things down", hereby acknowledging the *why* someone should (not) be involved. This often involved working with others "either we didn't know exists or we wouldn't be usually in contact with". This appeared new to the doctors as well: "Part of learning this process was to learn where to get the information from thus question above as I had no knowledge of the administrative side of the unit" (Study4). The doctors highlighted that they 'just don't get exposed to in their training' and 'never mix with' many other professionals in their organisation (Study4).

It involved learning *when* people should be involved (because "if you mess that up at the start of a project and don't include the people who feel they should be included then they can obviously become quite resistant to whatever you're trying to achieve later on so that was a very good lesson."). Crucially, it involved learning *what* others bring to change efforts; "knowing the kind of information that they might be able to give me", for example, help "unlock" problems through offering insight into "different ways of looking at a situation and developing strategies for dealing with problems and implementing changes". This involved learning "more about the skills of non-clinical managers, I realise they are a huge asset if included in projects." This too was described as a novel insight they had to specifically learn: "I guess I did not realise quite how many different people work, which sounds silly to say, within the NHS Trust that have skills that could be really useful to your clinical practice" (Study4).

Lastly, the 5W's involved a *whither* of other people, recognising how "it's actually the spread of knowledge laterally to colleagues that can make a lasting benefit" (Study4a).

I argue that the *paradox of other people* in research-use and change lies in the fact that when practitioners overfocus on those they perceive as barriers within their organisation, while not identifying and/or neglecting to engage those who could be resources, people who are resistant become an even greater barrier. Consistent with the literature [37], the practitioners suggest that such relational expertise is not only about accepting one's working environment as a barrier/support, but that it is learnable:

> *"I think it's just broadened my experiences of the NHS [National Health Service], there's a whole other side of the NHS that we just don't see, and having a better understanding of how to get things done, and the right people to talk to get things done.—so I think next time project like that and I want to implement it I will be a lot better prepared in terms of who to talk to and how to get things done, and the different layers of management on the NHS to try and get things done."* (Study4)

Above, the findings further suggested the importance of tools to help overcome the people barrier. My research is currently developing and trialling a '5Ws' tool to study whether scalable conceptual tools could support such learning and help overcome the people paradox in research-use.

3.3. The Paradox of Norms

In educational and healthcare practices, norms regulate who can and is expected do what, when and how. Norms about who should do what limited trialling of new research-informed practices. For example, in Study5,

> *"So they [heart surgeons] are quite happy to have a cardiology registrar who may not have passed all the accreditation come and look at the patient, whereas they don't believe the intensive care doctor—So they kind of said, 'Oh well, it's nice that you did your [FICE] scan but I want someone else to look at the patient.'"* (Study5, trainee doctor)

Norms also regulated when trainee doctors' practising the new scanning approach was seen as appropriate:

> *"You wouldn't automatically do an echo on a patient. It's a waste of time and it's a waste of money.—You have to do things led by clinical need."* (Study5, senior consultant)

In schools, norms regulate how students should engage in classroom teaching (for example, through actively contributing or passively listening, as discussed above) and how they must conduct themselves in specific situations, which can make it hard to use research that does not align with those norms. In the example above, trainee doctors breaching the norms of the clinical practice at hand is discussed as undesirable 'waste'. Similarly, teachers breaching the assumed norms of their practice by engaging in 'noisy' discussions or outdoor inquiries was discussed above as being potentially perceived as 'lazy' or 'wasteful', as not doing their job properly. In another example in Study2(b), students breaching the norms of the practice of tests (by listening to music or chewing gum) is discussed in the studies as potentially 'wrong' or 'abnormal'. Similarly, the doctors discussed how if a new research-informed practice is not "being done routinely" then people "think it's esoteric and strange" (Study5). This illustrates the significant challenges associated with not following the existing norms of the shared practice in one's work, be that teaching or clinical work.

Herein lies the *paradox of norms*: practice cannot change without changing its norms, yet departing from existing historically and socioculturally formed norms of well-established practices—like teaching or medicine—is regarded negatively. Moreover, if practitioners deviate from the established norms of their practice, they can no longer draw on shared understandings of what their actions are trying to accomplish, making change and bringing others along harder.

Our earlier research suggested that explicitly addressing existing the surface norms of a practice is a necessary but insufficient condition for enabling the use of research to genuinely change practice [103]. Research has discussed how norms have a surface expression ('*You have to do things led by clinical need*') but also an underlying rationale [104,105], and that changing the norms of a practice requires addressing not only the surface expression, but also the underlying rationale that motivates the norm and makes the actions it prescribes desirable. This study offers further illustration of this, such as in the example of a senior doctor in Study5 who described how trainees can overcome nurses' resistance to trialling new practices by actively engaging with their underlying motives, through "mak[ing] a deal with the nurse and say 'If I come back at a certain time, what's the best time to do a quick, you know, ten-minute scan?'"

Productively engaging with the underlying rationales of normative challenges to research-use requires the understanding that instead of a singular underlying rationale, surface level norms can be enunciated through *multiple* underlying rationales: earlier research identified four possible underlying rationales for classroom interaction norms, termed operational, interpersonal, discussional and ideational, and demonstrated that changing the surface level expression of a norm may not enable meaningful change in the practice it regulates if the new expressed norm continues to rely on the same underlying rationale. Research by Hofmann and Ruthven [103] showed that when teachers attempted to implement research-informed dialogic teaching practices, they typically introduced new surface-level norms superficially consistent with the research, such as 'listening to other students'. However, where they did not also address the underlying rationales

for such norms, those change efforts could become appropriated into existing practices and fail to support genuine change towards new research-informed teaching. When teachers enunciated the norm of 'listening' on the basis of an underlying rationale of 'good behaviour' (being quiet when others are speaking) or 'fairness to others' (others listened to you, you should listen to them), those norms did not work to support practices the research considered dialogic and, hence, beneficial to learning. Such genuine change required the teachers to explicitly address the underlying rationales to highlight that 'listening to others' was needed in order to be able to 'discuss multiple ideas and viewpoints' and 'learn from others' perspectives.

This paper's analysis offers further evidence of how identifying and addressing such multiple underlying rationales can help overcome a normative challenge. For example, in Study2(b), a norm that students cannot listen to music or chew gum during exams was initially justified through the rationale that it is 'wrong' (which Hofmann and Ruthven [103] would describe as an 'operational' rationale, focusing simply on frozen behavioural obligations). As the teachers worked on developing and implementing the new research-informed practices, they began examining not only the surface norm but its rationale. This resulted in developing a new rationale, which necessitated a change in the surface norm: the teachers realised that some students needed a distraction in tests to help them concentrate and that there was nothing 'wrong' or 'abnormal' about this. They changed the rationale for the exam/test situation norm to what Hofmann and Ruthven [103] referred to as an 'interpersonal rationale', that you cannot disturb others in a test. This had the effect on the surface norm that students could now chew gum in tests if they felt this helped them concentrate, but they could not play music. In Study3(a), telling teachers to change their teaching to be more interactive based on evidence was not impactful without addressing their underlying rationale for teacher-led practice that their students needed it.

I argue that this suggests that enabling research-use in practice requires not only relevant, high-quality research that can inform the educational, leadership or clinical target practice itself, but also relevant, high-quality research that can inform how existing practices can be *changed*, including addressing the normative aspect of these practices. For example, research has suggested that research-informed tools that make salient typical norms of the given practice (such as classroom interaction) and their possible different underlying rationales, such as the People, Talk, Ideas tool for supporting change towards more dialogic teaching [106], can help practitioners articulate, examine and collaboratively work on existing norms, particularly their hidden underlying layer, and identify productive opportunities to shift them to support genuinely new practices. Applying this tool to their practice, in Study1, teachers from multiple schools described the positive impact of creating explicit new 'ground rules' [107] together with their students to articulate the new expected norms to support the shift towards research-informed dialogic teaching practice.

> *"The Ground Rules for Dialogue came in really useful because we presented it to our class and we were both pretty impressed with them and how much they just wanted to work as a group and wanted to talk and share their ideas. That Ground Rules for Talk was really effective when it was linked in with colourful semantics, which we use quite a lot in our school."* (Study1)

Some teachers found that while "The Ground Rules for Talk was great, but, for me, then it was trying to follow it up with discussion. That is where my barrier was in my year group." (Study1). To address this, some of the teachers then went further, and 'operationalised' the new norms and associated ground rules into concrete tools their students could use to structure their engagement in the classroom discussions. One of the teachers "introduced some talk tokens: so they had little tokens and had to spend at least one of these little discs that I made, which they thought was quite cute." Another teacher took this idea further after encountering challenges:

> *"I used the talk tokens as well.—it worked well for some of them. For others, they just couldn't comprehend why they can't just talk. [So I introduced] response tokens. So,*

> *they had to spend their talk tokens, but then, if they wanted to respond to something that somebody else had said, I got them to think about their response: why were they arguing that, why did they disagree, why did they agree, rather than just talking, because I thought that was important to differentiate it between making a point and actually making an argument and having that discussion. That worked really well because, actually, they did argue against each other in a constructive way, surprisingly."* (Study1)

More research on translating new research-informed practices into concrete tools that might support such normative shifts in clinical settings is also important. A key aspect here is that while the actual norms that affected teachers' and doctors' work and research-use attempts were different, depending on the content of their work, the mechanism of needing to identify and address the *underlying rationales* of those (whichever) norms rather than just the surface norm was present across both professions.

3.4. The Paradox of Risk

It is clearly visible across the studies that trying new practices is risky even when these are warranted by research. One of the Study2(b) teachers expressed it poignantly, saying how "[a]t first, it felt like we'd brought a knife to a gun fight", while a Study1 teacher described her thoughts at the beginning as "I just thought, 'It's going to be car crash.'" A Study4 doctor above described implementing new practices as 'scary', while Study1 teachers referred to it as 'bravery'. Other doctors described attempting to implement new practices as "painful"; the difficulties encountered made them feel "I had been a failure" (Study4b).

These comments demonstrate the strength of feeling associated with attempting to use research for change. The fear that their attempts "don't work out", risking "a permanent blot on your reputation—would have the potential to put people off permanently" (Study4). Indeed, the practitioners in the studies described how, on their own, they would not have attempted to implement change projects "for another five or ten years", "once I'd sort of understood and worked my way in, and been careful about what I did and where I treaded for a little while", as they "don't want to get too big for my boots and try to change things" (Study4).

> *"I think there's a reluctance to put yourself out there amongst doctors, to take the risk, we manage risk brilliantly in our day jobs, especially GPs, that's what we do, but actually putting themselves outside their comfort zone and outside the zone they've been trained to feel uncomfortable in. And I think people worry about personal reputation—and I think that's enough to put some people off."* (Study4)

This quote highlights the personal and reputational dimension of risk-taking in attempting to develop new research-informed practices, which is so rarely discussed in the literature (and, in doctors' work, where 'risk' is typically considered in relation to patient safety). While these doctors manage clinical risks well, there is less preparedness for risks to practitioners themselves:

> *"It is quite high pressure, and you've got to be quite resilient—and I think some doctors really struggle with that—they can take it really personally and feel that people are having a go at them as a person, rather than because they happen to head up a [new] process."* (Study4)

The *paradox of risk* here is that "[y]ou're not really going to achieve significant or substantial change without a degree of risk, without a leap of 'faith'" (Study4). The risks involved "put people off" from trying. Yet the fewer people in an institution take such risks, trialling new practices, brave the resistance or alter the norms, the greater the personal risk to those who do. One of the healthcare leaders highlights this cultural challenge:

> *"I think we need to help change the mindset of the NHS, which I think has become very very risk averse so people don't like to do anything in case it goes wrong."* (Study4)

The practitioners themselves acknowledge that not wanting to be the only one risking doing something different can hinder the development and implementation of new practices even when research supports them, like in these studies:

> *"I think I would have done it eventually but it's helped me—it's given me the confidence to sort of, get on with it—So soon—exactly. Yes that's what I'm saying as well. I would have done this eventually, you know. Once I'd sort of understood and worked my way in, and been careful about what I did and where I treaded for a little while."* (Study4)

This can be especially true for new or junior colleagues:

> *"If you are a junior consultant and you hadn't done it [a SI project before] you'd be saying 'well I'm just finding my feet, I don't want to get too big for my boots and try to change things, I'm just going to lay low for a while' so the sort of things that you might take on might not happen for another five or ten years. So it [the PD programme] probably does accelerate that process a bit."* (Study4)

The fear of reputational risks among colleagues/seniors from trialling a new practice appeared more significant that the quality or importance of the research warranting the new practice. Some practitioners in the studies discuss PLIs as developing their own confidence to take risks ("I've become a lot less risk averse. Not to the point of being dangerous but not necessarily being afraid of that. The programme gave me the confidence." (Study4a)). They acknowledge that while "we all have some of those skills," it is about gaining the "confidence to use those" (Study4). Elsewhere, practitioners highlight that institutions and leaders explicitly acknowledging the risk involved in (any) research-based change efforts is central. Some Study1 teachers emphasised that a supportive school culture in which school leaders explicitly support such risk-taking, rather than simply supporting new practices, creates opportunities for trying to implement new practices:

> *"If you have got the backing of your head of department to say, 'Do it. See what happens. If it's carnage, we'll deal with it.'"* (Study1)

They describe the culture in their institution as "an implicit thing which was 'it is OK to try, it is also OK to fail'." (Study1). The doctors discuss the importance of engaging the managers for risk-taking, since "if you can engage the managers, then it becomes more of a collective risk" (Study4).

Yet, as the healthcare leader's comment above shows, many education and healthcare institutions are not characterised by such cultures supporting risk-taking at the leadership level.

I suggest that a key feature of both of these discussions is learning to learn from failures through framing them as opportunities for new insights. Study2(b) teachers discussed coming to understand that their difficult attempt at a new practice "wasn't actually at all a failure, because it is an extremely difficult thing to do", highlighting that "it probably wasn't that much of a failure after all, it just has scope for further developing". However, both the teachers and doctors emphasise that this is not easy and can be painful and lead to practitioners abandoning their change efforts. A Study3(b) teacher described how initially "I think I failed—so I said no, this is too much, and I won't manage", and only after encouragement from an external researcher "said okay fine, let me try to do it. So I prepared and went to class . . . it was just smooth—So at the end of it, I said okay now I can say I'm successful!". The same experience is discussed by Study4 doctors:

> *"It [their improvement project] was a learning experience but it was painful.—If you'd have asked me six months into the project, I'd have probably thought well what's the point, but actually at the end of it I realise what the point was."* (Study4)

This highlights the ongoing challenge of risk in attempts to develop and implement new practices. I will now turn to discussing the implications of these findings for facilitating research-use in education and healthcare at scale.

4. Discussion and Conclusions

Despite significant policy efforts in the UK, US and elsewhere to use research findings to inform the development of equitable and sustainable practices in education and healthcare (cf., [3–5,11]), research-use in practice remains rare [12,17,18,23]. We lack theoretical insights into the mechanisms of successful research-use and the nature of the challenges that stop practitioners from developing research-informed practices [20–22,27]. This paper addressed this gap. It was motivated by the systematic observation from my body of research on professional learning interventions in education and healthcare, which has shown that even when research is available and relevant, and practitioners are keen to use it, genuine change in practice to utilise that research remains elusive. This study sheds light on this puzzle. It develops intermediate theory about the mechanisms influencing practitioners' success in developing new research-informed practices following PLIs. These mechanisms are grounded in an analysis of concrete change efforts in institutions but were shown in this cross-contextual analysis to be recognisable in, and therefore potentially applicable to, different organisations and professions.

There is increasing recognition that using research as a resource to transform practice not only involves the adoption of new prescribed guidelines; it involves developing new practices [7,22,27,30,33]. It thereby also involves professional learning and practitioners' active agency to change their practice [1,27,43]. In this study, I built on the literature on research-use across the public sector, research on professional learning and theoretically informed work on professional change to help investigate the mechanisms and challenges involved when practitioners use research to change their practice. These studies highlighted the practitioners' agency and the relational and normative nature of research-use. I further highlighted the need to attend to the under-researched aspect of risk in efforts to use research to change practice.

To develop generalisable conceptual insights from close-up research on practice, I developed and utilised a novel methodological approach: I applied a dialogic method of analysis—the difference-within-similarity method—to synthesise findings from multiple settings across two professions, education and healthcare. This method, which simulates change in qualitative data, enabled me to identify and theorise cross-contextual and cross-professional patterns in the challenges to and mechanisms of change in professional practices which were aiming to develop and implement research-informed new practices.

I identified four key mechanisms that can stop practitioners using research to develop new research-informed practices, related to practitioners' perceptions of their agency, their relational expertise, the normative aspect of institutional practice and risk-taking. Moving analytically back and forth in the data, I discovered that these mechanisms function in a paradoxical way. I hence termed them *the paradoxes of professional change in research-use*. The way these played out revealed both similarities and differences between teachers and doctors. Differences were sometimes obvious on the operational level of each group's work activities and their content (such as when teachers were concerned about students' ability to learn in the new ways suggested by the research, which has no direct parallel in doctors' work) (cf., [58]). However, examining the underlying patterns and mechanisms that led to and sustained practitioners' current actions and interpretations (as recommended by [74]) that limited their research-use, important similarities were identified that suggest more fundamental patterns in the challenges to change practice, as necessarily involved in research-use.

I argued that the paradox of agency stems from the fact that practitioners commonly held the limiting assumption that conditions of their practice outside their control hinder change (in other words, that they do not 'have' agency to change their practice). The target/content of those limiting assumptions differed according to the content of their respective work (students/colleagues). However, the underlying mechanism that led to these interpretations was the same: both types of limiting assumptions were found often to be untrue, yet when strongly held by practitioners, they stopped them from trying out new practices and, hence, from noticing that change is possible and that they do have agency.

The paradox of other people lies in the fact that practitioners tended to overfocus on those people in their organisation who are likely to resist change efforts, and as a result of thereby not identifying and engaging those people who might be a resource, found it harder to overcome resistance. Studying teachers and doctors together suggests that while relational expertise to overcome this paradox is learnable, it is not learned automatically: the literature suggested that doctors have more opportunity to collaborate; however, they did not appear to be better at it. Purposeful professional learning is required for the development of the relational expertise required in research-use.

Research-use intersects with norms of practice. The paradox of norms emerges because while practice cannot change without changing its norms, departing from existing norms is frowned upon. Additionally, it means practitioners cannot draw on shared understandings of what their actions are trying to establish, making change and bringing others along harder. Here, too, the joint analysis suggests interesting insights. Which exact norms generate challenges to research-use is often sector- and, to a lesser extent, context-specific. However, in both sectors, addressing and changing norms to be able to use research required the understanding that it is insufficient to address the surface level of the norm (the expected/habituated 'to do'); it is necessary to identify, articulate and address the underlying rationale(s) for the norm to be able to break away from existing habituated practices, as is inevitably required by research-use.

Finally, the paradox of risk arises in research-use because the risk entailed in any attempt to achieve substantial change puts people off from trying, but the fewer people attempt change, the greater the risk is to those who attempt it, acting as a further deterrent. The immediate risks obviously differ in doctors' and teachers' work. However, the analysis found that across the sectors, a key challenge in research-use is that the fear of reputational risks involved in disrupting existing practices is often greater that the motivation for improving practices and outcomes warranted by the research.

Some of the identified ways of overcoming these challenges are not available to individual practitioners to effect, such as having enthusiastic leaders or researchers available for personalised support. I am interested in identifying scalable ways of overcoming the change paradoxes. Through integrating the study's findings with the existing theoretical literature on professional change, I propose a tentative framework for a research implementation model to facilitate transformative change. This model has three dimensions.

I suggest that to motivate practitioners to trial new research-based practices even when they think those are 'not going to work in their setting' so that they can come to see themselves as agentic (which is not the same as saying any specific new practice is a good thing) and to mitigate the risks involved in attempting change, three things need to be considered. Firstly, the literature review highlighted that practitioners' actions are oriented towards what they perceive to be concrete 'problems of practice' that they must first and foremost address [37,48]. To frame the research and the associated change efforts and risks as worthwhile and ethical, research findings need to be explicitly connected to *practitioners' local goals and problems of practice in their concrete context of work* so that they can clearly perceive the potential of any new practice in facilitating those (and not only what is considered important by researchers, policy-makers or at the system level).

Secondly, research needs to offer insights not only about the target practice (teaching, clinical care) but also about the change processes required to transform said practice. It needs to consider the multi-dimensional nature of normative change [103], the development of relational expertise [37] and the capacity to generate surprises. My findings suggest that achieving this requires the development of research-informed tools to support the development of effective collaboration and relational expertise and to enable practitioners to identify, articulate and work on the norms of the practice they are trying to change (cf., [74,77]).

Thirdly, I demonstrated how any conceptual model supporting research-use to transform practice in high-accountability educational and healthcare settings must seriously consider the risk involved to practitioners themselves in change efforts to use research.

This involves acknowledging local accountability systems, always including the accountability to students, patients and the practitioners themselves. To achieve this, it must offer practitioners research-based tools to mitigate the risks of research-use, addressing both outcomes and other stakeholders, such as inspections. These tools should be realistic and practice-relevant, enabling local practitioner-led monitoring, self-evaluation and the articulation of change efforts and their (ongoing) impacts in and on practice.

This leads me to propose a three-part conceptual implementation model:

1. Research findings to be utilised need to be visibly linked with practitioner-identified problems of practice;
2. Practitioners need to be offered not only research to be implemented, but also research-based tools to support its implementation (including changing practice norms and facilitating productive peer collaboration and dialogue);
3. They need to be offered research-based tools to mitigate innovation risks, such as monitoring and self-evaluation tools, based on research but translated to practice contexts.

I argue that the cross-contextual and cross-professional analysis in this paper suggests that supporting practitioners' efforts to develop new research-informed practices through the elements of the three-part model proposed here may have the capacity to foster effective professional learning associated with concrete change in professional practice towards sustained improvement informed by research.

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