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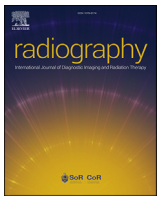

Research culture, barriers and facilitators within the radiography workforce in the UK – results of a national survey

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ABSTRACT

Introduction: Research is vital for diagnostic and therapeutic radiographers, providing the evidence base for disease diagnosis, screening, surveillance, radiotherapy planning, delivery, and treatment. Despite its benefits in improving patient outcomes and imaging services, little is known about the research culture barriers and facilitators within the UK radiography workforce.
Methods: An online survey with three sections was created, including demographic questions and a validated research and development culture index to measure research capacity, equality, diversity, and inclusivity. The survey was distributed between May and October 2023 to radiographers and nuclear medicine technologists via email and social media. Mixed methods analysis was performed using statistical analysis (R version 4.2.2) and qualitative analysis utilising a coding framework for open-ended responses.
Results: A total of 970 completed surveys were returned: 629 diagnostic radiographers, 306 therapeutic radiographers and 35 nuclear medicine technologists (~3 % of the UK workforce). Of respondents, 47.4 % had completed or were undertaking a postgraduate qualification and 41.1 % had engaged in research. The barriers to research yielded similar trends over all the radiographers. 'Lack of protected time at work', 'other roles taking priority' and 'lack of funding' being key barriers. The only enablers that scored less than 90 % agreement were 'research encouraged by manager', 'experienced external colleagues able to supervise', and the 'desire to prove a theory or hunch' and 'research written into the role description'.
Conclusion: Research remains underdeveloped in UK radiography roles. This national survey highlights that currently less than half of the UK radiographers have experience in research within their role. Protected time, funding, managerial support, and supervision access are crucial to embedding research into practice.
Implications for practice: Greater support is needed for radiographers and managers to overcome barriers and promote radiographer-led research.

Introduction

Radiography research is a vital part of the role of diagnostic and therapeutic radiographers, sonographers and nuclear medicine technologists, providing the evidence-base for advancing practice and improving patient outcomes. Both diagnostic and therapeutic radiography are rapidly evolving fields, driven by technological

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advancements and a commitment to delivering high-quality patient care. The need for radiographers to undertake research is defined by the Department of Health and the Society and College of Radiographers (SCoR).[1,2] The SCoR research strategy includes embedding and enabling research at all levels of radiography practice and education, and expanding research capacity through development of a skilled and motivated research active profession.[3] Despite this clear vision, the number of research active radiographers in the UK remains low as a proportion of the profession and this limits the potential for evidence-based improvements in care.[4]

In 2023, the Health and Care Professions Council reported 43 040 radiographers in the UK.[5] The 2016 SCoR research strategy set a target of 1 % of the radiography profession to hold or be working towards a doctoral level award by 2021.[6] In 2017, 90 radiographers who held or were studying for a doctorate responded to a survey, with a PhD being the most common award.[7] However, it was also reported that 25 % of academic radiographers with doctorates were nearing retirement.[8] By 2024 121 Radiographers held doctorates according to the SCoR doctoral log, but the expected number based on total registrants should be around 430. Radiographers are under-represented in National Institute for Health and Research (NIHR) Doctoral fellowships (DCAF), accounting for just 0.002 % of those awarded a DCAF in 2022 and 2023 combined, which is lower than Physiotherapists, Dieticians and Speech and Language Therapists.[9]

The Education and Career Framework aspires for advanced practitioners to hold a full master's qualification and consultant practitioners to have or be working towards a PhD. However, many of those in advanced and consultant practice roles are not fulfilling the research component of their roles with multiple barriers to undertaking research in practice.[10,11] While radiographer-led and multidisciplinary research including radiographers is improving, more progress is needed for an evidence-based future.[12] To create strategies to increase research activity and capacity it is important to understand the current culture of the workplace including barriers and facilitators to research. The aim of this study was to investigate research and development culture within radiography (diagnostic, therapeutic, and nuclear medical technologists). For the remainder of the paper 'radiographer' will be used to illustrate all the professions in parenthesis, unless specifically stated.

Methods

An online survey was chosen to reach a large number of radiographers nationwide. As per Society and College of Radiographers (SCoR) guidance, the survey was carried out for the legitimate purposes of a trade union survey of workplace conditions, with permission for survey participants to be approached via College of Radiographers (CoR) communications. Ethical approval is not required for legitimate purposes of a trade union however SCoR policy is to register with SCoR and gain permission to undertake the survey. The project was registered with SCoR Head of Professional Practice & Education with oversight from SCoR Knowledge Manager.[13]

Participants completing the survey consented to participation upon submission of the survey. The data was held in secure networks and email identifiers were removed from the data prior to analysis to ensure anonymity.

Survey design and distribution

The survey consisted of three sections (survey available in supplementary materials). Section one focused on respondent demographics including profession (diagnostic/therapeutic/nuclear medicine), level (banding), qualifications, research experience and current work status. Section two used the validated research and development culture index (RDCI) to assess research capacity at individual, team and organisation levels.[11] The respondents were asked to rate 15 statements covering three domains (personal, work, organisational) using a four-point Likert scale. Questions regarding barriers and enablers to research activity, derived from previous studies, were also included, with 12 barriers and 19 enablers.[11,12] These statements were reviewed by ten expert radiographers who ranked the relevance in a four-point scale from not relevant (score = 1) to highly relevant (score = 4) according to the questions 'What factors prevent or preclude participating in or leading research' and 'What factors enable participating in or leading research'. Content validity ratio (CVR) and content validity index (CVI) were calculated using:

CVR=(Ne - N/2)/(N/2), where Ne = number of experts voting 'highly relevant' and N = total number of recruited experts.

CVI = the mean content validity ratio of all questions on a test.

The closer the CVI is to 1, the higher the overall content validity of a test. The questions with a CVI >0.78 were chosen to be included in the questionnaire which resulted in a CVI of 0.87 (average score). Six questions related to barriers were included in the final questionnaire and 13 questions related to enablers. Two free text responses were included, one on barriers one on enablers to capture any other important barriers/enablers.[14]

The third section included equality, diversity and inclusion questions identified by the National Institute of Health Research.

The survey was distributed via email and social media to radiographers through the study team and the CoR between May and October 2023, using purposive and snowball sampling. Profession and geographic distribution were reviewed periodically, to ensure a representative sample.

Data analysis

All quantitative data analysis was carried out in R (version 4.2.2). Statistical analysis was carried out in base R and plots were created using the Likert package.[15]

Descriptive summaries were used to create demographic profiles. Responses in the research development culture index part of the survey were scored from 0 (strongly disagree) to 3 (strongly agree) with the median and range of scores calculated overall for all 15 RDCI statements as well as separately for each of the three domains (personal, work, organisational).

Research activity levels were quantified by calculating the total number of research activities participants reported engaging in. Inferential statistical analysis was conducted using this number in relation to participants' responses on level of training, age, gender, banding, work pattern (full or part time), disability, caring responsibilities and role.

Free text responses to the open-ended questions regarding other barriers and enablers to research were analysed using content analysis to identify common themes.

Results

Sample information

A total of 970 surveys were completed and returned. Respondents consisted of 629 (64.9 %) diagnostic radiographers, 306 (31.5 %) therapeutic radiographers and 35 (3.6 %) nuclear medicine technologists. Table 1 gives an overview of participants personal and professional demographics (A full table of participant characteristics is available in supplementary materials).

Table 1
Participant demographics.

Profession	Diagnostic radiographer (n = 629, 64.9 %)	Therapeutic radiographer (n = 306, 31.5 %)	Nuclear medic
Region, n (%)			
England	505 (80.3)	248 (81.0)	31 (88.6)
Scotland	71 (11.3)	37 (12.1)	4 (11.4)
Wales	27 (4.3)	10 (3.3)	0
Northern Ireland	22 (3.5)	11 (3.6)	0
Channel Islands	1 (0.2)	0	0
Isle of Man	1 (0.2)	0	0
Age, n (%)			
18–24	22 (3.5)	22 (7.2)	1 (2.9)
25–34	152 (24.2)	91 (29.7)	12 (34.3)
35–44	203 (32.3)	93 (30.4)	9 (25.7)
45–54	153 (24.3)	70 (22.9)	10 (28.5)
55–60	64 (10.2)	23 (7.5)	1 (2.9)
61–65	18 (2.9)	2 (0.7)	0
65 +	3 (0.5)	1 (0.3)	0
Prefer not to say	14 (2.1)	4 (1.3)	2 (5.7)
Years of experience, n (%)			
0 to 5	78 (12.4)	60 (19.6)	8 (22.9)
>5 to <10	92 (14.6)	70 (22.9)	6 (17.1)
>10 to <15	147 (23.4)	46 (15.0)	8 (22.9)
15 +	312 (49.6)	130 (42.5)	13 (37.1)
Full time, n (%)	468 (74.6)	220 (72.9)	29 (82.9)
Band, n (%)			
Band 5	56 (8.9)	42 (13.7)	1 (2.9)
Band 6	167 (26.5)	82 (26.8)	13 (37.1)
Band 7	252 (40.1)	92 (30.1)	12 (34.3)
Band 8a	77 (12.2)	47 (15.4)	8 (22.8)
Band 8 b	35 (5.6)	22 (7.2)	0
Band 8C or above	8 (1.3)	7 (2.3)	0
Other	6 (1)	3 (0.9)	1 (2.9)
University academic	28 (4.4)	11 (3.6)	0

Research training and activity

Overall, 73.8 % of respondents stated they had completed a first degree and 47.4 % had either completed or were currently undertaking some type of postgraduate qualification (PhD, Masters) albeit with the number of Masters degrees in the order of 33–40 % and the number of PhDs at <7 % in total across all professions. Overall, 41.1 % of respondents stated they had undertaken some kind of research activity. Table 2 shows the level of training and research activity by profession.

Individuals with postgraduate qualifications were more likely to engage in research activities, with a strong positive correlation between those holding a PhD (Spearman's rho = 0.44, p < 2.2e-16) or a Master's degree (Spearman's rho = 0.41, p < 2.2e-16) and research engagement. Those with a Master of Research (MRes) or Master of Philosophy (MPhil) showed a weaker, but still significant, positive correlation (Spearman's rho = 0.14, p = 1.04e-05 and Spearman's rho = 0.10, p = 0.0015, respectively).

Demographic and professional factors also showed associations with research activity. Age had a weak positive correlation

Table 2
Levels of education/training and research activity. Note, participants were able to select more than one option and therefore percentages do not add up to 100.

Profession	Diagnostic radiographer (n = 629)	Therapeutic radiographer (n = 306)	Nuclear medicine technologist (n = 35)
Level of training*, n (%)			
PhD	41 (6.5)	23 (7.5)	1 (2.9)
Masters dissertation	209 (33.2)	125 (40.9)	14 (40.0)
Masters in research	20 (3.2)	12 (4.0)	3 (8.6)
Masters in philosophy	8 (1.3)	4 (1.3)	0 (0)
First degree	444 (70.1)	247 (80.7)	25 (71.4)
Diploma in research	29 (4.7)	6 (2.0)	3 (8.6)
Certificate in research	55 (8.7)	21 (6.9)	5 (14.3)
Course in research methodology	173 (27.5)	96 (31.4)	7 (20.0)
Good clinical practice	294 (46.7)	177 (57.5)	28 (80.0)
Internship	49 (7.8)	11 (3.6)	8 (22.9)
* Completed or currently undertaking			
Research activity, n (%)			
Author of a non-peer reviewed publication	43 (6.8)	24 (7.8)	3 (8.6)
Co-author of a peer reviewed publication (not first or last author)	67 (10.7)	41 (13.4)	7 (20.0)
First or last author of a peer reviewed publication	61 (9.7)	35 (11.4)	3 (8.6)
Named applicant on a grant	34 (5.4)	19 (6.2)	1 (2.9)
Named applicant on a research ethics application	58 (9.2)	28 (9.2)	3 (8.6)
Presenter at a non-research conference	58 (9.2)	41 (13.4)	0 (0)
Presenter of research conference paper	49 (7.8)	35 (11.4)	6 (17.1)
Presenter of research conference poster	61 (9.7)	39 (12.8)	6 (17.1)

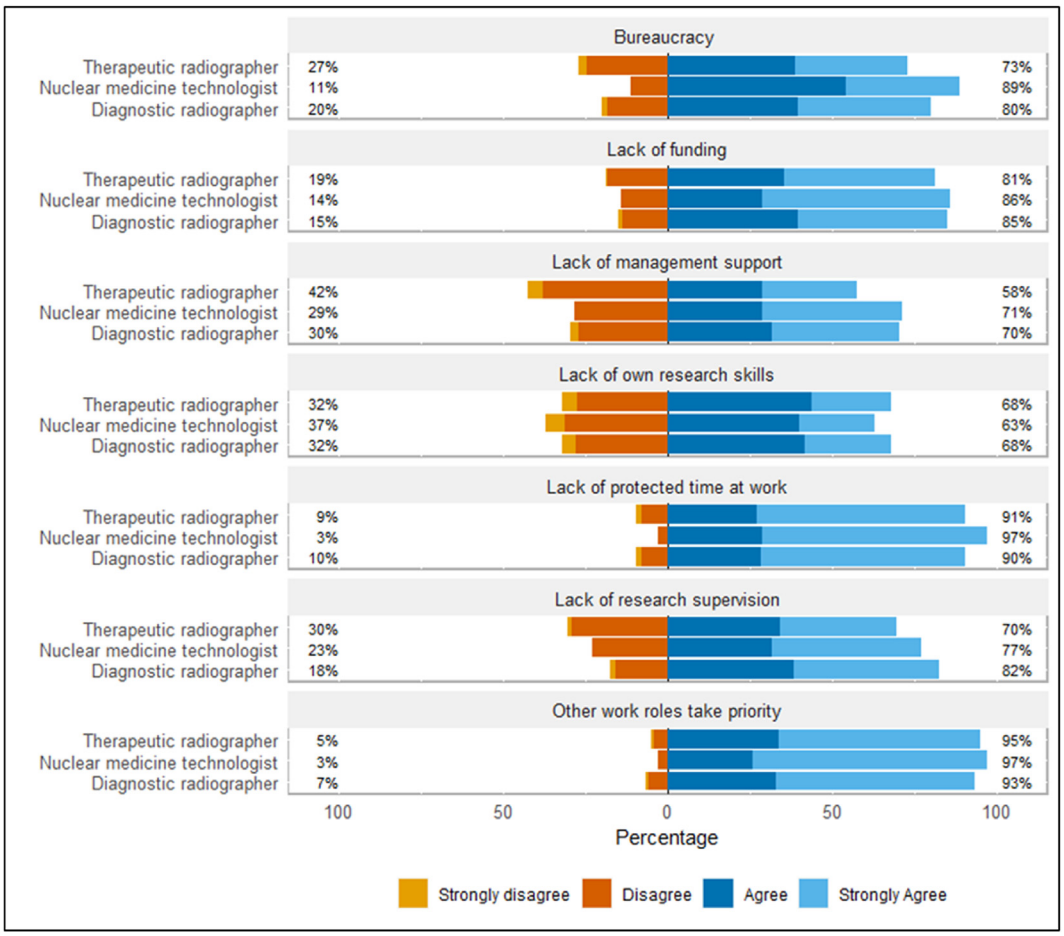

Figure 1. Statements rated in response to the question "What factors prevent or preclude participating or leading research?" from therapeutic radiographers (n = 306), nuclear medicine technologists (n = 35) and diagnostic radiographers (n = 629).

(Spearman's rho = 0.17, p = 3.29e-07), while employment band showed a moderate positive correlation (Spearman's rho = 0.34, p < 2.2e-16). Experience was weakly positively correlated (Spearman's rho = 0.21, p = 1.22e-08), and caring responsibilities had a small, statistically significant association (p = 0.002), but with a negligible effect size (delta = −0.092).

Although ethnicity appeared initially significant (p = 0.034), it was not statistically significant after Bonferroni adjustment (adjusted p = 1). Gender, employment status, role, and disability status were not significantly associated with research activity.

Research culture, barriers and enablers

Figures 1 and 2 show participant responses to questions regarding factors preventing and enabling research.

The RDCI section of the survey consisted of 15 questions (Table 3). Table 4 shows scores for all questions combined and for questions from each domain of the RDCI: personal, work and organisational.

Free text content analysis

A total of 429 responses were received to the question, 'Are there any other barriers that you think exist?', and 175 to 'Are there any other enablers that you think are important?'. After excluding blank and erroneous entries, 417 responses related to barriers and 155 responses related to enablers were analysed.

The analysis revealed three main themes: Organisational and Cultural Barriers, Personal and Professional Development Barriers, and Systemic Barriers.

Organisational and cultural barriers

The most frequently cited barriers included staff shortages and time constraints with many citing clinical duties prioritised over research activities. Lack of managerial support was also a barrier for some (n = 22) respondents, who suggested managers exhibited little interest in and a lack of understanding about research. Time management issues, including the lack of protected time was frequently mentioned as well as challenges related to work life balance (n = 9) and working part-time (n = 7). Respondents also suggested there were barriers relating to organisational culture, with some respondents suggesting research within the profession was undervalued and there were insufficient roles and opportunities available (n = 12).

Bureaucratic hurdles such as complex approvals processes, duplication, and insufficient funding, also emerged as barriers.

Personal and professional barriers

Perceived inequity in access to research opportunities was common (n = 24) with many comparing their situation unfavourably to other healthcare professionals. Issues such as age, gender,

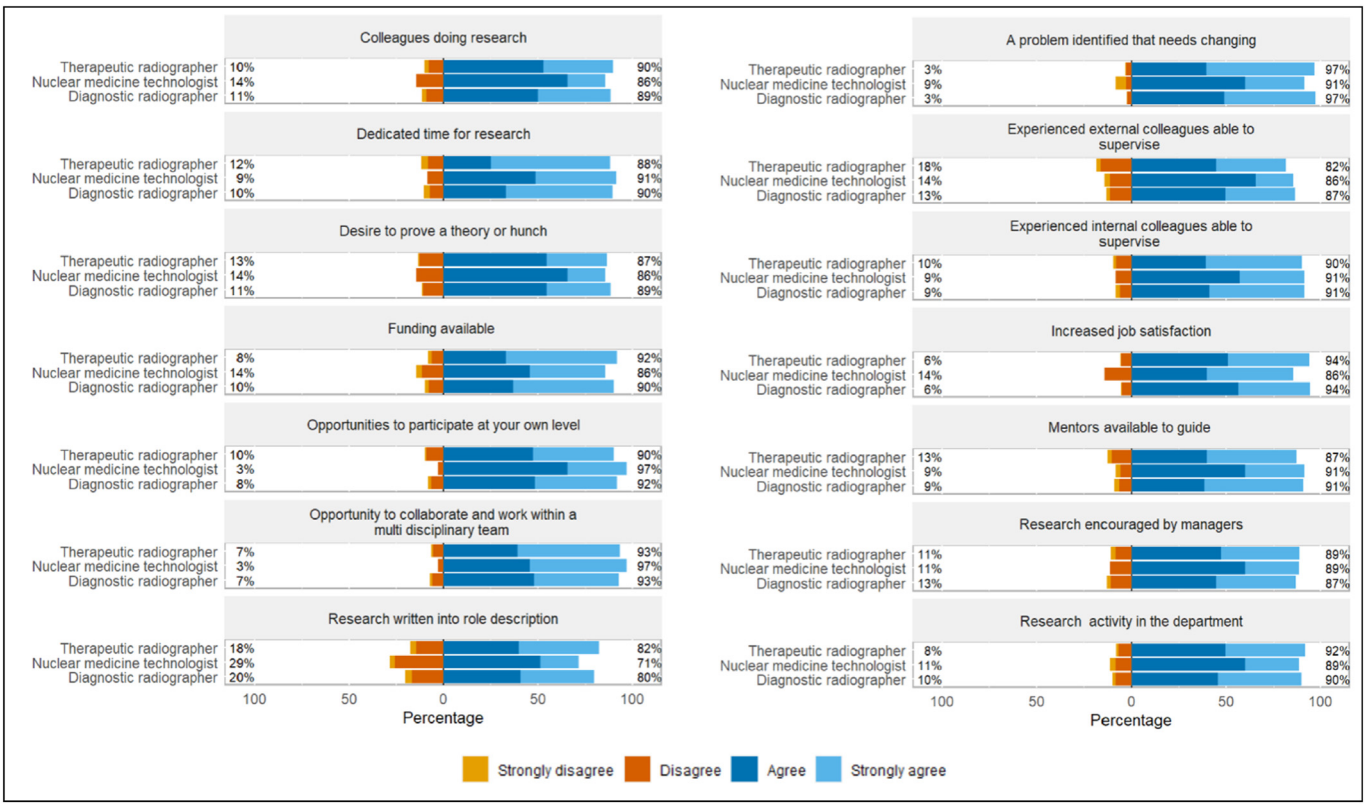

Figure 2. Statements rated in response to the question "What factors enable participating or leading research?" from therapeutic radiographers (n = 306), nuclear medicine technologists (n = 35) and diagnostic radiographers (n = 629).

race, and disability discrimination were reported but not demonstrated in inferential statistical analysis.

Personal barriers included lack of confidence and motivation, and feelings of impostor syndrome. A lack of peer support and a negative workplace culture also contributed to these challenges.

Systemic barriers

Eight respondents highlighted challenges in identifying research questions, a key barrier to initiating research. The main systemic issues were a lack of knowledge on how to begin, compounded by inadequate training, limited time, low confidence, and impostor syndrome.

Respondents noted that guidance frameworks and mentorship were enablers to research. whereas a lack of mentors and career progression, along with pay scale barriers, were common concerns. Educational gaps between higher education and clinical settings were also mentioned. Additionally, some felt research activities lacked visibility and recognition within the profession, with opportunities often going unnoticed, contributing to a broader cultural issue.

Discussion

This survey presents an insight into the research status and culture of radiographers' workplaces in the UK.

Sample information

The response rate is estimated because of challenges in determining the total number of radiographers in the UK and those who received the survey. Data from the Health and Care Professions Council may not account for retirees, long term sickness or other professions like sonographers and nuclear medicine technologists. Therefore, despite 960 respondents, this may represent <3 % of the work force.[5] Notably, therapeutic radiographers, making up 14.7 % of the workforce, represented 31.5 % of respondents.[16] While the response rate may be low, the sample size is comparable to similar studies investigating nurses and midwives and primary care health professionals.[17] The sample is also well-distributed across the UK and all radiographer grades making it reasonably representative.

Research development and culture index

The RDCI scores varied across and within domains. Radiographers demonstrated strong personal research skills despite only 41 % engaging in research. Similar to other disciplines, radiographers recognised the importance of research and desired more opportunities to share ideas.[17] Similar barriers in research for radiographers in Nordic countries were recorded such as lack of knowledge and an absence of a research culture.[18] In our study, the strong personal skills and desires were also reportedly restricted by the work environment. Improving research culture requires visible radiography research leadership, regular accessible forums for discussing service-related research investigations and clearer alignment between research initiatives and departmental and directorate plans.

Weaker areas like confidence in research skills, could be addressed through training and mentoring but supportive environments are essential for skill development. Clinical academic roles and research strategies have successfully increased research activity in some centres.[19,20] Collaborative work with other professions, as outlined in the NHS England multi professional

Table 3
Results of the RDCI (In order of highest agreement for all professions combined).

	Domain	Diagnostic Radiographers n = 629 (64.9 %)	Therapeutic Radiographers n = 306 (31.6 %)	Nuclear Medicine Technologists n = 35 (3.7 %)	All professions n = 970
I know how professional practice is influenced by research	Personal	545 (86.6 %)	290 (94.7 %)	32 (91.4 %)	865 (89.2 %)
I am very keen to use research in professional practice	Personal	549 (87.3 %)	268 (87.6 %)	31 (88.6 %)	848 (87.4 %)
I would like more opportunities to share professional practice development ideas and/or research and/or information across my institution	Personal	527 (83.8 %)	251 (82.0 %)	30 (85.7 %)	808 (83.3 %)
I would like to learn about research activity during the next 6 months	Personal	486 (77.3 %)	237 (77.5 %)	28 (80.0 %)	753 (77.6 %)
Development of my professional practice/role is valued as part of my job	Work	450 (71.5 %)	249 (81.4 %)	26 (74.3 %)	725 (74.7 %)
I understand research terminology	Personal	441 (70.1 %)	242 (79.1 %)	23 (65.7 %)	706 (72.8 %)
There are people around to help and support me to change and/or develop professional practice	Organisational	420 (66.7 %)	225 (73.5 %)	24 (68.6 %)	669 (69 %)
There is opportunity to develop professional practice in my area	Work	396 (63.0 %)	219 (71.6 %)	22 (62.9 %)	637 (65.7 %)
There are opportunities to reflect on my work/practice	Work	394 (62.6 %)	210 (68.6 %)	24 (68.6 %)	628 (64.7 %)
I have access to training and development opportunities which give me the skills to question and investigate practice	Organisational	373 (59.3 %)	213 (69.6 %)	19 (54.3 %)	605 (62.4 %)
There is strong professional leadership	Organisational	356 (56.6 %)	197 (64.4 %)	20 (57.1 %)	573 (59.1 %)
I feel confident about using research in professional practice	Personal	337 (53.6 %)	191 (62.4 %)	23 (65.7 %)	551 (56.8 %)
The development work that I do links with the Directorate's (or division/institutions) plans	Work	333 (52.9 %)	195 (63.7 %)	19 (54.3 %)	547 (56.4 %)
My discipline here works as equal partners with other disciplines in order to change or develop practice	Work	296 (47.1 %)	189 (61.8 %)	22 (62.9 %)	507 (52.3 %)
There are regular staff meetings to explore ideas	Work	248 (39.4 %)	159 (52.0 %)	21 (60.0 %)	428 (44.1 %)

Table 4
RDCI scores.

	Diagnostic radiographer (n = 629)	Therapeutic radiographer (n = 306)	Nuclear medicine technologist (n = 35)	All professions (n = 970)
All RDCI statements (15 questions) Median score (range)	27 (0–45)	28 (13–45)	27 (16–43)	27 (0–45)
Personal domain (6 questions) Median score (range)	12 (0–18)	13 (6–18)	12 (7–18)	12 (0–18)
Work domain (6 questions) Median score (range)	10 (0–18)	11 (0–18)	11 (3–17)	10 (0–18)
Organisational domain (3 questions) Median score (range)	5 (0–9)	6 (0–9)	5 (1–9)	5 (0–9)

framework for advanced clinical practice and measuring impact, is key to fostering research.[17,20,21]

Postgraduate qualifications, especially a PhD or Master's (dissertation) degree were strongly linked to increased research activity, in line with previous studies.[4] Older individuals and those with more experience were more likely to engage in research, although age was weakly corelated, possibly due to accumulated expertise, confidence, and autonomy. Caring responsibilities had a small impact on research participation, with individuals managing them still engaging in research, though possibly less so. Employment status (full-time vs part-time) did not significantly affect research engagement. Policies targeting lower employment bands or with less experience could help increase research participation, while further support for younger individuals or those with caregiving responsibilities could boost research engagement.

Barriers and enablers to research

Barriers to participating in research included lack of protected time and funding with research often not prioritised during periods of high clinical demand.[22,23] While, having research written into job descriptions was generally seen as an enabler, it was the area of most disagreement within the enabling statements and warrants further investigation. Supportive leadership is key and when leaders promote research it aligns with improved job satisfaction and staff retention, supporting the 2023 NHS long-term workforce plan.[24]

Organisational and cultural barriers

The free text responses to this survey corroborate the results from the fixed response questions and are supported by evidence in the literature.[22] Drawn from both clinical imaging and therapeutic

radiography, our respondents most frequently cited low staffing and time constraints as persistent barriers.

Radiography research is likely impacted by clinical demand, staff burnout, and staff shortages, reducing research output due to limited available hours.[25] Consistent with other studies, respondents highlighted the need for a cultural shift because research was often seen as separate from clinical practice rather than integrated into evidence-based care.[23,26,27]

Professional and personal barriers

The free text results provided further insight into professional and personal barriers related to inequity. Respondents perceived disparities in research opportunities compared to medical and physicist colleagues, as well as personal inequities related to age, gender, race, geography, and disability.

Part-time workers, in particular reported inequity, aligning with a previous finding regarding sonographers.[24] This is in contrast to NHS England Allied Health Professions' Research and Innovation Strategy which contends that research must be 'embedded into job descriptions and routine practice across all career stages of the Allied Health workforce[27]'.

Efforts must be taken to ensure all of the workforce is enabled to engage in research, avoiding the discrimination based on profession, protected characteristics, employment status, or career level. Focusing on equality, diversity and inclusion (ED&I) in radiography research[28] is crucial in radiography research to enhance perspectives and evidence-based practice. Attention to ED&I now needs to be explicit and overt throughout radiography research to foster positive research cultures.

Barriers to research included lack of confidence, motivation, imposter syndrome and uncertainty about how to get started in research or define research questions. While positive attitudes towards research is linked to research activity [28] they alone are insufficient to increase research capacity. Investing in research skills, knowledge and time is essential.[4] Peer support was identified as a key enabler in overcoming personal barriers.

Organisational and cultural enablers

A key challenge in fostering a positive research culture is the lack of management understanding of research and subsequent lack of support. Yet managers are key players who can inspire staff, influence culture, allocate (crucial) protected time and implement individual job plans. Significant association has also been demonstrated between dedicated research radiographer roles and wider implementation of research culture in practice[21,29] in line with free text comments from participants.

Research by radiographers in the UK is primarily conducted by those employed in academia.[29] Danish experience showed that clinical radiographers are motivated when departments offer training, support and clinically relevant research projects with dedicated research time.[30] Watts comments that it is now time for positive action to build on UK clinical radiographers' well-documented positive attitude to research and create a successful research culture.[27,31] In an exploratory factor analysis of the RDCI amongst nurses, it was concluded that the continuing promotion of research and development within Trusts is dependent upon a multi-faceted approach that addresses the learning needs of the organisation as well as those of the individual practitioners. The results of our survey again support these theories.[28]

Professional and personal enablers

Guidance for developing professionals, local research strategies and clinical academic radiographers is work underway including research and clinical trials radiographer roles at SoR[32,33].[34] The NIHR supported Radiographer Incubator has developed a framework to empower radiographers in their development with a targeted programme over the next two years.[35] This positive contribution of radiography peer support, mentors, special interest groups and peer networks is essential for the development of positive research culture in radiography and increased research activity.[36]

Survey respondents indicated that on a personal level, role models, mentorship and guidance are strong enablers. Current system level expectation that advanced and consultant practitioners must hold a minimum of MSc level award should be a positive enabler for research mentorship because those with postgraduate qualifications are more likely to engage in research.[30]

Limitations

Although this was a relatively small sample of the profession, the respondent demographics were representative of the wider radiography population. However, there is a possibility of respondent bias, where radiographers with a greater interest in research were more likely to respond to the survey, which may influence the overall findings.

Conclusion

In conclusion, this was the largest survey of radiographers assessing research culture and development within the UK. The results demonstrate a desire from many radiographers to undertake research, but ongoing barriers to the facilitation of embedding research into radiographer roles need addressing. Strong leadership, ensuring research is core to departmental activity across clinical and academic departments and access to research training, mentorship and support is essential to ensuring increasing radiography research in the future.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.radi.2025.102959.

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