

# Career intentions, their influences and motivational factors in diagnostic radiography: A survey of undergraduate students

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## **Introduction**

Diagnostic imaging continues to see increasing demands, particularly to support cancer targets and other clinical priority areas.<sup>1</sup> The recruitment of students into the graduate workforce and their long term retention in the profession is therefore critical, even allowing for the use of skills mix to expand image acquisition capacity.<sup>2</sup> The need to develop radiographers who are committed to a career in healthcare is essential, particularly with United Kingdom (UK) vacancy rate reaching almost 10%.<sup>3</sup> In the UK the training of diagnostic radiographers comprises a BSc (Hons) degree, or a pre-registration Master's level award, incorporating both academic and clinical placement learning. Higher Education Institutions (HEIs) must deliver a curriculum to prepare students for tasks associated with their first post which satisfy the requirements of the regulator, the Health and Care Professions Council (HCPC) and their Standards of Proficiency for Radiographers.<sup>4</sup>

Diagnostic radiography graduates have traditionally sought their first post within general radiography before moving into other areas after several years.<sup>5</sup> As a result radiography curricula have predominantly focussed on this career path.<sup>6</sup> Clinical placements in other specialist areas are included to broaden the understanding of patient pathways and the profession, whilst also facilitating long term career planning.<sup>5</sup> However, the evolving nature of healthcare practice, changes in technology and increased demands on services<sup>7</sup> has resulted in greater opportunities alongside potential for role enhancement and advanced practice.<sup>3</sup> This has led to some radiographers now securing first post appointments outside of general radiography and long term career decisions regarding specialisation are being made earlier. Additionally, there is a need to address recruitment to lower profile specialities such as mammography and interventional radiology (IR) which often struggle, in comparison to the high-profile areas of computed tomography (CT), magnetic resonance

imaging (MRI) and ultrasound (US). It is therefore essential that the contemporary radiography curriculum reflects the future needs of the profession and healthcare services.<sup>5,8</sup>

There is limited information regarding the influences on the career directions of radiography students,<sup>9</sup> but it is known that many variables can play a role including family, lifestyle, personality, and gender.<sup>10</sup> Further, decisions regarding career specialisation have been shown to be influenced by financial gain,<sup>11</sup> prestige and external perceptions.<sup>12</sup> Specialty choices are also informed by educational experiences,<sup>13</sup> although it is unclear how radiography programmes are influential and whether they guide students in short or long-term career planning.

This project aimed to scope the influential factors in diagnostic radiography students future career choices and to specifically determine how the undergraduate programme contributes to shaping the decisions.

## **Method**

The study setting was a single HEI in northern England which offers a three-year full-time undergraduate degree in diagnostic radiography. The degree programme includes academic and clinical practice placement within all three years and the students are each hosted at a single NHS hospital Trust, with opportunity for an external elective placement in the final year. Institutional ethical approval for the study was provided (EC26159) prior to commencement.

Following a review of the literature a cross-sectional survey was developed using OnlineSurveys (Jisc, Bristol, UK). The initial survey design was piloted on a small number of undergraduate students prior to launch resulting in minor amendments. The final survey (supplementary material) sought information regarding basic student demographics, role aspirations and motivating factors. Respondents were asked to rank a list of potential speciality areas from 1 (first choice) to 10 (lowest). It was possible to allocate the same value to multiple specialities and there was no requirement to use all 10 values. Although the survey used predominantly closed questions to maximise participant engagement a number of questions enabled free text comments to be added to provide further information.

An electronic invitation to the survey was sent by email in March 2021 and an explanatory video was posted on the university virtual learning environment together with a link to the survey. A participant information sheet explained the study purpose, the ethical considerations and confirmed confidentiality of responses with no specific identifiable data, beyond age category, gender and year

of study, being sought. The survey remained open for eight weeks, with reminders posted at four and six weeks.

Statistical analysis was undertaken in SPSS (v 27.0), speciality choice values were reversed numerically for graphical representation (1 became 10, 2 became 9, etc.). Non-response bias was assessed using Chi-square for responses in the first week (early) and last week (late) of the survey data collection period. Mann-Whitney U was used for comparison of speciality ranking by gender. Free text comments were collated and analysed thematically through identification of emerging and common concepts within and across the student cohorts.

## Results

All 133 students enrolled in a diagnostic radiography programme in a single HEI were invited to participate. In total, 90 responses were received across the three years of the programme, a response rate of 67.6%. The distribution of respondents per academic cohort is summarised in table 1.

Table 1: Response rate by sample and year group

	Year 1	Year 2	Year 3	Total
Student cohort (No.)	62	44	27	133
Respondents (No.)	29	40	21	90
Response rate (%)	46.7	90.9	77.7	67.6

Analysis of the early (n =36) and late (n = 21) questionnaire responses demonstrated no significant difference in engagement between the different year groups ( $X^2=2.6$ ;  $p=.269$ ) or whether the students knew the speciality they wished to pursue before starting their degree ( $X^2=0.084$ ;  $p=.770$ ). The respondents were predominantly female (n=73/89; 82.0%), with one respondent not specifying their gender. The student ages ranged from 18–54 years, with the majority below 25 years of age (n=55/90; 61.1%).

Overall, almost all respondents indicated that they were intending to apply for registration, and work, as a radiographer upon completion of their degree (n=87/90; 96.7%). The three respondents

who were undecided, or not intending to remain in the profession, explained that the job was “boring and repetitive” (Year 1), that they “want to look at undergraduate medicine or starting my own business” (Year 2), or “do not feel that this career option offers a good work/life balance. As a single parent this is a very important factor for me and perhaps wasn’t something I had considered when beginning the programme” (Year 3). Additionally, a further student said they were considering a future move to Physician Associate training.

When asked whether they were hoping to work at their clinical placement site, 70.0% (n=63/90) confirmed they were. Of the remainder, 17 (18.9%) were planning on remaining within the same geographical region. Reasons for choosing to relocate after degree completion included “Originally from outside of [region]” (Year 1), “Closer hospitals to my home” (Year 2), “Willing to locate for the best opportunity” (Year 2), “I want to explore the field in another country” (Year 2) and “I don't live in [region] and the world is to be explored” (Year 3).

Of the 11 motivational factors assessed for importance when considering career decisions the most important areas to the students were focussed on personal wellbeing and career opportunities (Table 2). Variation was noted across the three year groups suggesting that some factors may vary over the length of student experience.

**Table 2: Factors considered important when thinking about career choices**

Motivation Factor	Year 1 No (%)	Year 2 No (%)	Year 3 No (%)	Total No (%)
Work Life Balance	27 (93.1)	39 (97.5)	21 (100)	87 (96.6)
Career Development	27 (93.1)	39 (97.5)	21 (100)	87 (96.6)
Job Satisfaction	26 (89.7)	39 (97.5)	21 (100)	86 (95.5)
Income Potential	21 (89.7)	37 (95.0)	21 (100)	85 (94.4)
Work Environment	27 (93.1)	37 (92.5)	21 (100)	85 (94.4)
Intellectual Stimulation	25 (86.2)	37 (94.9)*	19 (90.5)	81 (91.0)*
Variety of Work	23 (79.3)	35 (87.5)	18 (85.7)	76 (84.4)
MDT Working	26 (89.7)	35 (87.5)	12 (57.1)	73 (81.1)
Ability to work autonomously	22 (75.9)	34 (87.2)	14 (66.7)	70 (77.8)
Research opportunities	20 (69.0)	16 (40.0)	6 (28.6)*	42 (47.7)*
Prestige	10 (34.5)	22 (55.0)	9 (42.9)	41 (45.6)

Note: \*not all eligible students in the cohort answered this question. Percentage calculated from responses received

General radiography was the career speciality preference for most respondents, followed by ultrasound and cross-sectional imaging (Figure 1). Five students (three Year 2 and two Year 3) provided an additional free text response identifying an additional preference, all stating they would choose “reporting”. Of these, four had identified general radiography as their first or second choice with the other ranking ultrasound first followed by mammography.

A gender bias was observed in the choice of some specialities, with a significantly greater number of females ranking ultrasound ( $z=2.83$ ;  $p=.0046$ ), mammography ( $z=3.57$ ;  $p<0.01$ ) and general radiography ( $z=2.05$ ;  $p=0.040$ ) higher. Conversely, males were more likely to rate PACS ( $z=-2.25$ ;  $p<0.05$ ) higher than females. Given the higher number of female students in the sample (82.0%), the gender speciality preferences may have had an influential factor in the overall pattern.

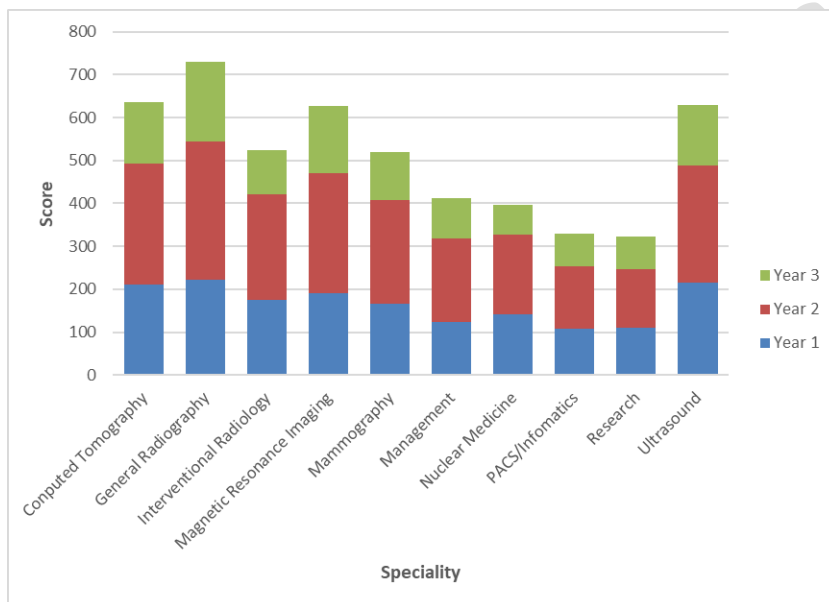


Figure 1: Specialty preferences across the three cohorts (score reflects cumulative ranking)

Almost one third of respondents ( $n=29/90$ ; 32.2%) had a clear career direction planned at the start of their degree, of these 11 (37.9%) stated their preferences had changed during their studies. In terms of the influential factors in their choice of career path the majority of students felt that their experience on clinical placement had contributed the most to their decisions (Table 3). Some cited influential role models in clinical practice, for example “A radiographer on placement who was very enthusiastic about her job and spent lots of time explaining and demonstrating her role to me” (Year 2). Another student described “Certain people seem very passionate about interventional [radiology] and have made it look and sound very interesting and quite fulfilling as a job role!” (Year 2). Interestingly the influence of others outside of the clinical setting, i.e. family, appeared to reduce

over the length of the course. The demographics of the students also may reflect their radiography career aspirations with one student stating that *“As a mature student I would want to be able to develop my career and advance quickly”* (Year 2).

Table 3: Influencing Factors when making Career Choices

Influencing Factor	Year 1	Year 2	Year 3	Total
	No (%)	No (%)	No (%)	No (%)
Clinical Placements	28 (96.6)	39 (97.5)	21 (100)	88 (97.7)
Other Radiographers on Placement	27 (93.1)	35 (87.5)*	20 (95.2)	82 (91.1)
Formal Teaching	23 (79.3)	31 (77.5)	16 (76.2)*	70 (77.7)
Medical Imaging Option Module	21 (72.4)	25 (65.7)*	18 (85.7)	64 (72.7)*
Prior Knowledge / Perception of Speciality	21 (72.4)	28 (70.0)	13 (61.9)	62 (68.8)
University Lecturers	20 (69.0)	27 (67.5)	11 (52.4)	58 (64.4)
Clinical Supervisor	20 (69.0)	23 (59.0)*	11 (52.4)	54 (60.7)*
Other Radiography Students	20 (69.0)	22 (55.0)	6 (28.6)	48 (53.3)
Family members	20 (71.4)	17 (42.5)	8 (38.1)	45 (50.6)*

Note: \*not all eligible students in the cohort answered this question. Percentage calculated from responses received

Importantly, some students felt that there had been limited opportunities so far to consider their career planning.

*“I’m only a first year we’ve not spent much time discussing careers yet.”* (Year 1)

*“At the moment there does not seem to be any guidance particularly on career choices and progression and the [university] careers service does not seem to focus on healthcare careers.”* (Year 2)

Further, respondents acknowledged a desire for dedicated teaching on career opportunities, both from academic and clinical staff, this was particularly for those in the second and third year of their programme, including

*“More career-based tutorials - what each modality entails in a day to day working life”* (Year 2)

*“More radiography careers sessions where radiographers of different modalities come to speak to us solely about the different modalities career opportunities.”* (Year 2)

*“More lectures based on getting jobs and progression within the field”* (Year 3)

Some saw that an academic staff member would be an appropriate advisor

*“Personal careers meetings with a lecturer that knows me well and knows my strengths to advise me.” (Year 2)*

*“More one to one with PAT [personal academic tutor].” (Year 1)*

Importantly, increased exposure to different imaging modalities and areas was seen as an important factor in supporting student’s career decisions, particularly giving choice and being less prescriptive

*“More flexibility of time spent in students’ modality of choice. If given the choice to spend more time in area of particular interest, students would be able to give further consideration to career options.” (Year 2)*

*“More time and different shifts spending in modalities” (Year 2)*

*“Whilst we are being exposed to modalities we are being trained to start in band 5 X-ray and this feels like the default career option.” (Year 2)*

*“Be given the choice of which modalities we would and wouldn't like to experience in second year based on whether we see ourselves progressing to that sector post qualification. Will give us the chance to spend more time in preferred modalities.” (Year 3)*

Other opportunities to gain information about different specialities were identified. Rather than specifically hospital recruitment events they suggested education around career pathways across different specialist areas and organisations.

*“Give more information on how you would actually progress to specialising in different areas, as this still confuses me.” (Year 1)*

*“Have a dedicated day with people from different field talking briefly of the work they do” (Year 2)*

*“Perhaps some kind of careers “event” specifically for radiography students. I think this may currently be offered in the different Trust hospitals but a student may only be aware of the events held by their host Trust and therefore miss out on opportunities at other sites.” (Year 3)*

## **Discussion**

The overall response rate for the study was reasonably high, although there was lower engagement from year one students, perhaps reflecting their limited knowledge of the profession at that stage of

their studies. Analysis of non-response bias confirmed that those not responding would not have been likely to influence overall outcomes. There were a greater proportion of female respondents, however this matches the overall diagnostic radiographer profile with 74.1% of the 36,923 HCPC registrants<sup>14</sup> being female.

The key positive finding from the research is that upon completion of the diagnostic radiography programme the overwhelming majority of the participants were intending to work within radiography. Students identified lifestyle factors, such as the importance of work life balance, as a critical factor when considering career choices, in line with the published literature.<sup>15-19</sup> Interestingly, this was of joint importance to career development which has been recognised by others,<sup>23-25</sup> and confirms that students are ambitious but want job satisfaction. Prestige and the opinion of others, including the media, have been shown to be influential factors within the medical literature,<sup>18,20-22</sup> whereas this study suggests this is less relevant in radiography, perhaps related to the lower profile of the profession.

Upon being asked if the students were planning on applying for their first radiographic post at their clinical placement site, most did, although some cited aspirations to work abroad or relocate for the best opportunity, again confirming the desire for job satisfaction and career development. This is similar to Williamson and Mundy<sup>25</sup> who found that 78.6% of the radiographers they surveyed would move for career development opportunities.

When ranking their current radiography career preference general radiography was the first choice. This contradicts previous research which suggests that cross sectional imaging is of greater interest but may be influenced by potential for future enhanced practice opportunities. This may be corroborated by the free text responses which cited *reporting* as a career choice, and as seen in the literature role extension opportunities are desirable to radiography students.<sup>26,27</sup> However, this also signifies a misunderstanding amongst the students, as reporting is an enhanced and/or advanced practice opportunity which can be undertaken in multiple speciality areas and this confusion may need to be challenged.<sup>6</sup> Gender preferences are perhaps not unsurprising, with technical areas, such as informatics, being identified by others<sup>26</sup> as more aligned with male interests, whereas softer skills such as counselling, as required in ultrasound and mammography, being of interest to females. It is also important to remember that mammography remains a female only speciality. Research opportunities was one of the lowest scoring factors for career choice, in contrast to the medical literature,<sup>17,21,28,29</sup> but similar to other non-medical career studies.<sup>9,30-32</sup> This may reflect the low



profile of research in radiography, particularly the opportunities for clinical-academic roles.<sup>33</sup> It maybe also demonstrate a lack of understanding of the requirement for advanced and consultant practitioners to be research active.

Sutton et al<sup>17</sup> explain that career speciality choices, within a chosen profession, are often considered prior to commencing undergraduate studies, however this study showed that 67.7% of the students did not know which speciality they wanted to work in prior to the programme. This may suggest that a lack of awareness about radiography, and its different facets, within the general population and particular amongst school leavers. Of the 29 students who had a firm career choice prior to commencing their studies, 11 of them had subsequently changed their mind, a phenomenon that Sutton et al<sup>17</sup> also identified. Importantly, the undergraduate degree does appear to help influence and guide students with their decision making, in line with previous studies,<sup>13,34,35</sup> although there is more that can be done to guide pre-registration students.

This study has established that speciality choice is strongly influenced by the clinical and academic settings, with the most significant factor being the experiences gained during clinical placements, aligned with previously published studies.<sup>18,24,28,36</sup> Limited opportunities to engage whilst on placement has been shown to negatively influence the choice of that speciality on graduation.<sup>24</sup> Others have described the central role in which individual clinical staff play in shaping undergraduate student's attitudes.<sup>13,22,24,37</sup> This was replicated in the results of the project, with 91.1% strongly agreed that radiographers on clinical placement influenced their career decisions, with several identifying positive role models as a factor. Taylor et al<sup>24</sup> also found that an academic role model who was enthusiastic about their career was a critical influence, in their case to choose mammography.

Interestingly, some students identified potential improvements for how the course could better provide career advice. The students perceived a strong bias within the curriculum towards preparing them for general radiography, perhaps explaining why this was the highest ranked speciality. Several of the comments from the students confirmed that they desire increased exposure to all specialist areas in order to inform their decision making, consistent with the wider literature.<sup>26-30</sup> With increasing first post appointments in a range of specialities and opportunities for advancement in clinical practice not being limited to a single area, ongoing review of the pre-registration curriculum is vital to prepare and inform future radiography workforce planning.

Limitations

It is important to note that the study was conducted during a global pandemic. The sample comprised a single HEI and therefore the generalisability of the findings is limited. Future larger scale research is required to support long term workforce planning and design of pre-registration radiography curricula. The influence of family on career choices as a concept was based on the findings in the literature review, whereas wider socio-cultural factors were not considered, this is perhaps an oversight and should be considered in future research.

Reporting (independent image interpretation) is acknowledged to be a focus of clinical practice for many in UK advanced and consultant radiographer roles. This was not considered to be a standalone career choice in the questionnaire construction as it is a task-related activity within many specialisations and only one of many areas of role development. With hindsight the choice of PACS as a career speciality should have been broadened to informatics, particularly to reflect the future impact of artificial intelligence on the radiography profession.<sup>40</sup>

## Conclusions

The results from this evaluation conducted within a UK HEI have shown that the most significant motivational factors when considering diagnostic radiography career decisions were lifestyle and career development. The findings also showed that the three greatest influences on career choice are clinical placement experience, clinical radiographers and formal teaching. The results have demonstrated the effects of experiences gained whilst on clinical placement and it is therefore essential that clinical staff understand their responsibilities and the opportunities to support the recruitment of future generations of radiographers.

The project has shown the importance of starting career guidance early within the undergraduate curriculum. Importantly, academic teaching and clinical placement opportunities need to reflect the breadth of radiography specialisations, enabling them to make appropriate optionality choices and decisions regarding their future careers. It is important to note that the radiography academic team together with their clinical placement partners have a responsibility to be responsive to service needs and to also ensure that undergraduate radiography students are made aware all of career opportunities that may exist.

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