



Impostor phenomenon traits in radiography students: Findings from a UK pilot survey

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ABSTRACT

Introduction: Impostor Phenomenon (IP) includes feelings of being a fraud, which can be associated with high anxiety levels. Research suggests healthcare students on clinical placement report high levels of anxiety. This study aimed to explore radiography students' (diagnostic and therapeutic) IP traits within the United Kingdom (UK).

Methods: The pilot study used a mixed-method online survey, applying the Clance Impostor Phenomenon Scale (CIPS). Internal student recruitment used the university virtual learning environment (VLE), and external UK recruitment used social media with a convenience sampling method. The survey included demographic questions (gender, age, year of study, course). The statistical analysis used the Kruskal-Wallis test for the quantitative responses and content analysis of the qualitative responses.

Results: The survey received $n = 92$ responses; 77% were found to have frequent or intense IP traits. No significant differences were identified by age ($p = 0.46$) or radiography programme (diagnostic or therapeutic) ($p = 1.00$). The year of study demonstrated a significant difference ($p = 0.01$), with second-year students scoring a higher CIPS score (78.56) than first and third years (72.41 and 66.17, respectively). There was also a significant difference between males and females surveyed ($p = 0.001$). The thematic analysis highlighted that the clinical placement environment, prior IP knowledge, feelings of not belonging, and being an older/mature student increased IP feelings.

Conclusion: Both therapeutic and diagnostic students returned a high CIPS score >70 , demonstrating that IP traits were present in the sample of survey responses. Although being an older/mature student was a subtheme in qualitative responses, the quantitative data displayed no statistical difference amongst the CIPS scores by age. A significant difference between males and females surveyed ($p = 0.001$) and year of study ($p = 0.01$) was found with second years students scoring higher (mean CIPS score of 75.56) than first and third-year students (72.41 and 66.17, respectively). The qualitative responses further suggested as clinical placement experiences increased, feelings of IP decreased.

Implications for practice: Educational intervention methods such as workshops may assist radiography students in identifying and coping with IP traits before their first clinical placement.

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Introduction

Clance and Imes¹ first described Impostor Phenomenon (IP) in high-achieving women during the late 1970s and the 1980s. Since then, IP has been identified equally in both genders^{2,3} and is commonly described by participants of IP research as waiting to be exposed as a fraud⁴ or that any successes they achieve are down to

luck and are undeserved,⁵ as well as being linked to depression and anxiety.^{6,7} In healthcare, there has been much research around IP in doctors, nurses^{4,8} and related healthcare professions such as pharmacy and dentistry.^{9,10} Within radiology, IP has been correlated with radiologist burnout.⁷

There is currently a need to grow the radiography workforce,¹¹ with an estimated 94% of United Kingdom (UK) National Health Service (NHS) Trusts with vacancy posts, with an average staff turnover rate projected to be 11.8%.¹² However, student radiographers report a lack of confidence and feelings of stress whilst on clinical placements.¹³ Small-scale research conducted by Thomas, Naidoo and Engel-Hills¹⁴ and Mawson, Miller and Booth¹³ explored

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occupational stress in the workforce,¹⁵ and attempt to reduce radiography student stress by improving resilience,¹⁴ a key skill to aid in future careers, as well as investigating the causes of their stress.¹³ Despite this work, there does not exist any research specifically aimed at IP in radiography students despite IP potentially impacting up to 82% of the population.³

The survey aimed to examine whether radiography students within the UK display IP traits using the Clance Impostor Phenomenon Scale (CIPS).¹⁶

Methods

The pilot study survey was open to UK undergraduate diagnostic and therapeutic radiography students. Institutional ethical approval for this study was provided by Canterbury Christ Church University (ETH2223-S2ORPR-CG).

The survey was hosted online using Google Forms (Google, USA, 2023) and was split into two sections, a consent form and the CIPS,¹⁶ which consists of $n = 20$ attitudinal Likert statements about the participants' thoughts and feelings. The data analysis of the CIPS adds up all the participant's scores to give an overall total. The total is then graded; if < 40 , the participants show few Impostor characteristics. 41–60 is a moderate display of Impostor characteristics, 61–80 is frequent Impostor characteristics, and > 80 is intense Impostor characteristics.

While the CIPS is one of many IP ranking scales available in the literature, it is the one which is most regularly used with strong internal validation.² Permission was granted by the original CIPS author, Dr Clance, for the use of the scale for this study.

In addition to the CIPS scale, the survey collected demographic data on participants' age, gender, radiography programme (diagnostic or therapeutic), and year of study for correlation against the demographic groups using Kruskal-Wallis statistical analysis (p -value significance level $p \leq 0.05$) for patterns or themes. All survey responses were collected anonymously. There were also options for voluntary qualitative responses for more in-depth comments on participants' perspectives, rationale and knowledge of IP.

This study used content analysis (realist approach) of the reality and experience of the student participants (convenience sample). Demonstrated in patterns and themes of the content in the textual answers, reported as objective findings (direct quotes of the student experience, attitudinal or behavioural responses).

The precise population size is unknown but can be estimated by the current Health and Care Professions Council (HCPC) approved

list of universities in the UK¹⁷ providing diagnostic radiography $n = 36$ and radiotherapy $n = 14$ programmes. The College of Radiographers¹⁸ has estimated the number to be around $n = 1700$ students for diagnostic radiography and around $n = 432$ students for radiotherapy. Participants were recruited internally through the university's virtual learning environment (Blackboard Inc, USA, 2023) and externally using social media (X, formally Twitter Inc, X-Corp USA, 2023). The survey was open to UK diagnostic and therapeutic radiography students between January and February 2023. A convenience non-probability sampling strategy was used to recruit students through specific course programmes (internally) and opportunistic snowball sampling through UK online communities (externally to the university). This method recognises sampling bias of recruiting only participants through the advertised survey routes and selection bias of participants more likely to engage in the subject matter or be inclined to engage with the topic.

Results

There were $n = 92$ responses, $n = 20$ identified as males, $n = 70$ as females, and $n = 2$ preferred not to say. The percentage of males to females of 22%–76% for this survey reflects the 24%–76% split reported by the healthcare regulator HCPC.¹⁹ Although these figures may have changed during the intervening years (2018–2023), this survey can be taken as broadly reflective of the demographic breakdown of the wider radiography workforce. Similarly, $n = 14$ (15%) therapeutic radiography students responded compared with $n = 78$ (85%) diagnostic radiography students. Which is also reflective in the percentage of therapeutic radiographers (15%) to diagnostic radiographers (85%) in the UK workforce.¹⁹ The participants' anonymised responses were from all over the UK; geographic location data was not recorded, so analysis of regions was unavailable.

Of $n = 92$ responses, 77% were found to have frequent or intense IP traits (Fig. 1). The comparisons of the mean CIPS score by subgroup category are displayed in Table 1.

The mean CIPS scores for each group were compared using Kruskal-Wallis statistical analysis (Table 1.) However, the 'Prefer not to say' ($n = 2$) gender group and '58+' age category ($n = 1$) were excluded from the statistical analysis, as the sample size was too small to calculate. No significant differences were seen between the participant's age ($p = 0.46$) and the radiography programme (diagnostic or therapeutic), with the radiography programme (diagnostic or therapeutic) presenting as a related group ($p = 1.00$).

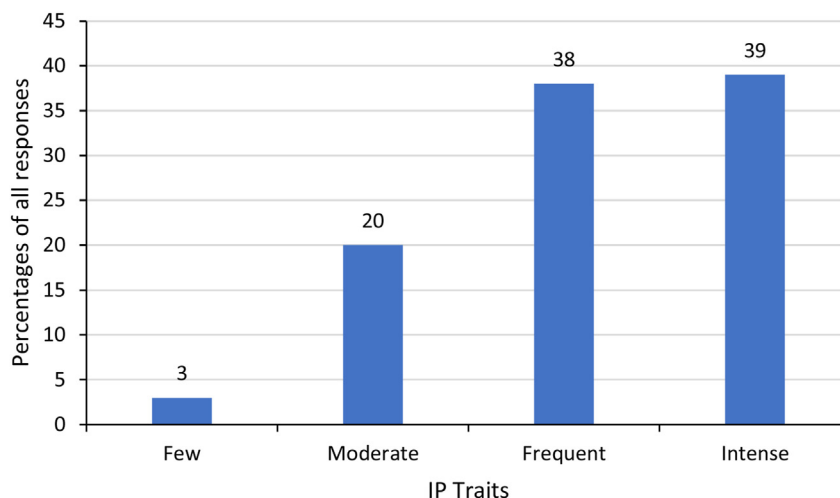


Figure 1. IP Trait percentages of all participants.

Table 1
Kruskal-Wallis statistical analysis of results.

Group	Mean CIPS scores	Trait Descriptor	Range of scores	Number of participants	SD	% 1 SD	p-value
Males	62.90	Frequent traits	38–89	n = 20	16.59	55	0.001
Females	75.24	Frequent traits	44–99	n = 70	14.42	66	
Prefer not to say	76.00	Frequent traits	76	n = 2	0.00	100	0.46
18–27	71.09	Frequent traits	38–99	n = 45	15.74	71	
28–37	76.00	Frequent traits	39–97	n = 24	15.58	75	
38–47	73.88	Frequent traits	46–94	n = 16	15.59	63	
48–57	68.17	Frequent traits	51–88	n = 6	15.56	50	
58+	63.00	Frequent traits	63	n = 1	0.00	100	
1st Year	72.41	Frequent traits	48–96	n = 17	13.15	65	0.01
2nd Year	75.56	Frequent traits	43–96	n = 39	13.81	77	
3rd Year	66.17	Frequent traits	38–99	n = 36	18.22	53	
Therapeutic	72.14	Frequent traits	40–96	n = 14	14.52	57	1.00
Diagnostic	72.65	Frequent traits	38–99	n = 78	15.07	72	

The year of study demonstrated a significant difference ($p = 0.01$), with second year students scoring higher (mean CIPS score of 75.56) than first and third-year students (72.41 and 66.17, respectively). There was also a significant difference between males and females surveyed ($p = 0.001$). 73% of responses ($n = 67$) said they had prior knowledge of IP before completing this survey, and 84% ($n = 77$) said they felt they had experienced IP before. After the survey, 12% ($n = 11$) said their knowledge of IP had changed based on completing the survey.

There were two options for qualitative free-text responses during the survey to allow participants to provide reasoning and rationale for their responses or any additional comments relating to the topic. There were $n = 20$ responses to the pre-CIPS section and $n = 12$ to the post-CIPS section, with $n = 5$ individuals responding to both free-text questions. From these responses, $n = 4$ key themes emerged: ‘feelings of not belonging’, ‘placement environment’, ‘being a mature or older student’, and ‘IP knowledge’.

Specific IP-related comments on ‘feelings of not belonging’ and IP included:

“During my time in placement setting, I often feel that I shouldn't be there, that I'm not good enough to be there.” – Responder 35 (Therapeutic Second Year).

“I felt sometimes I am not good enough” – Responder 71 (Diagnostic First Year)

“My first placement block having an overwhelming feeling of “I'm not supposed to be here” especially when presented with a trauma case to attending to a scan in resus.” – Responder 74 (Diagnostic First Year).

“I felt like I lacked the ability to be a therapeutic radiographer, and that I was not meant to be on the course.” – Responder 90 (Therapeutic Third Year).

Participant answers related to ‘placement environment’ and IP themes included:

“Just made me think how much of impostor phenomenon is based on the mindset of the student and how much occurs based on the work environment created on placement by the staff/trust.” – Responder 42 (Diagnostic Second Year)

“I felt like I didn't really fit in at placement at first; however, after some encouragement and practice, I kind of got over this feeling and feel like I belong now” – Responder 81 (Diagnostic Second Year)

Common participant responses on being an ‘older or mature student’ related to having IP included:

“I regularly feel imposter syndrome in a radiography department as I am sometimes older than the radiographers that are training me” – Responder 15 (Diagnostic Second Year)

“I'm a mature student and have prior knowledge of this phenomenon, some of which is linked to self-belief and those who have an exaggerated belief in my capability. I feel that I have to work harder to obtain the knowledge, and feel that I need to be ahead of the curve.” – Responder 20 (Diagnostic Second Year)

Participant responses on ‘IP knowledge’ included:

“I had prior knowledge of this due to it being something I deal with fairly often and have done some prior research into this feeling.” – Responder 44 (Diagnostic First Year)

“I believe I have felt this on a regular basis throughout my degree.” – Responder 78 (Diagnostic Third Year).

Discussion

All participants (and sub-group categories of demographics) had a mean CIPS score in the frequent IP trait grading. However, there was a statistically significant ($p = 0.001$) difference between the mean CIPS score of males (62.90) and females (75.24). While IP is found in both males and females, research suggests that females tend to exhibit IP to a greater degree²⁰; in this way, the results are consistent with the literature.² It should be noted, though, that while reflective of the gender population of the UK radiography workforce, the sample sizes for males and females ($n = 20$ and $n = 70$, respectively) may potentially impact the CIPS scores for the genders in this sample population of student radiographers.

Placement, belonging and year of study

Similarly, to the gender ratios of participants being representative of the wider UK radiographic workforce, the diagnostic and therapeutic student representative sample size ($n = 78$ and $n = 14$) was reflective of the registered UK workforce.¹⁹ However, unlike in the gender analysis, there was no statistically significant difference between the mean CIPS scores of therapeutic or diagnostic students (72.14 and 72.65, respectively). These scores are also higher than the mean CIPS scores from other healthcare studies, including medical students (CIPS = 63.1),²¹ dental students (CIPS = 65),²² and nursing students (CIPS = 60.13).²⁰ These results suggest

radiography students feel higher IP levels than other healthcare or medical students.

The feelings of not belonging were the most common textual responses provided by participants. These comments were highly emotive and aligned with the findings of Grossman,²³ who found a destructive self-doubt present in nursing students.

By comparison, comments by participants around the 'placement environment' theme were often more reflective in nature and more positive. The key themes suggest that a period of adjustment to placement is needed for radiography students and that IP feelings reduce with time and experience. These findings echo Lundvall, Dahlström, and Dahlgrens²⁴ three themes of learning in practice, specifically 'attuning to practice'. If placement is the primary driver of IP, it would then be expected that the CIPS score would decrease between years. However, the data does not support this, as second year student responses had the highest CIPS scores (78.56). A study into clinical stressors in first- and second-year students by Mason²⁵ found fear of making mistakes or needing to repeat examinations and feeling inexperienced to be primary clinical stressors for the students surveyed. As second-year students begin to develop their practice, they become more autonomous and are expected to improve in all aspects (academic and practical) towards level 6 qualification.²⁶ This may explain the increased IP feelings presented in the data.

There is a statistically significant difference between the year groups ($p = 0.01$), and after peaking in the second year, the third year had the lowest mean CIPS score (66.17). It could be suggested that third-year students are more confident and ready for clinical practice as qualified professionals than the other less experienced year groups due to their additional placement time. However, one participant felt they were still unprepared for qualification, showing that feelings of 'preparedness' are very individual.

"In my opinion, as a third-year student, I am pushed nowhere near hard enough on placement to prepare me for life as a qualified radiographer - the transition from being a student to being a staff member should be almost seamless, especially after training for three years in the same institution. Instead, a yawning chasm continues to exist between finishing the 3rd year and starting as a working radiographer." – Responder 85 (Therapeutic Third Year).

This response aligns with the findings of Naylor, Ferris and Burton,²⁷ that training (even the final year of study and placement) cannot fully prepare everyone for the reality of the work (post-qualifying) and Naylor, Ferris and Burton,²⁷ had similar responses of students feeling concerned about working in areas they lacked experience. Naylor, Ferris and Burton,²⁷ further note the perception of the new reality of work may require coping strategies and continued learning post-degree to progress from novice to expert qualified radiographer. This perception can be improved through the support of mentoring programmes.^{7,9}

Mature/older students and IP knowledge

It has been shown in the literature on IP that older or mature students often have strong IP feelings.²⁸ Concepts previously mentioned concerning competence and unpreparedness have also been reported in other studies on stress in older radiography students.¹³ However, the data does not support that older students have IP stronger than the younger age brackets. The two oldest age brackets, 48–57 and 58+ had the lowest CIPS means (68.17 and 63) of those surveyed, and there was no significant difference found between the CIPS means of any of the age ranges surveyed (with the 58+ excluded due to sample size). A study of second-career

teachers found that their professional identities differed from first-career teachers in that their focus was more on collaborative practice and teamwork rather than teaching and teaching practice.²⁹ This difference in focus was potentially a result of their life and work experiences, but it served to harm their self-esteem as they struggled to adjust to their new careers. It is entirely plausible that aside from the age of the mature students, their previous experiences could also be impacting their increased perception of IP in themselves.

The final theme of 'IP Knowledge' follows from this concept. Many students ($n = 67/92$) claimed previous knowledge of IP, and even more ($n = 77/92$) stated they felt they had IP previously. In the comments, this was backed up as students admitted to researching IP feelings and having IP during their studies.

There is evidence from the data that many students have knowledge of IP and have IP traits. Parkman²² has previously demonstrated the benefits of educating students about IP and how to identify it so it can positively impact well-being and attainment. Rivera et al.⁴ also saw positive results from holding a 75-min workshop for medical students and hospital staff on IP and the positive benefits and strategies of behavioural change at an individual, peer, and institutional levels. Arleo et al.⁶ an interventional radiologist, has suggested the concept of the 5 Rs for coping with IP, these being Recognize, Rational, Reframe, Ready and Repeat. In the same way, as Rivera et al.⁴ and Parkman,²² Deshmukh et al.⁷ found a positive impact on radiologists by running a workshop aimed at reframing IP feelings as a benefit to the individual.

Improving radiography students' understanding and knowledge of IP is important.^{4,7,22} This study's findings suggest this occurs before radiography students' second years, and they may benefit from it in their first year before clinical placements. The literature suggests that this does not need to be extensive training and can be done in a one-off workshop provided the information presented is accurate.^{4,7}

The literature also suggests that formalised mentoring programmes have a positive impact on individuals' IP feelings.^{7,30} Mentoring has been seen as a way of helping improve professional identity formation,⁹ which has been linked to improvements in IP feelings²⁷ and the experiences of mature students in education.²⁸

Limitations

Due to low sample sizes for statistical calculations, the categories of 'prefer not to say' and '58+' groups were excluded from the statistical analysis of age and gender. However, their data were included in the wider data sets of the year of study and radiography programme (diagnostic and therapeutic). Additionally, due to the convenience non-probability sampling strategy using social media for recruitment, the statistical results may not be representative of the whole student population. Furthermore, as geolocation data was not recorded, there was the potential for non-UK responses (although the survey asked the participants to confirm they were studying in the UK).

Future research with a larger sample size could examine whether radiography students completing the survey were currently at university or in clinical placements to draw a comparison between these two settings. As previously shown, some groups returned a low sample size, and a longer data collection period may potentially return more responses for a greater representation of all subgroups.

There is also a risk of bias in the survey responses, which was touched upon by one comment provided by a participant.

“... please bear in mind that people 'bothered' to fill the survey may have already carry some of the traits.” – responder 31 (Diagnostic Second Year).

It is also possible that the nature of the survey and people's preconceived ideas of their IP status may bias them towards a higher score in the CIPS.

Conclusion

Radiography students, both diagnostic and therapeutic, in these findings displayed high levels of IP (CIPS score >70). A significant difference was noted between males and females surveyed ($p = 0.001$) and year of study ($p = 0.01$). Second-year radiography students display the highest IP levels (mean CIPS score of 75.56) compared to first and third-year students (72.41 and 66.17, respectively). However, despite this high IP level, students succeed in placement and qualify to become working radiographers.

Radiography students are very aware of IP but would benefit from further training in IP, how to identify it and cope with it when they experience it. It is recommended that seminars or workshops occur in a student's first year before their first clinical placement to reduce student anxiety and stress and provide skills that may reduce IP feelings.

Conflict of interest statement

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.radi.2023.10.005>.

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