

Obesity bias in diagnostic radiography students: A survey of attitudes, perceptions and technical confidence

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ABSTRACT

Introduction: Obesity bias exists in healthcare professionals and students from numerous disciplines and negatively impacts the quality of care, outcomes, engagement, and satisfaction of their patients. With obesity rates continuing to rise in the United Kingdom (UK), more patients will be affected than ever, and it is becoming an increasingly important issue to tackle. This study aims to assess the attitudes to obesity of student diagnostic radiographers and determine if obesity bias exists in this population.

Method: Student radiographers ($n = 140$) at a single university in the UK were invited to complete an online survey comprising measures designed to assess levels of bias and attitudes towards obesity, including the Attitude Towards Obese Persons (ATOP) scale. Likert-type scales were used to collect quantitative data, and data analysis included descriptive statistics, frequencies, and Spearman's rank correlation coefficient.

Results: Responses were received from $n = 38$ students. The mean ATOP score for participants was 70.37 (SD = 19.26). With 26 % ($n = 10$) scoring below 60, demonstrating strong negative attitudes towards obese individuals. Additionally, students (76.3 %; $n = 29$) indicated that they observed high levels of obesity bias whilst on clinical placement. There was a statistically significant correlation between levels of weight bias and students' confidence in working with obese patients ($r(36) = 0.4, p 0.01$). Students who are less confident working with obese patients had higher levels of obesity bias.

Conclusions: Obesity bias exists in radiography students at levels comparable to those that have been found previously in other healthcare professionals and students. Furthermore, radiography students lacked confidence in their technical ability to work with obese patients and lower confidence levels were associated with higher levels of obesity bias.

Implications for practice: The findings of this study provide preliminary knowledge upon which future research can be built.

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Introduction

Obesity is a global health issue, the prevalence of which continues to increase worldwide.¹ Defined by the World Health Organisation (WHO)² as an “excessive fat accumulation that may impair health”, obesity is classified by body mass index (BMI), whereby a $BMI \geq 25 \text{ kg/m}^2$ is considered overweight, and a $BMI \geq 30 \text{ kg/m}^2$ indicates obesity.² In the United Kingdom (UK), statistics indicate that 26 % of adults are classified as obese, and an additional 38 % are

overweight; 64.3 % of the population is above the healthy weight range.³ However, despite its prevalence, obesity is stigmatised, resulting in obese individuals facing multiple forms of discrimination because of their weight.⁴ The term “weight/obesity bias” refers to the association of negative attitudes to overweight or obese individuals, whereby these are subsequently enacted in behaviour.⁵ It is already established that obesity bias is prevalent in the general population, occurring across important areas of living such as employment, education, and healthcare⁶ and is stronger than many other common socially desirability biases of sexuality and religion.⁷

With such high incidence, it follows that healthcare professionals and students will encounter overweight and obese patients in

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clinical practice. A study by Flint⁸ on obesity bias reported healthcare professionals and students perception, and characterisation of obese patients with derogatory terms such as lazy, sloppy, having poor self-control, and less willpower to adhere to treatment. Obese patients frequently report experiencing stigma from healthcare professionals as well as lower levels of satisfaction following healthcare experiences^{4,9} and this bias has been shown to reduce the quality of care they receive as well as negatively affecting patient outcomes and engagement.^{10,11}

Many patients require diagnostic imaging during their time in hospital,¹² with 43.2 million imaging tests reported to have been undertaken in a recent 12-month period in England alone.¹³ Therefore, if obesity bias was determined to be prevalent among diagnostic radiographers and students, there could be significant negative implications for patient care.

Literature from 1989 to 2020 shows obesity bias exists across various healthcare providers.¹⁴ However, the primary limitation across the studies is the heterogeneity of methods used to assess bias. Many studies lack robustness as they fail to utilise standardised instruments or psychometrically sound measures leading to findings that are difficult to compare.¹⁵ Historically, literature from the UK pertained only to qualified healthcare professionals rather than students. Swift et al.¹⁶ noting that trainee healthcare professionals in the United States of America (USA) and Hong Kong also exhibited negative attitudes towards obese patients, conducted a study to assess levels of weight bias in trainee healthcare professionals in the UK. Using validated instruments, Swift et al.¹⁶ surveyed $n = 1130$ student dietitians, nutritionists, nurses, and doctors, finding that unacceptable levels of weight bias were present across all groups. Similar findings were replicated recently in physiotherapy students ($n = 179$) in the Republic of Ireland,¹⁷ highlighting the potential for future interventions to be targeted at an educational level to dispel negative attitudes if the existence of obesity bias can be established in a student population.

Despite substantial research into obesity bias in healthcare, there is a significant gap in the knowledge of the radiography profession. It is acknowledged that obese patients pose unique technical challenges for radiographers. Diagnostic images can be more difficult to attain for obese patients due to limitations of the equipment, inadequate exposure and radiation penetration, limited patient mobility and difficulty locating anatomical landmarks for positioning.^{18,19} However, the attitudes and perceptions of radiographers towards obese patients are largely unexplored; at the time of writing, only two studies were identified addressing obesity bias in radiography. A study by Aweidah et al.²⁰ of $n = 37$ surveys and $n = 12$ interviews of qualified radiographers in Australia offered preliminary confirmation that obesity bias does exist within the profession, concluding that radiographers exhibited significant levels of implicit weight bias. Aweidah et al.²⁰ found no evidence of explicit weight bias; however, the authors acknowledge that they used a bespoke survey with no reliability or validity information. Furthermore, participation was not anonymous, and participants were possibly reluctant to express explicit weight bias due to social desirability. Therefore it is difficult to conclude that explicit weight bias does not exist in qualified radiographers based on this study.

A qualitative study by Thanh Le, Robinson, and Lewis²¹ explored student radiographers' learning experiences with obese patients. Although obesity bias was identified as a theme, no quantitative measures were employed to indicate prevalence. Interestingly, a key conclusion drawn by Thanh Le, Robinson, and Lewis²¹ was that student radiographers were not confident in their ability to image obese patients and would rather not do so unaided. However, they did not explore student radiographers' attitudes towards obese patients.²¹

No research currently exists exploring the prevalence of obesity bias in student radiographers in the UK. To be able to tackle bias, it

is first necessary to establish and understand its existence and foundations; if obesity bias is present among students, there could be significant implications to address this within the educational curriculum for early intervention. Thus, this study aims to explore whether there is a relationship between student radiographers' attitudes towards obese patients and their confidence in working with them through valid measurement instruments.

Methods

A cross-sectional survey investigated attitudes to and experiences with obese patients. A quantitative approach was utilised as this is known to be effective at measuring the existence of a phenomenon (obesity bias) within a population.²² When knowledge pre-exists, a quantitative approach permits standardised data collection methods.²³

Participants

Convenience sampling was used to recruit students from the diagnostic radiography department of a university in the UK ($n = 140$). The inclusion criteria were enrolment on the undergraduate diagnostic radiography degree programme and experience of attending clinical placement. Recruitment took place through the University's virtual learning environment (VLE) application of Blackboard Learn Ultra (Anthology, London, 2023) announcements tools, engaging a member of faculty staff as a gatekeeper and intermediary between the researchers and participants; an invitation to complete the survey was disseminated along with a participant information sheet comprising information on the background of the study, what participation entailed, withdrawal procedures, what data would be collected,²⁴ and how compliance with General Data Protection Regulation²⁵ would be met. A compulsory consent form was included at the beginning of the survey, and all response data collected were anonymous.

Measures

The electronic survey ([supplementary material](#)) comprised four sections presented consecutively and starting with demographic (personal data^{25,26}) variables of age range, gender, and cohort year of study for data analysis of patterns and trends against the attitudinal responses. The second section of attitudinal statements ($n = 20$) applied the pre-existing, validated measure of the Attitudes Towards Obese Persons (ATOP) scale,²⁷ followed by the Perceived Weight Bias in Health Care²⁸ attitudinal statements ($n = 7$), with ($n = 7$) concluding attitudinal statements specific to the clinical radiography environment.

Attitudes towards obese persons scale

The ATOP scale²⁷ is a weight bias assessment tool that has been shown to have high reliability and validity, with Cronbach's alpha (α) scores ranging from 0.8–0.84.²⁹ The scale²⁷ consists of $n = 20$ items rated on a 10-point Likert scale (0 = strongly disagree to 9 = strongly agree), assessing stereotypical attitudes towards people with obesity. Permission to use the scale was granted by the original author,²⁷ who provided scoring instructions ([supplementary material](#)); scores range from 0 to 120, whereby a higher score indicates a more positive attitude towards obese people, thus a lower level of weight bias. This scale²⁷ was chosen for its known reliability and reasonable length, as it was hoped this would improve completion rates for the survey.

Perceived weight bias in health care

A previously validated measure by Puhl, Luedicke and Grilo²⁸ was applied to assess healthcare students' perceptions of weight bias expressed in the clinical environment. Using $n = 7$ items, rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Two sub-scales were identified within the measure by the authors²⁸ ($n = 5$ items measured the perceived acceptability of weight bias, and $n = 2$ items measured the opinion of acceptability of weight bias) with internal consistency for both subscales, at $\alpha = 0.9$ and $\alpha = 0.82$, respectively.²⁸

Obese patients in the clinical radiography environment

This measure was created to assess attitudes towards obesity targeted to radiography professionals, which could not be found in the current literature. There was $n = 7$ items rated on a 5-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree). Items 1–3 were adapted from the Puhl, Luedicke and Grilo²⁸ measure used in the previous survey section; the wording was altered to reflect radiography. Items 4–7 were informed by the Thanh Le, Robinson, and Lewis³⁰ literature review exploring radiography student experience with obese patients.

Two subscales were identified: one measuring attitudes towards working with obese patients and one measuring confidence in working with obese patients. Each subscale produced acceptable internal consistency³¹ using Cronbach's Alpha at $\alpha = 0.76$ and $\alpha = 0.77$, respectively. Scores for these subscales were totalled (items 2, 3 and 4 were reverse scored due to negative wording) to produce two overall scores, one reflecting attitude and one reflecting confidence.

Ethics

This study was conducted per the institutional ethics policy³²; ethical approval was granted by the university's research ethics committee (ETH2223-S20RPR-NT). The research topic is sensitive in nature (discrimination, weight and body image are topics that have the potential to be distressing for certain individuals). Full disclosure of the nature of the survey was given to all participants at the start of the survey, along with an advisory warning for individuals not to participate if they felt that the nature of the research had the potential to cause emotional harm. Additional signposting to internal university and external independent support services was offered upon completion of the survey to ensure that any participants affected by the content of the research were aware of where they were able to access professional support.

Data analysis

The quantitative data was analysed using SPSS Statistics (IBM v.29.0, US, 2022) to produce descriptive statistics and frequencies. Inferential statistics were also used to explore whether there was a statistically significant ($p \leq 0.05$) relationship between participants' ATOP scores and attitude/confidence scores. Non-parametric tests were used due to the ordinal nature of the data collected. Thus, Spearman's rank correlation coefficient (rs) was calculated. Reliability analysis was carried out for each measure using Cronbach's alpha.

Results

The survey received $n = 41$ responses, of those $n = 3$ were incomplete, and were excluded. Consequently, data were analysed from $n = 38$ respondents; from the demographics, the largest

gender of participants was female (71%), and the most common age range was 18–29 (53%; Table 1).

Attitude Towards Obese Persons (ATOP) scale

Out of a possible overall score of 120, whereby higher scores demonstrate more positive attitudes towards and subsequently less obesity bias, the mean score for participants in this study was 70.37 (SD = 19.26; range 24–108).

Additionally, 26% of participants scored below 60 on the scale, indicating that their attitudes towards obese people were entirely negative overall.

Perceived weight bias in healthcare

Participant agreement with the Perceived Weight Bias in Healthcare items, whereby agreement includes answers of “agree” or “strongly agree”, are displayed in Table 2. The agreement was much lower on the opinion subscale than the perceived acceptability subscale; only one participant (2.6%) agreed that they felt it was acceptable to make jokes about obese patients. However, perceived weight bias was much higher, and 55.3% of participants

Table 1 Demographics of survey participants.

	Demographics	Number of participants (n)	Percentage of participants (%)
Gender	Male	10	26
	Female	27	71
	Prefer not to say	1	3
Age	18–29	20	53
	30–39	7	18
	40–49	7	18
	50+	4	11
	Cohort of study	1st Year	10
	2nd Year	11	29
	3rd Year	17	45

Table 2 Perceived weight bias agreement (agree or strongly agree Likert responses).

Subscales	Survey Item	Agreement n (%)
Perceived acceptability of weight bias among peers and instructors in the health care setting.	1. My peers tend to have negative attitudes towards obese patients.	13 (34.2)
	2. I have heard/witnessed other students making jokes about obese patients.	15 (39.5)
	3. I have heard/witnessed healthcare professionals making negative comments or jokes about obese patients.	29 (76.3)
	4. I have heard/witnessed healthcare professionals or instructors making negative comments or jokes about obese patients.	10 (26.4)
Personal opinions about the acceptability of weight bias towards patients with obesity.	5. In the medical setting, obese patients are a common target of derogatory humour by students, healthcare providers or supervisors.	21 (55.3)
	6. It is acceptable to make jokes about obese patients.	1 (2.6)
	7. If a person becomes obese, it's really their own fault, so it is acceptable to make jokes about their weight.	1 (2.6)

agreed that obese patients are a common target of derogatory humour in the healthcare setting of radiography departments.

Obese patients in the clinical radiography environment

Attitudes towards working with obese patients were mixed (Table 3), 50 % of participants agreed that they enjoy working with obese patients as much as others, whilst 42.1 % said they find working with obese patients frustrating, and 7.9 % would rather not image obese patients at all. However, scores for the attitude subscale ranged from 5 to 15, with a mean of 10.1 (SD = 2.5), indicating a reasonably positive attitude towards working with obese patients. Scores for the confidence subscale were lower, ranging from 4 to 14, with a mean of 8.9 (SD = 2.8). With 57.9 % of participants reporting less confidence in their ability to image obese patients than those who are not overweight, 34.2 % were not confident that they could position obese patients correctly for imaging, and 36.8 % were not confident that they could adjust exposure factors correctly. Only 26.3 % of participants felt their education had been sufficient to train them to work with obese patients.

Relationship between weight bias and attitudes and confidence

Spearman’s rank correlation coefficient was calculated to determine if there was a statistically significant ($p \leq 0.05$) relationship between participants’ ATOP scores which reflect explicit weight bias, and subscale scores for both the attitude and confidence scales.

There was a positive correlation between ATOP scores and attitude towards working with obese patients ($r(36) = 0.57, p = 0.0002$), indicating that lower levels of explicit weight bias were associated with positive attitudes towards working with obese patients (Fig. 1).

There was a positive correlation between ATOP scores and confidence in working with obese patients ($r(36) = 0.4, p = 0.013$), demonstrating that lower levels of explicit weight bias are associated with greater confidence in working with obese patients (Fig. 2).

Discussion

The findings of this study indicate that radiography students at a UK university have witnessed weight bias in clinical settings (Table 2) and exhibited some low levels of bias towards obese individuals (Table 3). With a mean ATOP score of 70.37, the level of obesity bias found was comparable to previous levels in other healthcare professionals and students (69.1–74.13^{17,33–35}) who were assessed using the same measure. This is an important finding, as this has not been previously demonstrated in radiography students, and whilst cross-referencing with other disciplines can be useful, radiography is unique in that there is a greater emphasis on diagnosis. Thus patient interaction times are often shorter with less continuity, making it challenging to generalise phenomena. The range of ATOP scores was particularly concerning in this study (24–108), as it indicates that some students hold strong negative opinions of obese individuals, and over a quarter of students scored under 60, reflecting overarchingly negative attitudes.

Many students responded that working with obese patients was frustrating and that they didn’t enjoy working with them as much as their regular weight counterparts. Given that students represent the next generation of healthcare professionals and that it is evidenced that obesity bias reduces the quality of patient care,¹¹ it is worrying that these attitudes exist. However, a clearly defined approach to reducing obesity bias in healthcare students has historically been lacking.¹⁰ Recent studies have indicated that achieving some weight-bias reduction in students is possible and that curricula should adequately educate students on the causes of obesity along with the impact of bias on their practice.³⁶ Identifying that radiography students exhibit similar levels of weight bias to that found in other professions opens the door to such interventions.

Despite the levels of explicit weight bias found, it was interesting that the majority of the students (97.4 %; $n = 37$) reported that they felt it was unacceptable to make jokes about obese patients, yet the participants expressed observing other students (39.5 %; $n = 15$) and qualified healthcare professionals (76.3 %; $n = 29$) doing so. This finding is similar to Puhl, Luedicke, and

Table 3
Obese patients in radiography departments (*reverse scored items).

Subscales	Survey Item	Strongly Disagree n (%)	Disagree n (%)	Neither Disagree nor Agree n (%)	Agree n (%)	Strongly Agree n (%)
Attitude to working with obese patients.	1. I enjoy working with obese patients as much as I enjoy working with patients who are not overweight.	0 (0)	9 (23.7)	10 (26.3)	12 (31.6)	7 (18.4)
	2. Working with obese patients can be frustrating.*	2 (5.3)	6 (15.8)	14 (36.8)	14 (36.8)	2 (5.3)
	3. I would rather not image obese patients.*	11 (29)	14 (36.8)	10 (26.3)	2 (5.3)	1 (2.6)
Confidence working with obese patients.	4. I am less confident in my ability to image patients who are obese than patients who are not overweight*	3 (7.9)	7 (18.4 %)	6 (15.8)	15 (39.5)	7 (18.4)
	5. I am confident that I can position obese patients correctly for imaging.	0 (0)	13 (34.2)	5 (13.2)	17 (44.7)	3 (7.9)
	6. I am confident that I can adjust exposure factors correctly for obese patients when imaging.	3 (7.9)	11 (29)	7 (18.4)	14 (36.8)	3 (7.9)
Satisfaction with education.	7. I feel that my educational institution has provided me with sufficient training to address any additional challenges associated with working with obese patients in clinical practice.	9 (23.7)	10 (26.3)	9 (23.7)	7 (18.4)	3 (7.9)

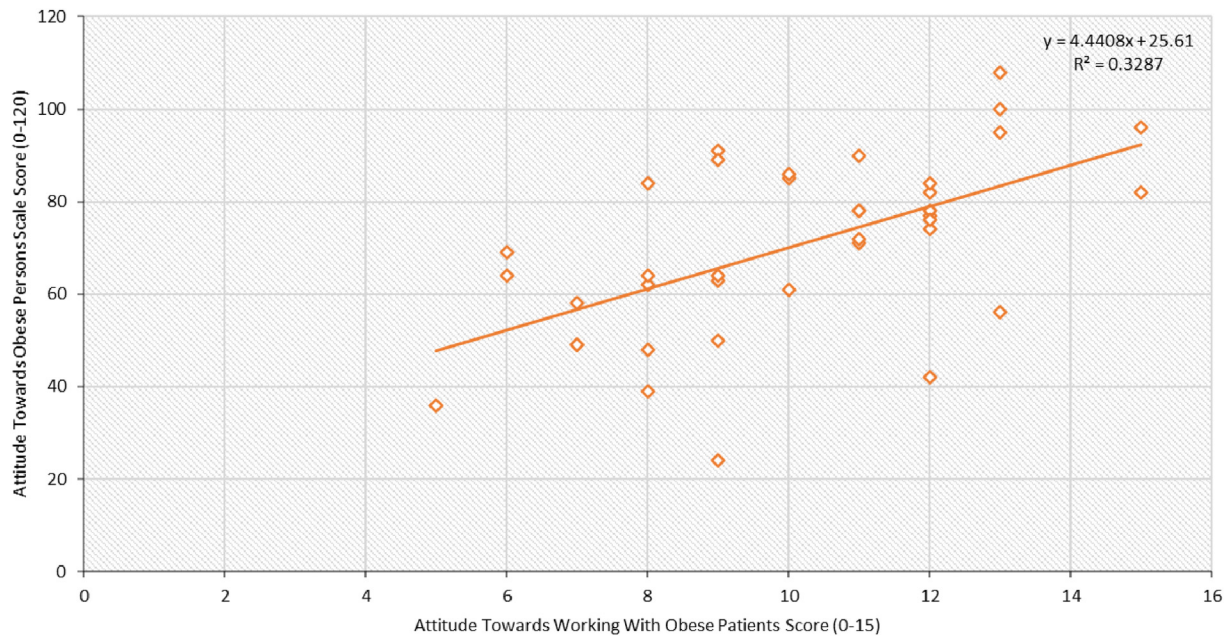


Figure 1. Scatter plot relationship between ATOP score and Attitude Towards Working with Obese Patients items.

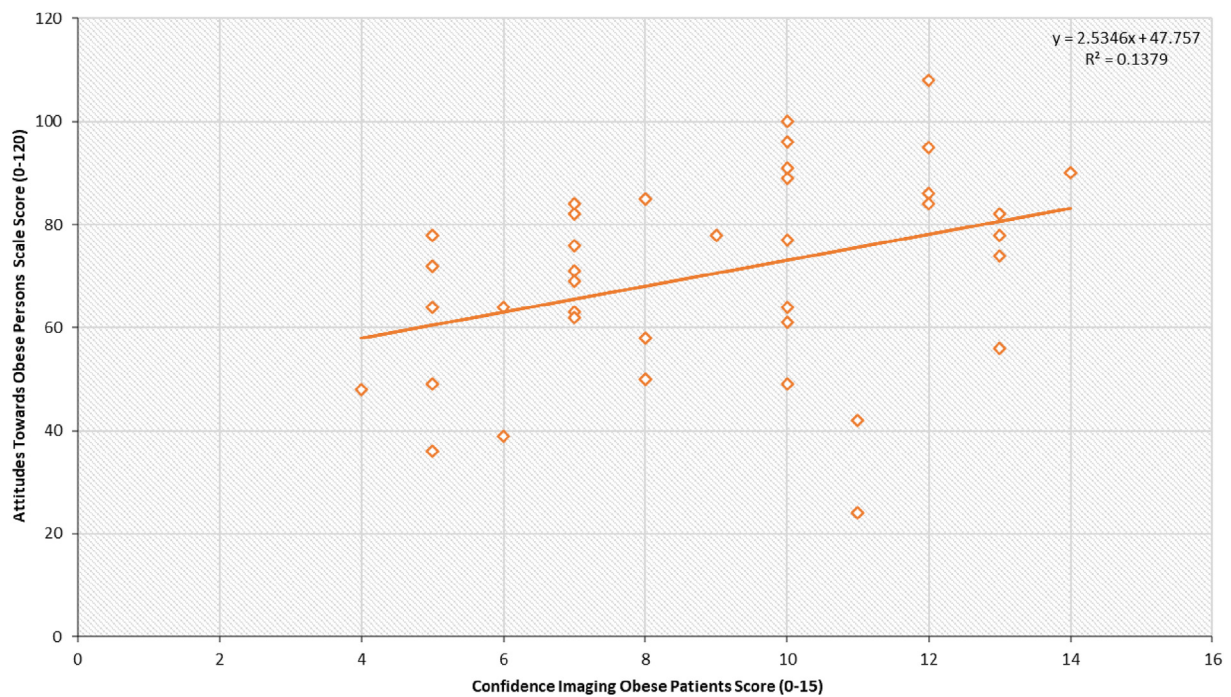


Figure 2. Scatter plot relationship between ATOP score and confidence imaging obese patients.

Grilo's²⁸ results of healthcare students in the USA and suggests that students are exposed to high levels of weight bias during their training. Regardless of their personal beliefs, social acceptability of weight bias is propagated in the clinical environment that they may be reluctant to challenge.

It is, therefore, possible that to reduce weight bias in radiography students, it would be useful to employ measures that challenge the social acceptability of negative attitudes across the profession, as it has been shown that student experience in the clinical learning environment can affect the formation of their

professional identities along with their perceptions and levels of empathy.³⁷

Furthermore, it was found that not only are many student radiographers less confident working with obese patients than their regular weight patients, but that there is a statistically significant relationship between their confidence levels and their attitudes towards obese individuals. Students reporting lower confidence levels also exhibited higher levels of explicit weight bias, along with more negative attitudes towards working with obese patients. Whilst the design of this study did not permit

causation to be determined in this instance, these findings highlight an opening for future research to explore how these two variables interact. Only a quarter of students (26.3 %; $n = 10$) reported that they felt their education had been sufficient to prepare them for working with obese patients clinically, a notion echoed in previous literature whereby it has been identified that mainstream radiography learning resources do not contain sufficient material regarding obese patients³⁰ and could account for the lack of confidence reported. Thus, if a causal relationship exists, improving the adequacy of technical training could improve student radiographers' attitudes towards obese individuals.

There are several limitations to this study; the convenience sampling method used, along with the low response rate (29 %) and subsequently small sample size ($n = 38$), reduces the capacity of the sample's ability to be representative of the broader population of radiography students. However, it is reasonable to argue that this study provides preliminary information in a largely unexplored area, offering an initial insight into the attitudes of student radiographers in the UK and a foundation upon which further research can be built. Additionally, the cross-sectional design prevented causal inference, and it is suggested that considering the relationships demonstrated between confidence, attitudes, and weight bias in this study, exploring causation would be a valuable focus of future work.

Conclusion

The findings of this study indicate that student radiographers have negative attitudes towards obese individuals and exhibit obesity bias at levels comparable to those found previously across a range of other healthcare disciplines. Students were frequently exposed to weight-biased behaviour from their peers, colleagues and supervisors in the clinical environment, demonstrating that weight-bias was socially accepted. Radiography students also reported lacking in confidence in their ability to image obese patients in clinical practice. Furthermore, this lack of confidence correlates with their self-reported levels of explicit weight bias.

This study offers valuable information regarding obesity bias in radiography students; however, making recommendations for clinical practice based upon the small and unrepresentative sample would be unreasonable. Instead, recommendations would be for future research to expand upon this work with a much larger sample, including students from multiple academic institutions. If similar results were replicated using these measures, this would evidence the necessity for implementing targeted weight bias reduction interventions for radiography students.

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.2023.11.006>.

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