

Review Article

Radiography students' resilience: The impact of interpersonal interactions in the clinical environment

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ABSTRACT

Introduction: Many diagnostic radiography programs prescribe work placement early in the degree. In these programs first year students become actively involved with the workflow of clinical facilities, under the supervision of qualified diagnostic radiographers. In the clinical environment students are confronted with diverse interpersonal interactions, but little is known about the impact of these relations on the resilience of first year radiography students commencing clinical placement.

The aim of this paper is, therefore, to present findings from a study that explored and identified how interactions, as they relate to the clinical environment, affect first-year radiography students' resilience.

Methods: Qualitative data were collected through focus groups (FGs), guided by a semi-structured interview schedule. First-year radiography students were purposively selected, using the inclusion criteria, and recruited through advertising the study on the learning management system (LMS). Voluntary participation, a confidentiality agreement, and informed consent were required prior to the focus group. Thematic analysis was performed, and after five focus groups, the researcher was confident that data saturation had been reached.

Findings: Twenty-one students participated in five focus groups. The key findings on interpersonal interactions, as they relate to the clinical environment, were identified as (i) student-patient relations, (ii) student-qualified radiographer relations, (iii) student-lecturer relations, and (iv) student-student relations. Student-patient relations seemed difficult at times; however, viewing encounters from a patient perspective helped students reframe negative experiences into positive perspectives. Furthermore, the findings relating to student-qualified radiographer relations and student-lecturer relations indicated that encouraging and respectful relationships greatly contribute to building students' resilience.

Conclusion: This research shows that empathetic interpersonal interactions and protected time with peers and lecturers in the clinical environment serve as enablers of resilience in diagnostic radiography students. Negative interpersonal encounters adversely affected students' resilience, whereas positive interactions contributed to improved student resilience.

Implications for practice: The study highlights the diverse clinical interactions that have a significant impact on radiography students' resilience. It suggests resilience-enhancing strategies to better manage interpersonal interactions in the clinical environment thereby improving students' confidence and communication skills.

RÉSUMÉ

Introduction: De nombreux programmes de radiographie diagnostique prévoient un stage en début de cursus. Dans ces programmes, les étudiants de première année sont activement impliqués dans le flux de travail des établissements cliniques, sous la supervision de radiographes diagnosticiens qualifiés. Dans l'environnement clinique, les étudiants sont confrontés à diverses interactions interpersonnelles, mais on sait peu de choses sur l'impact de ces relations sur la résilience des étudiants en radiographie de première année qui commencent leur stage clinique.

Cet article a donc pour objectif de présenter les résultats d'une étude qui a identifié et exploré la manière dont les interactions, en lien avec l'environnement clinique, affectent la résilience des étudiants en première année de radiographie.

Méthodologie: Des données qualitatives ont été recueillies par le biais de groupes de discussion, guidés par un programme d'entrevues semi-structurées. Les étudiants de première année en radiographie ont été sélectionnés de manière ciblée, en fonction de critères d'inclusion,

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et recrutés par le biais d'une annonce de l'étude sur le système de gestion de l'apprentissage (SGA). La participation volontaire, un accord de confidentialité et un consentement éclairé étaient requis avant le groupe de discussion. Une analyse thématique a été effectuée et, après cinq groupes de discussion, le chercheur était convaincu que la saturation des données avait été atteinte.

Constats: Vingt-et-un étudiants ont participé à cinq groupes de discussion. Les principaux constats sur les interactions interpersonnelles, en ce qui concerne l'environnement clinique, ont été identifiés comme étant (i) les relations entre les étudiants et les patients, (ii) les relations entre les étudiants et les radiographes qualifiés, (iii) les relations entre les étudiants et les conférenciers, et (iv) les relations entre les étudiants. Les relations entre les étudiants et les patients semblaient parfois

difficiles; cependant, le fait de considérer les rencontres du point de vue du patient a aidé les étudiants à recadrer les expériences négatives en perspectives positives. En outre, les résultats relatifs aux relations entre les étudiants et les radiographes qualifiés et entre les étudiants et les enseignants ont indiqué que des relations encourageantes et respectueuses contribuent grandement à renforcer la résilience des étudiants.

Conclusion: Cette recherche montre que les interactions interpersonnelles empathiques et le temps protégé passé avec les pairs et les enseignants dans l'environnement clinique favorisent la résilience des étudiants en radiographie diagnostique. Les rencontres interpersonnelles négatives ont eu un effet négatif sur la résilience des étudiants, tandis que les interactions positives contribuent à l'améliorer.

Keywords: Resilience; Interpersonal; Relationships; Radiography; Students; Clinical environment

Introduction

The radiography profession is characterized by high stress levels due to workload, time pressures, rapid patient turnover, and the increasing demands of new technology [1-3]. These factors challenge radiographers who must work and think quickly and recover from these demanding encounters before attending to the next patient and create a stressful environment for radiography students transitioning into clinical settings. Existing literature demonstrates that radiography students are often unprepared for the complex and challenging interactions they encounter in the clinical environment, particularly those in high-pressure areas such as the emergency department [4,5]. In South Africa, the clinical context is further complicated by the quadruple burden of disease, referring to communicable diseases, violence and injury, maternal and child mortality, and non-communicable disease [6]. This further leads to an increase in the diversity and high patient volumes requiring medical imaging.

Due to the commonly used pedagogical approach of work-integrated learning (WIL), there is a compulsory component of workplace learning (WPL) for radiography students in South Africa. Consequently, all Bachelor of Science (BSc) in Diagnostic Radiography or equivalent programs in South Africa integrate WPL from either the first year or early in the second year of study [7]. At the research site, first year students undergo five months of intensive classroom-based instruction before being introduced to the diagnostic radiography clinical environment in the second semester. Following this initial exposure, students follow a rotation schedule consisting of two-weeks classroom-based learning and two-weeks clinical workplace learning for the remainder of the academic year. Under the supervision of diagnostic radiographers, they gain technical skills and learn about their professional roles and responsibilities.

Students will enter the program with varying levels of resilience, as resilience is influenced by personal history, the environment, social support systems and exposure to trauma and

suffering [8]. Jackson et al. [9] define resilience as “the ability of an individual to adjust to adversity, maintain equilibrium, retain some sense of control over their environment, and continue to move on in a positive manner”. This definition is particularly relevant in radiography contexts where students must navigate the stressful and ever-changing challenges of clinical environments and move on to the next patient swiftly. Moreover, based on this context it can be argued that it is necessary for radiography students to develop resilience rather than relying on coping mechanisms, which can, in some cases, be maladaptive [10]. For example, students could adopt avoidance as a coping mechanism for dealing with difficult interpersonal interactions instead of learning how to manage such relationships and proceed in a more positive manner. Specifically, a study done by De Witt [11] emphasizes the importance of highlighting resilience as a positive concept for learning and that it is a dynamic process with the environment playing an important role in the cultivation of resilience. The dynamic nature of resilience means that it is an attribute that can be developed or enhanced over time through interactions and experiences. This is in keeping with research that suggests that strong interpersonal connections strengthen social coping mechanisms, further underscoring the significant role of social interactions in positively impacting resilience [12,13].

Research by Van Breda [14] emphasizes the importance of fostering positive relationships between individuals and their environments to cultivate resilience, while Cohen and Legg [15] highlight the need to equip students with skills that enable positive interactions. Without sufficient training, students may struggle to cope with the demands of the clinical environment, impacting their resilience negatively. Additionally, implementing resilience training and support has the potential to improve the overall WPL experience as patient interactions have been reported to be traumatizing and demotivating [16]. Such interventions can also facilitate and improve the overall care to patients as students will be able to provide better care to patients.

This paper, therefore, places a focus on the exploration of how interpersonal interactions within the radiography clinical environment influence students' resilience, particularly considering the unique demands of the South African healthcare context. By identifying key stressors and examining how positive interpersonal interactions can contribute to the development of resilience, the findings may inform improvements in the radiography curriculum to better prepare students for both the academic and clinical settings and thereby support student success.

Method

Research design

This study adopted a qualitative, explorative, and descriptive design. A qualitative design was considered appropriate as it allowed the participants the opportunity to express and provide detailed accounts of their experiences in the clinical environment. Furthermore, the need for an exploratory design arose from a prevailing lack of understanding of the influences of resilience and what it means to first-year diagnostic radiography students, leading to enhanced understanding [17] of the radiography student context. A detailed description of the participants' reality was further elicited by the descriptive design [18].

Ethics

Ethical clearance was obtained from the Research Ethics Committee (REC 2021/H27) at the university where the students were enrolled. Additionally, site permission was granted by the Head of the Department of Medical Imaging and Therapeutic Sciences. Consent and voluntary participation were explained in the study information leaflet. Participation in the research study was voluntary and written informed consent and a confidentiality agreement were obtained from participants prior to the focus groups. Participants were informed of their right to withdraw from the study, without consequences, even after they had voluntarily agreed to participate.

Population, sample, and recruitment

The study population consisted of first-year diagnostic radiography students. In 2021, approximately 65 first-year students enrolled for the Bachelor of Science (BSc) in Diagnostic Radiography at the research site. A purposive sampling method was used to invite all actively registered first-year diagnostic radiography students who had participated in workplace-based learning for the first time. An invitation to participate in the study was posted on the learning management system (LMS), the primary communication platform with students at the research site. The utilization of the LMS facilitated equitable access to the study information and ensured that the invitation was directed to all registered first-year students in diagnostic radiography. To guard against power imbalance and possible

coercion, the researcher, an educator involved in teaching BSc first-year students, was not involved in recruitment. An educator independent from the research and who was not directly involved in teaching the first-year students facilitated recruitment.

Data collection

Focus groups were conducted with first-year diagnostic radiography students. First-year diagnostic radiography students who entered workplace learning for the first time during 2021 were included. Repeating first-year students were excluded from the study as they may have already adopted coping strategies from prior workplace learning. The focus groups were guided by a semi-structured interview schedule. The semi-structured format enabled a flexible approach for the inclusion of probing and follow-up questions where clarity and in-depth responses were enhanced [19]. Focus groups took place after the final assessments of the first academic year were completed. This time frame was selected as it was realized that students would be less likely to be stressed at this time. In addition, the time was considered appropriate as students would have completed a significant amount of time in the clinical environment allowing them to reflect on their experiences in the clinical environment during their first year. Participants were allowed to participate through face-to-face or online focus groups. At the convenience of the participants and the lead researcher four focus groups were conducted face-to-face, and one was facilitated through the Zoom online platform. Each focus group consisted of four to five participants and lasted between 50 and 70 min. After each focus group and prior to conducting the next one, the lead researcher reviewed the recordings multiple times to identify preliminary codes. After the fourth focus group the researcher found that no new codes emerged. To confirm data saturation, a fifth focus group was conducted. A total sample of 21 participants, comprising 14 female and 7 male radiography students was included. Focus groups were audio recorded and transcribed verbatim.

Data analysis

Braun and Clarke's [20] six-step approach to thematic analysis was followed. Manual thematic analysis was done, which enabled the researchers to identify patterns of meaning in the data rather than imposing pre-existing themes on the data. The six steps involved (1) familiarising yourself with the data, (2) generating codes, (3) searching for themes, (4) reviewing the themes, (5) defining and naming the themes, and (6) producing the report. Table 1 demonstrates the researcher's active role in Braun and Clarke's [20] thematic analysis process.

Trustworthiness

To ensure that a robust research process was followed, the principles of trustworthiness, namely credibility, confirmability, dependability and transferability, were followed [22]. Cred-

Table 1
Thematic analysis.

Step	Description of the researcher/s active engagement
(1) Familiarising yourself with the data	The lead researcher repeatedly read (between four to six times) through the data (transcripts) to gain a clear and deep understanding of the content and identify significant aspects.
(2) Generating codes	The lead researcher systematically coded the data by writing notes and highlighting interesting features. Braun and Clarke [21] define codes as a unit capturing observations. An initial code book was developed by the lead researcher. A presentation and in-depth discussion of the codebook was conducted by the researcher with the two co-researchers who have extensive experience in qualitative research and data analysis. Following the collaborative review, the codebook was refined and finalised. To enhance confirmability, a condensed version of the codebook is provided in Appendix 1 (supplementary file).
(3) Searching for themes	The lead researcher sorted the codes into potential themes and created a thematic map to visualise relationships between them.
(4) Reviewing the themes	The themes were reviewed by the research team to ensure they adequately captured the essence of the data and considered the need to merge or refine themes.
(5) Defining and naming the themes	Meaningful names were assigned to each theme and a clear definition for each one was provided, ensuring they aligned with the data.
(6) Producing the report.	The process was concluded with the lead researcher producing a research report, reflecting the participants' views accurately. Bias was minimised through reflexivity.

ibility was adhered to by keeping field and reflective notes displaying written accounts of the researcher observations, and descriptions of the research setting and participants' behaviour. This information, together with the transcripts, was used to facilitate triangulation. Confirmability was enhanced by sharing the themes and codes with participants to confirm that a shared meaning of the interpreted data was obtained [23]. To ensure dependability, detailed steps of the research process and transcripts are available. Lastly, to ensure transferability, a dense description of the research site, participant demographics and methodology is available.

Findings

The results provide detailed insight into the effects of interpersonal interactions in the clinical environment on first year diagnostic radiography students' resilience. Interpersonal interactions as they relate to the clinical environment included: (i) student-patient relations, (ii) student-qualified radiographer relations, (iii) student-lecturer relations, and (iv) student-student relations. These four themes will be explained, supported by verbatim quotations from the data.

Student-patient relations

This theme was developed as participants indicated that interactions with patients affected their ability to cope. Relations with patients can be very positive, but for many students, they seem to have been challenging. Specifically, participants were unprepared to encounter severely injured patients and at times experience patients who were impolite, resulting in them feeling ill-prepared and even questioning their career choices. The direct quotes demonstrate the range of data on student-patient relations.

"It's always easy to communicate with my patients, I always introduce myself. And then sometimes ask them questions like, do you know why you [are] here?... I always take my time to explain to them, why they're there. They always respond nicely.

Every time when they say thank you after everything, I feel a lot better." (FG2P1)

"I recall there was a patient who was actually swearing at everyone. I think my past experiences has built me as a person to accept people...from my side, I assume that okay, it's pain, making the patient to act the way because I myself was once in pain. I would be so mean to everyone. I understood it. I understood him very well. It was just pain." (FG2P2)

So it was a very difficult patient for me and the patient was very rude to me and that day I felt like I can just quit and just leave all of this. I felt like it wasn't for me and like it was a wrong career for me" (FG5P3)

Student-qualified radiographer relations

As can be seen in the quotes below, participants expressed that the feedback, perceptions, and attitudes of radiographers whom they worked closely with influenced their attitude towards situations. When radiographers expressed encouraging feedback to students, they felt more confident, which boosted their resilience for working in the clinical environment. Conversely, if radiographers were not constructive in their feedback, students felt demotivated.

"But it was the one day that I also had to do a patient with a lot of X-rays and I was not scared but stressed that I was going to mess it up, and I called somebody to come and check and they told me that everything was perfect. So, it's just like them telling you that you did a good job and just re-assuring you that you shouldn't be stressed and just know that you can do this." (FG1P1)

"I asked a qualified radiographer to help me, and I think she saw that I wasn't okay because the patient was rude...she told me that sometimes you will meet people like this, people who will just take away your peace. But don't allow it; just carry on with your work and carry on smiling at the patient because this patient is in pain. I think talking to qualified radiographers,

because they've been there for such a long time, it helps just to get your peace back.” (FG5P3)

“That was the worst day when we had just arrived. I think it was just the beginning of clinical so we didn't know a lot of things... Aren't you supposed to be cleaning? The way she just snapped at us, it was in front of everyone, we felt disrespected. I felt she should have maybe said it in a polite way, 'Do you guys know where the linen room is?'. You're supposed to do this and this and this and that. It's the way she spoke and also just in front of everyone. It was just embarrassing. I believe that was my worst day.” (FG4P4)

Student-lecturer relations

While in the clinical environment, students still relied heavily on support from lecturers. Regular communication and check-ins from lecturers during clinical rotations were perceived as a source of encouragement and were highlighted for contributing to improved self-esteem, and the importance of this is demonstrated by the following representative quotes.

“We want to interact with you (lecturer) more. Because what I know is if you're a student that is like you're a slow learner or you take time to process information. If you see that your lecturer is supporting you that actually boosts your self-esteem because you believe that you can do it.” (FG4P1)

“Others haven't seen their families in three, almost ten months. Just check up because I know of a lot of students that are actually struggling to focus sometimes because nobody's asking them how, how you are doing. If you're not doing well go to this person, you can talk to this person and that person.” (FG1P4)

“The student check-up, I think doing what [the lecturer] did in the mid-year interview was so good. It was much good. Just talking.” (FG1P3)

Student-student relations

Participants' responses, as shown in the quotes below, indicated that peer interactions were considered vital to developing resilience. They expressed how much they appreciated the interactions with other students who could relate to their experiences and who offered emotional support. The awareness of a support network pushed them to persevere.

“And then I would speak about it to my peers, and I would speak to them and be like, “Okay, now I did it like this.” But they said it's like this. So then you I think just speaking about it also helps and sometimes to see things you don't want to see. And then you also speak about it. It helps a little bit.” (FG3P1)

“The other thing that helped me – that is still helping me... I think it's my colleagues [peers]. Those are the people that I talk to most, especially my year group colleagues [peers] because they are also new to this environment” (FG5P4)

“And also, some fourth-year students who helped us whenever we needed help, pushed me to come back. [T]hey were always there to help.” (FG3P3)

Discussion

This research is the first of its kind at the research site, generating new insights into the impact of interpersonal interactions on the resilience of first-year diagnostic radiography students. Participants identified several relations within the diagnostic radiography clinical environment that significantly influenced their coping in the clinical environment. These interactions were described as both positive and negative, impacting resilient behaviours.

Student-patient relations

Participants in the study reported feelings of surprise and shock at the severity of patient conditions and, at times, the disrespectful nature of patient interactions. Similar findings were observed in research on radiography students, where participants expressed shock at working with severely ill patients and reported feeling unprepared for these encounters [24,25]. This sense of unpreparedness and shock is not unique to radiography. Nursing students working with critically ill patients have also reported feelings of sadness and helplessness, particularly when they struggle to provide adequate care and support [16].

Patient behaviour, such as rudeness, is often attributed to pain, sorrow, or anxiety [26]. Despite the challenges relating to patient interactions, patients expect to be treated with empathy, care, and respect [27]. Hyde and Hardy [27] identified empathetic care, respect, and effective communication as key components of patient-centred care. However, when students feel unprepared and face difficult interactions, they may struggle to display empathetic and caring behaviours. Therefore, students need to be appropriately prepared for such patient encounters in order to facilitate a person-centred environment without compromising their resilience.

Taylor et al. [28] further argue that resilience is vital for individuals to cope with clinical scenarios and that a demonstration of empathetic cultures and emotion regulation are vital for coping with stressful patient interactions. Emotion regulation can help one to stop and reflect on experiences rather than being overly reactive or overwhelmed by emotions and thoughts [29]. Although students in the current study encountered difficult patient interactions, they displayed an understanding of patients' conditions and demonstrated sympathy, empathy, and patience by actively listening to patients and asking questions. This indicates that, despite their challenges in such interactions, resilient behaviours in the form of empathetic care were demonstrated to some extent.

This finding aligns with Henshall et al. [30] who assert that resilient nurses deliver better patient care. However, to cultivate resilience in the context of patient interactions, students need adequate preparation and support. Simulation-based learning plays a critical role in developing competence in a safe learning

environment before commencing workplace learning [2], while Charalambous and Kaite [16] advocate for structured sessions where students can openly discuss their challenging and emotionally difficult encounters. Such discussions can help students reframe negative emotions into positive perspectives [31] which are associated with better psychological functioning [32].

Student-qualified radiographer relations

Participants' responses indicated the relations with radiographers were generally positive, but negative encounters were expressed, which adversely affected their motivation and confidence. Students observed how some radiographers demonstrated patience, guidance and assistance to them. These positive behaviours boosted students' confidence. Radiography students in Ireland also reported good communication, feedback, and supervision from radiographers. This impacted their competence and confidence [33], both of which have been highlighted as key determinants of resilience [34].

Consistent with the findings of the current study, research in radiography and nursing reported how students observed undesirable behaviours from supervising radiographers and nurses [16,24,25,35]. Bwanga and Lidster [25] found that radiography students are adversely affected when radiographers exhibit poor communication skills towards both students and patients. Radiographers themselves have cited time pressures and heavy workloads as factors that negatively influence their interactions with students [25,36]. Although radiographers operate under considerable pressure, it is crucial that they remain aware of the impact their behaviour has on students' resilience. Therefore, it is recommended that radiographers implement effective coping strategies to manage work-related stress, as prolonged negative behaviours may impair students' ability to cope. Ineffective coping mechanisms and undesirable behaviours may foster an unsupportive learning environment, ultimately hindering the professional development and resilience of students. Regular debriefing sessions amongst radiographers are recommended, providing them with the opportunity to reflect on the impact of negative and positive behaviour on students' resilience.

Student-lecturer relations

The participants in this study emphasized the importance of interaction with lecturers during clinical placements. Lecturer engagement was perceived as a critical resource for resolving clinical uncertainties, providing strength, and enhancing students' self-esteem. This finding aligns with research in the nursing field, which demonstrated that nursing students felt supported when lecturers engaged with them in a nurturing and caring manner [37]. Similarly, a study on radiography students' perceptions of clinical stressors revealed that face-to-face interactions with lecturers were considered a form of emotional support [38]. Additionally, Mason [39] found that regular engagement with lecturers helped reduce student stress and burnout by providing opportunities for feedback and reflection. Likewise, medical interns reported improved stress management

through regular well-being check-ins with supervisors [40]. These findings suggest that radiography students would benefit from regular one-on-one check-ins and interactions with clinical lecturers during clinical placement, as such interactions enhance resilience. Furthermore, lecturers and other individuals within the student's immediate environment have been shown to serve as external protective factors contributing to resilience [41].

Student-student relations

The study results indicated that peer interactions are essential for fostering resilience in students. Participants expressed a strong appreciation for engaging with their peers, noting that observing the resilience and confidence of fellow students, as well as sharing experiences, motivated them to persevere. Similar findings were reported among radiography students in a separate study, where peer-assisted learning was associated with enhanced self-confidence, improved communication skills, and an enjoyable learning environment [42]. In the nursing context, students demonstrated better leadership, teamwork, and clinical skills due to peer learning in clinical settings [43]. Further research supports the notion that students who receive peer or mentor support are more likely to exhibit resilience [44,45]. Therefore, fostering student-to-student interactions is crucial for nurturing resilience. Studies highlight that the integration of team activities where students connect with each other regularly are critical for cultivating resilience [12,46]. Therefore, creating opportunities such as protected peer time during clinical placements is essential to support students' resilience development.

Limitations

A possible limitation of the study is its focus on first-year radiography students' perceptions of how interpersonal interactions affect their resilience. While this was an important perspective, because of the importance of resilience being enabled early on in the programme, it highlights the opportunity to conduct further research to include perspectives from students across all years of study. This would provide comparative data across levels of the programme and enhance the understanding and insights into how interpersonal interactions influence student resilience throughout their educational experience.

Conclusion

As student radiographers progress to become the next generation of qualified professionals, it is crucial to guide them from early in their training. Students are often distressed by patient interactions; however resilient students are better prepared to navigate difficult patient interactions and demonstrate empathic person-centred care. Reflections and debriefings are recommended where negative patient encounters can be reframed into positive learning experiences. The supportive qualities students exhibit such as motivation, teamwork, confidence build-

ing, and mentoring should be nurtured, trusting that these behaviours will transition into professional practice, ultimately contributing to resilience. Both radiographers and educators should recognise themselves as external protective factors playing pivotal roles in fostering students' confidence, competence, and resilience. The curriculum must, therefore, emphasise the development of resilience, with a particular focus on equipping students to navigate diverse interpersonal interactions, as an important enabler of resilience. It is recommended that structured interventions like teamwork activities and mentorship be integrated into the curriculum to improve communication skills and build confidence essential for students to navigate the clinical environment. Additionally, dedicated protected time with peers, educators, and radiographers should be incorporated to foster strong interpersonal bonds and further support the development of students' confidence [12,13,33,44,45].

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jmir.2025.101902](https://doi.org/10.1016/j.jmir.2025.101902).

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