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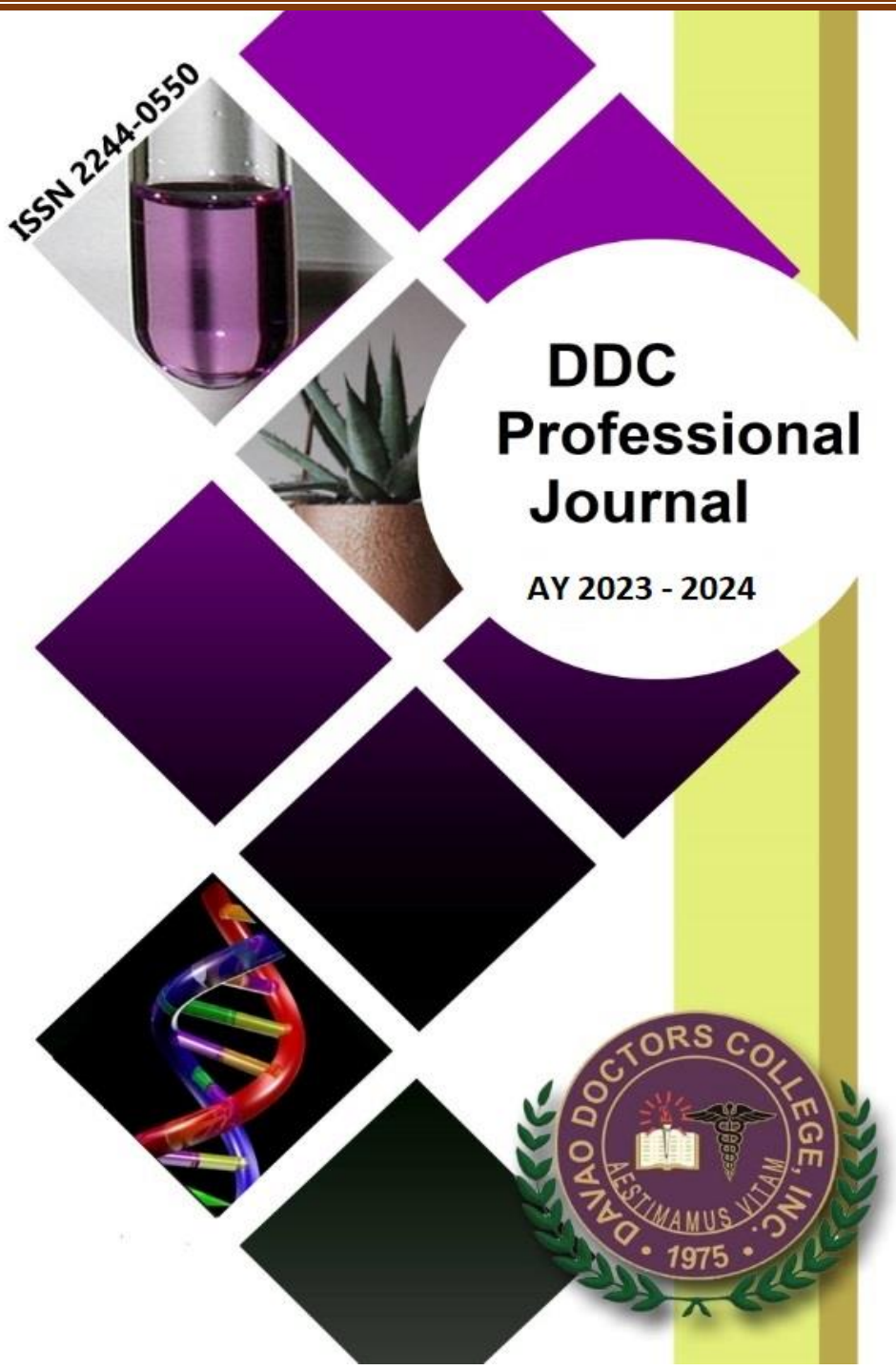

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Lived Experiences of Radiologists in Teleradiology Services in Davao Region: A Phenomenological Study

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Abstract

Teleradiology is expected to play a more significant part in healthcare delivery in the years to come as it continues to develop. This qualitative phenomenology study aimed to learn more about the participants' lived experiences in teleradiology service, particularly in the Davao region. Data were generated through a semi-structured interview with seven (7) radiologists. By analyzing the participants' talk through post-structural discourse analysis, the study identified three essential themes on their difficulties encountered: (1) Network Issues characterized by the core ideas of loss of connection and server error, (2) Operator-skill related challenges that are depicted by lack of training and poor scanning/positioning technique, and (3) Technical-related issue with the following core ideas of data privacy and variability of imaging modalities and image viewers. Three essential themes on their coping strategies were generated: (1) Secure network stability characterized by the core ideas of looking for alternatives and establishing a stable connection, (2) Coordination and personnel development characterized by the following ideas of technologist training and personnel communication, and the last emergent theme (3) Operational-related strategies that are characterized by the core ideas of patient recall and consider on-site. The insights surfaced three essential themes: (1) Establish a systemic approach, (2) Benefits and drawbacks of teleradiology, and (3) Post-graduate training that is depicted by the creation of guidelines and standard procedure, advantages, and limitations of teleradiology, and the provision of proper training for technologists, respectively. Lastly, the recommendation of the study is delineated in terms of methodology.

Keywords: *Teleradiology, Social Sciences, Descriptive Phenomenology, Davao Region*

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Introduction

Teleradiology is the most recognized and well-known subfield of telemedicine, one of the subfields of information technology. *Teleradiology* can be defined as sending medical images from one facility, like a hospital, to another clinic or hospital (Maher et al., 2018). In teleradiology, radiological pictures are transmitted from one site to another via telecommunications infrastructure. However, teleradiology installation may be fraught with difficulties. According to a study by Rosenkrantz et al. (2019) on the practice of teleradiology in the United States, access to electronic health records (62.8%), quality control (53.8%), and technician proximity (48.4%) were the most obstacles for teleradiology. Technical interpretation standards (33.3%) were the approach that was most frequently thought to be effective for enhancing teleradiology. Radiologists in smaller practices were less likely to use teleradiology or it for a smaller percentage of their workload, were less likely to benefit from teleradiology's coverage advantages, and reported more difficult implementation issues, particularly concerning

electronic health records and prior examination access.

One hundred two radiologists (56% men, 44% women) took part in the study by Al-daheri et al. in 2023. Regarding the general state of teleradiology, 69.6% of participants said it is a valuable tool for image interpretation. However, 44% needed to determine how teleradiology would affect patient confidentiality. Furthermore, teleradiology cannot address issues highlighted in complex cases that call for the physical presence of patients. Additionally, it might not allow for adequate discussion of medical images with other professionals.

Moreover, other teleradiology-related occurrences have also happened in other places. A study conducted by Essop (2020) across the rural areas in South Africa, where teleradiology was deployed, demonstrates that at the site, radiologic technologists and referring doctors are doing added tasks not mentioned in the teleradiology service-level agreement (SLA). They feel ill-prepared to carry out these roles. Another painful reality was conducted in Iran by Sadoughi et al. (2017) also concluded that data security, regulating and restricting access to patients' clinical information during the teleradiology process, the possibility of legal protection for radiologists, the formation of executive teams in the organization and providing financial support to them, and the invitation of executive managers as the prominent supporters of teleradiology were some other factors affecting the success of its implementation.

In the Philippines, most institutions have been compelled to begin or accelerate their digital transformation. Terms like telemedicine and teleradiology are getting more frequently used. Given this push and the benefits we have already observed, the optimum moment to learn about and allocate funds to teleradiology may be right now (Lee et al., 2020). However, it cannot be easy to establish telemedicine in underserved areas of a country like the Philippines (Dela Cruz et al., 2021). According to the study conducted by Tolentino (2021), The Universal Health Care (UHC) Act of the Philippines, also known as Republic Act 11223, is funded to the tune of Php 209.26 B from various sources, according to the Budget Briefer of the Department of Health - Philippines. As mentioned above, the incorporation of telemedicine and increased efficiency in the nation's numerous health processes are encouraged under section 36.5 of the law. However, telemedicine and other associated medical practices are not given a specific budgetary allocation in the General Appropriations Act 2021. The UHC Act was only recently signed on February 20, 2019, and is still in its infancy. Other services, including telemedicine and teleradiology, may receive a different priority level because essential services and policies will be implemented first.

In light of the above situation, the researcher is interested in determining the lived experiences of radiologists in employing teleradiology services in the Davao region. Since there have been few studies about teleradiology in the Philippines for a while, it is finally time to bring this subject to light. The outcome of this research is directed at authorities to help recognize and develop interventions for the challenges of teleradiology.

Methods

This qualitative research utilized a descriptive phenomenological study approach in exploring and understanding the lived experiences of radiologists in teleradiology services in the Davao region. Qualitative research is an iterative process wherein the scientific community's understanding is increased by creating new, meaningful distinctions as a result of getting closer to the subject under study (Asper & Corte, 2019). It explores and provides deeper insights into real-world problems and gathers participants' experiences, perceptions, and behavior (Tenny et al., 2022). To better comprehend ideas, opinions, or experiences, qualitative research entails gathering and evaluating non-numerical data (such as text, video, or audio). It can be used to get comprehensive insights into a situation or come up with fresh research concepts (Bhandari, 2023).

This research study was conducted in selected public/private hospitals and clinics that utilize teleradiology services across the Davao region.

Participants

The participants of the study embodied the following criteria that include the following: (a) presently working in a public/private hospital or clinic in the Davao region, (b) at least six (6) months of teleradiology service experience, and (c) can be a male or female radiologist. In this study, people who had experience with or understanding of an interesting phenomenon were identified and chosen (Creswell & Clark, 2011). Thus, the key participants of the study were the radiologists working in the Davao region. The researcher adopted Creswell's (2013) recommendation from his book that a phenomenology study be carried out with a heterogeneous group with a minimum of 3 and a maximum of 15 participants. Thus, the researcher had at least seven (7) radiologists who have experience in teleradiology services in the chosen clinics/hospitals.

Furthermore, because we are unable to generalize to all radiologists working in the Davao region, purposive sampling was utilized to select the respondents. Additionally, the snowball sampling technique was used in this study. Through snowball sampling, the participant is known to the researcher, and this identified participant will act as a referral source for other radiologists who meet the criteria.

Data Sources

The data needed for the study was taken from the informants through a Key Informant Interview (KII), guided by questions from the interview protocol. Interviews were conducted among the radiologists. Interviews enabled the researchers to discover the experience of a person (Kvale, 1996). However, the study's data and supporting information came from various online journal articles and books, especially for the introduction and review of linked literature.

Ethical Consideration

In the conduct of the study, the study aimed to explore and understand the lived experiences of radiologists in teleradiology services in the Davao region. The results of this study will provide support to radiologists to enable efficient clinical practice and interpret high-quality radiographs by better understanding their difficulties with teleradiology. The community will be informed of the research's findings, specifically to those who will benefit the most.

In terms of risks and benefits, the interview may cover the participants' own experiences, which involve personal thoughts, rest assured the study will only be utilized for research reasons.

The benefits of this study can aid the researchers in starting intervention efforts that can address the experiences they have had.

The respondent’s participation in this study is voluntary. If the respondents are uncomfortable in any manner, they have the option to decline participation. Furthermore, even if the respondents initially chose to take part, they are free to leave the study at any moment without

incurring any fees. Any information submitted by respondents will not be included in the data gathered if they decide to leave the study.

In the gathering, retention, and processing of personal data, researchers followed the criteria of transparency, legitimate purpose, and proportionality (Data Privacy Act of2012). The respondents will be offered the option to remain anonymous to protect their privacy and confidentiality. Even if the respondents provided names and other identifying information, none of it will be included in the printed research report. The information collected for this study will be handled in the strictest confidence. Any information mentioned in the material, should this research study ever be published, will not in any way identify the respondent's name. Also, the researcher politely denies requests for information regarding the data acquired from anyone unrelated to the study. Only the researchers will have access to the data, which will be kept completely private. After the study, if the participants so request, a copy of the findings may be given to them. Finally, after the study, all of the raw data will be properly disposed away.

Data Analysis

Thematic analysis was done manually in analyzing the results of the series of interviews conducted. Thematic Analysis was considered the most appropriate for any study that seeks to discover using interpretations. It provides a systematic element to data analysis. It allows the researcher to associate an analysis of the frequency of a theme with one of the whole contents. This will add precision and complexity and strengthen the overall meaning of the research. Qualitative research necessitates comprehending and gathering many elements and facts. The thematic analysis offers a chance to comprehend any issue's potential from a wider perspective (Marks and Yardley 2004). Namey et al. (2008) said, “Thematic Moves beyond counting explicit words or phrases and focuses on identifying and describing both implicit and explicit ideas. Codes developed for ideas or themes are then applied or linked to raw data as summary markers for later analysis, which may include comparing the relative frequencies of themes or topics within a data set, looking for code cooccurrence, or graphically displaying code relationships.” (p.138)

Thematic Analysis allowed the researcher to determine precisely the relationships between concepts and compare them with the replicated data. By using, thematic analysis there is the possibility to link the various concepts and opinions of the learners and compare these with the data that has been gathered in different situations at different times during the project. All possibilities for interpretation are possible. In the process of thematic content analysis, the researcher will also be guided by Creswell’s Method of Data Analysis.

Results and Discussion

The study identified three essential themes on their difficulties encountered: (1) Network Issues characterized by the core ideas of loss of connection and server error, (2) Operator-skill related challenges that are depicted by lack of training and poor scanning/positioning technique, and (3) Technical-related issue with the following core ideas of data privacy and variability of imaging modalities and image viewers.

Network Issues. The participants expressed that internet connectivity plays a significant role in medical imaging, particularly when teleradiology is used. When slow connection speeds interfere with transmitting image-heavy studies, the workflow can quickly become frustrating and affect patient care. Therefore, the use of teleradiology is severely hampered by the lack of dependable internet connectivity and low broadband connectivity in

rural locations. The challenge in the need for high-speed and reliable internet connectivity, particularly in rural or remote areas with limited broadband access can limit the ability of teleradiology services and may require additional investment in network infrastructure (Zafar, 2023). Aside from the possible loss of connection, the participants also articulated that they were also challenged by the error of the server. Servers received images from different modalities. It is difficult to transfer images from one station to another when the server is fully offline or infected with a virus.

Operator's Skill-related Challenges. The study also shows that the operator's skill-related challenges are also a test to the participants. Since the radiologist is no longer on-site, most of the procedures are conducted by the radiologic technologist. Radiographers' confidence in carrying out specific procedures can be impacted by a lack of training. In radiology, more than with any other imaging modality, the medical use of ultrasound is highly operator-dependent. A failure to keep up with diagnostic and technological changes provides the possibility of misinterpretation, errors, and poor repeatability when utilizing the equipment. Diagnostic error may only be avoided with thorough training, which includes understanding both the limitations and the potential of ultrasound equipment (Salvesen et al., 2019). Aside from the lack of training, they also find difficulty in technologists' poor image acquisition and positioning techniques. Even trained and experienced technologists have limitations. Difficult examinations and procedures are poorly performed. From the interviews, it was clear that participants were concerned that radiographers couldn't handle complex imaging. This requires a technologist to be aware of the various positions and techniques required to isolate and provide a sharper view of a body area being photographed. Aside from improving the visibility of an anatomical region, varied projections can also aid in anatomizing an anomaly or locating a foreign body.

Technical-related Issues. The participants shared that loss of image quality due to improper image viewing is one of the identified difficulties. As claimed by Eizo (2022), when building a teleradiology-ready environment, it is critical to examine the accuracy of the monitor used to view medical images. In addition, consumer displays are unlikely to provide the consistency and precision necessary for physicians and radiologists to perform complete patient diagnoses. (Neill, 2019). Furthermore, a poor-quality image does not provide adequate diagnostic information and may lead to a missed or incorrect diagnosis. Aside from loss of image quality due to improper image viewing, another difficulty that the participant identified is the variability of image modality used. The problems that the participants face vary depending on the modality used by the technologist. The participants expressed the difficulty of reading ultrasound procedures compared to X-rays since ultrasound is highly operator-dependent. Due to the nature of teleradiology, the participants also expressed their worries about the data privacy of patients. Because networks can be infiltrated by hackers, there is a chance that patient information could be accessed. Although security and privacy have been included in teleradiology practice almost since its start, there is still much research being conducted in this field in quest of improvements. Furthermore, according to Ruotsalainen (2019), Any teleradiology system's security and privacy protection must be carefully developed, and appropriate security and privacy-enhancing techniques must be used.

Coping Strategies

Three essential themes on their coping strategies were generated: (1) Secure network stability characterized by the core ideas of looking for alternatives and establishing a stable connection, (2) Coordination and personnel development characterized by the following ideas of technologist training and personnel communication, and the last emergent theme (3) Operational-related strategies that are characterized by the core ideas of patient recall and consider on-site.

Secure Network Stability. The participants look for alternatives to continue having access to the internet for continuous reading of medical images. Moreover, they have been able to adapt by figuring out how to make sure an internet connection is available while they are traveling or even at home for efficient workflow. As mentioned earlier, teleradiology is entirely dependent on technology and connectivity. Should there be a lack of access to the internet, teleradiology is no longer an option and patients will remain undiagnosed or even untreated without an on-site radiologist (Kethrapal 2022).

Coordination and Personnel Development. Since teleradiology is when images are evaluated remotely by a radiologist who is not present at the location where the images are generated, they must communicate with the involved personnel to close the gap and address any other issues that may emerge. When it comes to scanning procedures, equipment failure, or server downtime, the participants established a channel of communication with the relevant staff. As mentioned by Smith et al. (2019), communication is essential at all stages of the teleradiology workflow, from the initial request to the final report. They also discuss the different types of communication that are used in teleradiology, such as voice, text, and video. One participant conveyed that sometimes when images are unclear, sending videos is an option.

Some of the participants also expressed that one of the coping strategies is technologist training. Radiologists perform a variety of tasks throughout the day, whether they work in a private practice, a community or academic institution, or even a hybrid situation. Teaching is one of the most crucial responsibilities in the transfer of knowledge, and the ongoing replenishment of the health, vibrancy, and advancement of the field (Saul, 2018). According to Brink et al. (2018), to maintain the accuracy of radiographic pictures and the security of patients, radiologists must train radiographers. They also talk about how difficult it is to train radiographers because it takes so much time and resources. In addition, it was stated by Smith et al. (2019), that radiologists have the expertise and experience to train radiographers in the most effective way possible.

Operational-related Strategies. A change in operational strategy was one of how they overcame their challenges. When certain issues arise in reading transmitted images such as unclear images or positioning errors, the participants stated that they need to recall the patient. According to Green et al. (2020), the risk of patient recall in teleradiology can be reduced by using strategies such as using radiologists who are located close to the patient's hospital, using teleradiology for simple imaging studies, and providing radiologists with access to patient medical records and other clinical information.

Aside from patient recall, another strategy that the radiologist utilized was on-site scanning and consideration. The participants stated that they prefer to attend on-site when situations appear to be too challenging for radiographers to obtain images using several modalities. The on-site considerations were commonly for ultrasonography examinations, where the participants expressed that ultrasound is operator-dependent, and needs accurate scanning for accurate diagnosis. **(***"…If there are chances that I can miss something, I'm always telling them to refer to a radiologist who can do it personally.") (Jong-seong).*

Insights

The insights surfaced three essential themes: (1) Establish a systemic approach, (2) Benefits and drawbacks of teleradiology, and (3) Post-graduate training that is depicted by the creation of guidelines and standard procedure, advantages, and limitations of teleradiology, and the provision of proper training for technologists, respectively. Lastly, the recommendation of the study is delineated in terms of methodology.

Establish a Systemic Approach. Establishing a systemic approach is one of the insights and recommendations from their experiences. The participants' experiences allowed them to consider how standardizing guidelines for using teleradiology would increase its effectiveness and perhaps even help it overcome some of its limitations. According to the findings of the studies by Marti-Bonmati et al. and Pattynama, establishing legal requirements, establishing the necessary standards, and providing an adequate infrastructure to meet these standards boosts both service providers' and recipients' confidence in using these technologies (2018). To them: (*"...Right now, there is no definite rule in teleradiology and as a whole, radiologists have their protocols on how they scan the patient, per institution it's different… I think it's better to have unified guidelines to have better practice as a whole of society. I think that's what the society of PCR needs to do..."). (Jong-seong).*

Post-graduate Training. This is characterized by a core idea for the provision of proper training for technologists. According to the participants, the technologist's skills have an impact on the precision and effectiveness of teleradiology. The majority of participants believe that the technologists should have the necessary training because they rely on and put their trust in them. (*"I recommend radtechs to receive proper training, which should go beyond simple scanning and focus more on developing their skills. So that it's not challenging for us radiologists to interpret when challenging circumstances emerge.") (Nikki).*

Furthermore, as mentioned by Mwansa et al. (2020), the radiography undergraduate degree only focuses on the fundamentals of several diagnostic imaging modalities and general radiography. At the postgraduate level, the emphasis is on educating radiographers in specialized diagnostic imaging fields like mammography, nuclear medicine, computed tomography, magnetic resonance imaging, and ultrasonography. The authors acknowledge that the creation of postgraduate programs would allow radiographers to specialize and acquire cutting-edge knowledge and skills in fields where there is a need for healthcare and where they have an interest. They would be prepared to take on new, more challenging responsibilities and broaden their areas of expertise. and is expected to raise the standard of diagnostic imaging services.

Benefits and Drawbacks of Teleradiology. An insight by the participants shows that teleradiology has its benefits and drawbacks. This essential theme is characterized by the core idea: the advantages and limitations of teleradiology. Although teleradiology is not without its limitations, as technology develops it is likely to have an even greater impact on how radiology is done. To the participants, (*"Teleradiology, has pros and cons. Of course, one of its advantages is that you don't need to travel to distant areas anymore. And It's convenient, more convenient because we can read the images anywhere. More like a work-from-home setup. The challenge is those things I mentioned earlier, the quality of the images, if the quality is good then we can read it more accurately.) (Nikki)*

According to Alahmari (2019), in addition to its many benefits for health care in general, teleradiology also has some drawbacks. The benefits of teleradiology can be summed up as follows: it helps provide radiology services for rural areas, addresses the shortage of radiologists, offers a second opinion to a local radiologist, offers readings from a specialized radiologist in a

particular field (pediatric radiology, neuroradiology, cardiovascular imaging, etc.), addresses the issue of scan interpretation delays, reduces the workload of other radiologists, provides quick service, lowers costs, and helps with medical professional recruitment. Some of its limitations are the cost of teleradiology system installation, teleradiology system upkeep, technical difficulties, the legal jurisdiction of teleradiology system, medical license and certified practitioners in various countries, foreign and non-certified practitioners, accreditation of teleradiology service, the need for teleradiologist training, and the restricted access to clinicians.

Recommendations

The findings of the study are a valuable source of information for the radiology community and for all allied health professionals. In addition, it will help policymakers better comprehend and understand the experiences of the participants in using teleradiology. Furthermore, based on the results, the following recommendations were suggested by the researcher:

Formulation of policy, regulations, and unified guidelines for the use of teleradiology. A unified guideline should be enforced to ensure that teleradiology services are provided effectively. This may include establishing clear communication protocols between the sending and receiving sites. This comprises protocols for how to request studies, how to transmit images, and how to communicate with the radiologists. Furthermore, a policy must also be created concerning network encryption to protect patient privacy and security. This will help to protect patients and ensure that they receive high-quality care.

The provision of education and skill-based training for healthcare providers. Healthcare providers who utilize teleradiology services should be educated and trained in the appropriate use of teleradiology technology. This will help ensure that they can provide safe and effective care. Developing and conducting specialized training programs in other imaging modalities for the radiologic technologist is also recommended to improve the necessary skills.

Support research. Research is needed to understand the benefits and risks of teleradiology better. This research will help to inform policymakers and healthcare providers about how to use teleradiology best to improve patient care. Since this study is qualitative, the researcher also recommends conducting quantitative research.

Future Researchers. This research study can be used as a future reference by other researchers further to explain the radiologist's lived experiences in teleradiology services. In addition, the recommendation made above may be the basis for new research to produce a more thorough conclusion. As stated in the study's limitations, since this was a qualitative study, it was only possible to generalize some radiologists' experiences in the Davao region. Future research may use a larger sample size and respondents from other settings with similar experiences to those identified in this study.

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Underlying Reasons for Non-selection of Interventional Radiology: A Multiple Case Study among Selected Radiologic Technologists in Davao Region

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Abstract

This multiple case study was conducted to explore the underlying reasons why Radiologic Technologists (RTs) in the Davao Region are not pursuing Interventional Radiology. The study identified five essential themes in their current situation working as Radiologic Technologists that include: Self-Fulfillment characterized by the core idea of job appreciation, an engaging work environment that is depicted by a positive workforce and bearable workloads; Professionally Competent Workforce with a core idea of a Knowledgeable Radiologic Technologists and Standard Adherent Equipment characterized by calibrated equipment and; Positive Disposition on Patients characterized by the core idea, comforting behavior. Four essential themes under The Underlying Reasons Radiologic Technologists did not pursue Interventional Radiology were generated namely: Lack of Exposure, Occupational Exhausting, Professional Incompetence; and Insufficient Hospital Resources. The first essential theme is characterized by insufficient field exposure, the second is formed by the core ideas of higher risk of radiation exposure and Long-Standing Time, and the third theme is characterized by lack of knowledge lack of training, and Limited Access to Equipment for the last theme. The insights surfaced three essential themes, success stories, expert mentoring, and professional enhancement. Success stories are reflected by positive narratives, learning from seasoned and expert RT for expert mentoring, and Provisions of Actual Skill Tests and Attendance on Seminars for Professional Enhancement. Recommendations include Provisions of Training to Capacitate RTs, Upskilling, Positive Narratives, and Curricular Implementation Review and Weakness of the Study.

Keywords: *Interventional Radiology, Radiologic Technology, Multiple Case Study, Davao Region*

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Introduction

Interventional radiology is a specialization in radiology that is relatively new yet has significantly contributed to recent medical advances. It is at the forefront of technological innovation and medical advancement (The British Society of Interventional Radiology 2020). IR treatments are often noninvasive and can be targeted through digital subtraction angiography, ultrasound, CT scans, or MRI (Alnajjar et al., 2019). The Society of Interventional Radiology states that an expert in this field can diagnose and treat various conditions using minimally invasive, cutting-edge imaging techniques (Abohimed et al.,

2020). Additionally, rapid technological evolution has prompted the optimization of imaging modalities, which are now the basis for diagnosing and treating many illnesses in different fields (Emin et al., 2019). However, as the uses of IR have grown, there has been an increased demand for human resources in the field, resulting in greater complexity of resources required (Alnajjar et al., 2019).

In the context of the Davao Region, Philippines, the availability of a sufficient number of IR specialists is a pressing concern. Furthermore, there is limited interest among radiologic technologists (RTs) in pursuing IR as a specialization, highlighting the need to investigate the factors influencing their career decisions. This study aims to explore the factors that discourage RTs in the Davao Region from pursuing a career in interventional radiology. By understanding these factors, future RTs can make informed career choices, and policymakers in the radiology department can develop strategies to encourage more RTs to specialize in IR.

The research problem centers around the shortage of IR specialists and the limited interest among RTs in pursuing IR in the Davao Region. Understanding the underlying reasons for this lack of interest is crucial for addressing the workforce shortage and ensuring the availability of high-quality IR services. The theoretical lens guiding this study encompasses the theory of planned behavior and the Competence Motivation Theory. The theory of planned behavior suggests that individuals' intentions and subsequent behaviors are influenced by attitudes, social norms, and perceived behavioral control (Ajzen, 1991). The Competence Motivation Theory posits that individuals are motivated to take action to acquire or display competence (Harter, 1978). By exploring the reasons why RTs do not choose IR, this study aligns with these theoretical perspectives.

The significance of this study lies in its potential to benefit various stakeholders. Radiologic Technologists can gain insights into the benefits and challenges of specializing in IR, informing their career decisions and professional development. Medical students and residents can make more informed specialty choices based on the factors influencing RTs' career decisions. Patients can benefit from improved accessibility and availability of IR services resulting from a better understanding of the current state of IR. The Department of Health (DOH) can identify gaps in IR services and design interventions to address the shortage of IR specialists. Hospital administrators can plan their workforce needs for IR services more effectively. By addressing the shortage of IR specialists and encouraging more RTs to specialize in IR, this study aims to contribute to the improvement of healthcare delivery and ultimately enhance patient outcomes in the Davao Region.

Methods

This qualitative study employed an iterative approach to understanding the research phenomenon in-depth. A multiple case study design was used, focusing on the Davao Region, Philippines. Ten radiologic technologists who did not specialize in interventional radiology were selected as participants. Face-to-face in-depth interviews were conducted as the primary data collection method. Thematic analysis was applied to analyze the interview data and identify patterns and themes. Ethical considerations were followed to protect participants' rights and privacy throughout the research process.

Results and Discussion

The demographic profile of the people who participated in the interview has led the researcher to use code names to protect the participants' anonymity. Ten (10) individuals agreed to participate in the in-depth interview voluntarily, on their own time.

Case number 1 is a 28-year-old male radiologic technologist working at Hospital A. The second case has been working at Hospital B a male 25 years old. Case numbers 3 and 4 have been working in Hospital D, a 26 and a 27-year-old female radiologic technologist, respectively. Three cases have been in Hospital C, a 26- and 29-year-old female RT and a 29 male RT. The oldest case has been working in Hospital A, a 31-year-old male RT.

The data from radiologic technologists in Davao City revealed several significant themes regarding their work environment and job satisfaction. The first theme, "Self-Fulfillment," highlighted the radiologic technologists' gratitude and fulfillment in serving others R1, R2, R3, and R10 (Akinwale & George, 2020). Job satisfaction and fulfillment have been linked to improved patient outcomes and healthcare delivery (Badrianto & Ekhsan, 2020).

"Currently, I am a radiologic technologist at a hospital in Davao City, and I am happy with my job and working environment". (R1).

"As a CT and MRI radiologic technologist, I'm delighted with my career and workplace". (R2)

"I'm grateful for my current situation and the chance to serve others". (R3)

"I am thankful for the opportunity I have to help people in my current situation". (R10)

The second theme, "Engaging Work Environment," emphasized the positive and engaging nature of the radiologic technologists' workplace R4, R7, and R9 (Ramli, 2019). This finding underscores the importance of fostering a work environment that promotes engagement, job satisfaction, and fulfillment (Sun & Bunchapattanasakda, 2019).

"So, I like working with them. I like where my position is I have to help patients and at the same time, display my expertise as a radiographer or radiologic technology". (R4)

"Okay, I've been working here at a Hospital in Davao City. Working here is good. I handle multiple modalities like C-arm, X-ray, and Bone Marrow Density (BMD) scan machines". (R7)

"I handle my workload well under pressure to provide exceptional care to all patients. I'm proud of my work and my colleagues' praise". (R9).

The third theme, "Goal-Oriented Workforce," highlighted the significance of effective communication, supportive colleagues, and a culture of compassion R5, R6, R10 (Ayofe & Martha, 2022). Open communication and a focus on patient care contribute to a goal-oriented workforce, which is essential for achieving organizational objectives and providing high-quality patient care (Naghshineh, 2022).

"I've been complimented on my meticulousness and clear communication". (R5)

"I work with very nice seniors and workmates who have been guiding me, and I was directly assigned to work in ultrasound". (R6)

"This experience reaffirmed to me the value of open lines of communication and compassion in my line of work, and I am grateful to be part of a company that places such a premium on patient care". (R10)

The fourth theme, "Standard Adherent Equipment," emphasized the importance of using equipment that adheres to clinical standards and

instills confidence in the results (R2, R4). Access to necessary equipment and resources increases perceived behavioral control and motivation (Halabi et al., 2021).

The company ensures that our facilities are still in adherence to standards. R2

We always ensure that our equipment is good and reflects reliable results as part of our SOP.R4

The fifth theme, "Professionally Competent Workforce," highlighted the pride and expertise of radiologic technologists R8, and R9 (Purwanto, 2020). A professionally competent workforce is crucial for optimal patient outcomes and collaboration in healthcare settings (Halabi et al., 2021).

"I enjoy my job. It is my responsibility to operate and maintain imaging equipment, prepare patients for scans, and work closely with radiologists and other medical professionals in my role as an imaging technologist". (R8)

"On one occasion, I was called upon to perform an urgent ultrasound on a severely unwell patient. That was a critical moment, but I was able to keep my cool and give the doctor the information he needed to make a correct diagnosis without losing concentration. When the doctor and the rest of the medical staff praised my professionalism, I knew I had done a good job as an ultrasound technologist". (R9)

In conclusion, the findings emphasize the importance of creating a supportive, engaging, and goal-oriented work environment to promote job satisfaction and fulfillment among radiologic technologists and healthcare professionals. These factors contribute to better patient outcomes and improved healthcare delivery.

The study findings reveal that radiologic technologists in Davao City face challenges related to lack of exposure, occupational exhaustion, professional incompetence, and insufficient hospital resources when considering a career in interventional radiology. Lack of exposure emerged as a significant issue impacting career paths, with limited opportunities to observe and gain practical experience in interventional radiology. Occupational exhaustion was linked to the physically demanding nature of the job, including prolonged standing during procedures and radiation exposure. Professional incompetence was attributed to insufficient learning and training, leading to a lack of knowledge and skills. Insufficient hospital resources, such as budget constraints and technological limitations, hindered access to specialist equipment for interventional radiography.

"Because of my limited background and exposure to the discipline, I did not give much thought to pursuing a career in interventional radiology. I was interested in radiography and had taken the necessary classes and done the required clinical rotations, but most of my experience was limited to diagnostic imaging". (R2)

"The main reasons are a lack of experience and limited opportunities. Because not all hospitals have an IR department, it can be difficult to gain experience in this modality, which in turn limits the opportunities available to pursue it (R7)

The findings emphasize the importance of increasing exposure to interventional radiology for radiologic technologists. Hospitals can establish dedicated interventional radiology departments and provide opportunities for clinical rotations, continuing education courses, and on-the-job training. This will enable technologists to gain practical experience and expand their career options. (Taslakian et al., 2019; Lucchini et al., 2018)

Occupational exhaustion in interventional radiology requires attention to ensure the well-being of healthcare professionals and optimal patient care. Implementing self-care strategies, managing work-life balance, and following safety protocols are essential to mitigate the negative effects of occupational exhaustion. (Sovold et al., 2019; Shoman et al., 2021)

"My other reason may not pursuing interventional radiology is the physically demanding nature of the work. Procedures can be long and require prolonged standing, which can be tiring and uncomfortable. Additionally, despite radiation protection measures like shields and aprons, the amount of radiation exposure can be high, with technologists potentially exposed for several hours each day. These factors may deter me from considering IR as a career path". (R7)

"Because of the risks involved, the need to be on call 24/7, and the scarcity of employment prospects ". (R8).

To address professional incompetence, ongoing learning and growth opportunities should be provided to radiologic technologists pursuing interventional radiology. This includes access to practical experience, equipment, and mentorship programs to enhance their competence and job satisfaction. (Amsalu et al., 2020; Echenique & Wempe, 2019).

"The lack of accessible educational and professional development options has discouraged me from pursuing a career in interventional radiology". (R1)

"During my training, I had no opportunities to gain real-world experience. That is to say, I had no opportunity to put into practice what I had learned in class regarding the necessary approaches and instruments". (R10)

"We didn't get hands-on experience with the equipment and procedures, which is essential for establishing specialized skills and confidence". (R3)

Insufficient hospital resources pose challenges for interventional radiology practice. Budget constraints, staffing limitations, and technological barriers need to be addressed to ensure adequate access to specialist equipment and resources. Collaboration between hospitals and educational institutions can help overcome these limitations. (Niati et al., 2021).

"At my place of employment, I had only a limited amount of access to the specialist equipment and resources that were necessary for interventional radiography". (R5)

In summary, addressing the challenges of lack of exposure, occupational exhaustion, professional incompetence, and insufficient hospital resources is crucial for promoting career opportunities and ensuring high-quality patient care in interventional radiology. Implementing strategies such as increasing exposure opportunities, prioritizing healthcare professionals' well-being, providing ongoing learning opportunities, and improving hospital resources are key steps toward overcoming these challenges.

The study highlights the importance of success stories, expert mentoring, and professional enhancement in promoting interventional radiology and attracting technologists and interns to the field. Ramsden et al. (2022) support the use of evidence-based strategies, including sharing success stories, to attract healthcare workers. The Theory of Planned Behavior (TPB) and the Competence Motivation Theory (CMT) provide insights into shaping attitudes, influencing behavioral

intentions, and enhancing perceived control and competence satisfaction.

Success stories can shape positive attitudes toward interventional radiography (Ramsden et al., 2022). Highlighting success stories of influential individuals and those who have overcome obstacles can influence subjective norms and enhance perceived behavioral control (Ramsden et al., 2022).

Recruiting technologists and interns requires demonstrating Interventional Radiography's benefits and potential. Share success stories and provide training. R3

There must be strong captivating programs that would encourage others to pursue IR. R4

The program must have exceptional stories to tell so others will be persuaded to pursue IR. R7

The limited RTs pursuing IR may be because we have known few here in the region and their stories are not well shared. Sometimes this can encourage others. R8

Expert mentoring is crucial for developing skills and competence in technologists. Mentors can provide feedback and support, set challenging goals, and foster autonomy and competence satisfaction (CMT) (Ramsden et al., 2022). Various learning opportunities, such as simulation training, hands-on experience, and research projects, help students and trainees acquire the necessary skills for interventional radiology (Ramsden et al., 2022).

"Provide adequate experience and skill development to encourage students and trainees to choose IR. Mentorship, internships, continuing education, workshops, and conferences are examples. These possibilities can assist in training the future generation of interventional technologists". (R2)

"Students and trainees may participate in simulation training, observation, hands-on training, clinical rotations, and research projects. By providing a variety of chances, students and trainees can acquire the skills and information necessary to become competent IR technologists". (R3)

Professional enhancement involves continuous learning and development. The TPB suggests providing information about the benefits of continuous learning, creating a supportive learning environment, and setting clear goals (Ramsden et al., 2022). The CMT emphasizes the importance of motivation, goal-setting, feedback, and recognition (Ramsden et al., 2022). Structured and standardized training programs are essential for IR technologists (Simamora & Fathi, 2019). Mentorship, job satisfaction, technological advancements, and the visual nature of the work also attract individuals to the field (Goldman et al., 2019).

"Interventional radiology can be promoted by giving didactic lectures, clinical observation, hands-on training, mentoring, and ongoing education. We can also advertise IR's perks, career growth, collaboration with other healthcare professionals, and job prospects, especially in high-demand or shortage areas". (R9)

"Student and trainee IR technologists can acquire the necessary information and skills through exposure to a variety of learning opportunities, including Simulated training, observation, hands-on experience, clinical rotations, and research projects. plus demonstrating the technology's worth and relating the successes others have had with it". (R10)

"I mentioned the need for specialized training in interventional radiography. Radiologic technologists who wish to pursue this field must complete a formal education program and obtain certification from a recognized authority". (R5)

In conclusion, success stories, expert mentoring, and professional enhancement are vital for promoting interventional radiology. These strategies shape attitudes, influence behavioral intentions, and enhance skills and competence. Structured training programs and supportive learning environments are necessary to attract and retain technologists in the field.

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Career Choice Influence and Role Perception in Relation to the Intention of Grade 12 Stem Students to Enroll in Radiologic Technology Program

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Abstract

The shortage of healthcare workers is a global issue. The importance of the intention of students to enroll in the Radiologic Technology program cannot be underestimated in the bigger picture of the state of health and wellness of the local populace. Hence, this study aimed to determine the relationship between career choice influence and role perception regarding the intention of Grade 12 STEM students to enroll Radiologic Technology program in Digos City. A total of 253 students enrolled in two selected educational institutions were the respondents of the study. A quantitative method utilizing a descriptive-predictive design was employed. Furthermore, the statistical approaches utilized in the study were Mean, Pearson Product-Moment Correlation, Linear Regression Analysis, and Moderated Regression Analysis. The findings showed that Grade 12 STEM students' overall role perception was high, and their intention to enroll was moderate. Moreover, the results yielded that role perception had a positive correlational relationship with the intention of Grade 12 students to enroll. Furthermore, the results of regression analysis revealed that role perception significantly predicts the intention to enroll. Career choice influence (parents, gender, and peers) has a moderating effect on the relationship between role perception and students' intention to enroll, and only school influence revealed no moderating effect. The present study has revealed fresh perspectives that can aid school administrators and guidance counselors in devising an educational framework that would augment the number of students enrolling in the Radiologic Technology program.

Keywords: *Radiologic Technologist, Social Studies, Descriptive-Predictive, Digos City*

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Introduction

A growing labor shortage in the healthcare sector is the most significant threat to patient safety in the nation. According to the findings of Liu et al. (2017), the number of health professionals needed globally will increase to 80 million by 2030. At the same time, the number of health workers available is predicted to increase to 65 million, creating a net global shortage of 15 million health workers. Additionally, a lack of Radiologic technologists existed even before the COVID-19 outbreak. In 2019, X-ray techs were 8.5% understaffed in radiology departments across the United States (Laniado, 2021). The role of Radiologic Technologists in the current times cannot be underrated. As the world is constantly plagued with medical health challenges in various forms, the need to attract Science, Technology, Engineering, and Mathematics (STEM) students to enroll in medical-

related courses, particularly in Radiologic Technology, is seen to help ease the burden the future state of health condition of the nation (Hallett & De, 2020).

Radiography has the lowest enrollment of any program offered at the University Kuala Lumpur-Royal College of Medicine Perak (Maulana et al., 2018). Based on the study of Markovich (2022), the problem of low enrollment among students in the Radiologic Technology program can be traced to many misconceptions about the course. This perspective is linked to a need for more understanding of the nature of the profession, its various study options and specialties, and, most importantly, incorrect information regarding the exposure and hazards involved with working in an environment with ionizing radiation. This notion significantly influences people's decisions to pursue careers in Radiologic technology and directly contributes to the labor market's current low supply (Markovich, 2022).

Meanwhile, career choice influence is vital in increasing the number of students enrolling in Radiology Technology courses (Matalon, 2019). Career choice influences the students to take up a course they will enroll in tertiary level. Among the notable influence that links to student enrollment in a specific program is peer influence (Okwulehie, 2018). This phenomenon has a significant influence on a multitude of students when making decisions regarding their prospective career paths. Conversely, parental influence is a significant factor in determining the program of study that students choose to pursue (Humanika, 2019).

In addition to the influence of career choice, the perception of the role of the Radiologic Technology course also plays a significant role in students' decision to enroll in the program. Students noted that their choice is driven by their understanding of the role of Radiology Technologist in terms of their breadth of professional outlook on their work and their projected professional image, among others. These have created an impression that the program offers a lucrative value for work in the future (Almodovar et al., 2018).

The importance of the intention of STEM students to enroll in the Radiologic Technology program must be considered in the bigger picture of the state of health and wellness of the local populace. In the above context, the researcher would like to explore the variables covered in this study to uncover the roles of these two variables in identifying which influences the intention of the students to enroll in the program. More so, the results of this study are aimed at contributing meaningfully to the body of knowledge regarding the variables of this research, as the researcher has yet to come across a similar study undertaken in the local setting and during the pandemic. The information gained in this study is an add-on to the existing available literature on role perception, career choice influence, and intention to enroll in the Radiologic Technology program, thereby filling the knowledge gap regarding the variables under study.

Methods

The descriptive-predictive method was used to determine the relationship between career choice influence and role perception concerning the intention of Grade 12 STEM students to enroll Radiologic Technology program in Digos City. The respondents of the study were the Grade 12 STEM students enrolled in two academic institutions in Digos City with a sample size of 253. A Raosoft calculator was employed to determine the sample size, and convenience sampling was used to select the respondents. Only the Grade 12 under the academic strand of STEM and who are of legal age, specifically 18 years old and above. Participants who did not meet the established criteria were excluded from the study.

On the day of data collection, the study

used a web-based survey method as per the feedback received from both the instructors and students, which was found to be the most favored approach in gathering empirical data required for this research. The survey questionnaire consists of a total of 62 items and is divided into three parts. The Part I items are made up to determine the role perception of the respondents, Part II, is designed to collect information related to students' intention to enroll in the Radiologic Technology profession, and Part III, determines if career choice influence moderates the intention of the STEM students to enroll Radiologic Technology program. Before the administration of survey questionnaires, the instrument was subjected to validation and reliability testing. Three (3) experts in the field were asked to validate the research instrument. After this, the researcher conducted a pilot study wherein twenty-two respondents were requested to answer the survey questionnaire followed by a Cronbach's Alpha reliability analysis or consistency testing.

In the analysis of data, the following statistical tool was employed: Mean was used to measure the degree of role perception and intention of Grade 12 STEM students to enroll Radiologic Technology program. On the other hand, Pearson Product Moment Correlation was employed to determine the relationship between role perception and the intention of Grade 12 STEM students to enroll Radiologic Technology program. However, the assumption of randomization failed in this statistical tool. Furthermore, Linear Regression Analysis was used to examine the correlation between role perception and the intention of Grade 12 STEM students to enroll. Finally, Moderated Regression Analysis was used to investigate whether career choice influence moderates the relationship between role perception and the intention of Grade 12 STEM students to enroll in Radiologic Technology in Digos City.

Results and Discussion

Table 1. Summary of the Level of Role Perception of Grade 12 STEM Students

Role Perception	Mean	SD	Description
Possess skills for a wide professional remit	4.223	0.669	Very High
Perception of own professional status	4.137	0.652	High
Degree of professional interdependence	4.008	0.693	High
Level of rapport with patients and colleagues	3.975	0.656	High
Breadth of professional outlook	3.920	0.720	High
Projected professional image	3.912	0.797	High
Degree of patient interaction	3.895	0.679	High
Overall mean and SD	4.010	0.695	High

It can be assessed in Table 1 that combining the seven facets of role perception: breadth of professional outlook (3.920), degree of patient interaction (3.895), projected professional image (3.912), perception of own professional status (4.137), possessing skills for a wide professional remit (4.223), level of rapport with patients and colleagues (3.975) and degree of professional interdependence (4.008) indicates that the Grade 12 students have a high level of perceived role of the Radiologic Technology with an overall mean of 4.01. This denotes that the majority of the participants hold a favorable perception regarding the role, professional responsibility, and technical competencies of Radiologic Technologists both in hospital and clinical settings. The present study bears a resemblance to the research carried out by Andales et al. (2017), which revealed that students exhibit a level of familiarity with the responsibilities of Radiologic Technologists in hospital situations. The aforementioned discovery was substantiated by Dalmacio et al. (2017), as they observed that students in Senior High School demonstrated a considerable comprehension of the functions and obligations of Radiologic Technology as a profession.

Table 2. Summary of the Level of Intention of Grade 12 STEM Students to Enroll in the Radiologic Technology Program in Digos City

Intention to Enroll	Mean	SD	Description
Opportunity to Advance	3.137	1.115	Moderate
Prestige or Status	3.123	1.145	Moderate
Job Security	3.101	1.083	Moderate
Advisory Received	2.983	1.088	Moderate
Financial Assistance	2.971	1.113	Moderate
Salary	2.834	1.139	Moderate
Grit Personality	2.833	1.117	Moderate
Overall Mean and SD	3.002	1.114	Moderate

Table 2 presents the level of the intention of Grade 12 STEM students to enroll in the radiologic technology program in Digos City. The study reveals that the seven indicators used to measure the level of intention exhibit an average score of 3.00, indicating a moderate level. The overall standard deviation of the indicators is 1.114. This indicates that Grade 12 STEM students exhibit a neutral level of agreement regarding their intention to enroll in the Radiologic Technology program. Among the seven indicators, the statements under the indicator *opportunity to advance* have the highest category mean (M=3.13) with a qualitative description of moderate, which implied that they neutrally intend to enroll due to better training opportunities and professional advancement activities. The lowest category mean is the items covered by the indicator of *grit personality* (M=2.83), which denotes that the respondents moderately demonstrated passion and determination to enroll. The moderate interpretation of all category means suggests that each indicator had a

significant bearing on participants' intention to enroll in the Radiologic Technology program. In a similar manner, Twumasi et al. (2018) conducted a study that found that in cultures that prioritize individualism, young individuals are influenced by intrinsic factors such as personal interest, personality traits, and self-efficacy, as well as extrinsic factors such as job security and high salaries, when selecting a profession. Additionally, interpersonal factors such as parental guidance play a lesser role in this decision-making process. Furthermore, these individuals are encouraged to make their own career decisions independently.

Table 3. Test of Relationship between Role Perception and Intention of Grade 12 STEM Students to Enroll in Radiologic Technology Program

INDEPENDENT VARIABLE	**INTENTION TO ENROLL**			
	r	**p-value**	**Remarks**	**Decision on Ho**
ROLE PERCEPTION	0.417	<.001	Significant	Rejected

Table 3 shows the test of correlation between role perception and the intention of Grade 12 STEM students to enroll in the Radiologic Technology program. The data revealed that the relationship between role perception and the intention of Grade 12 STEM students to enroll Radiologic Technology program is significant, as can be gleaned from the p-value that is less than 0.05 ($p<.05= < .001$) and correlation coefficient, $r=0.417$. This means that role perception has a positive significant relationship with the intention of Grade 12 STEM students to enroll Radiologic Technology program. This suggests that the increase in the role perception would also likely increases the intention of Grade 12 STEM students to enroll in the Radiologic Technology program. This aligns with the findings of Sit et al. (2020), which suggest that students' enrollment decisions are significantly impacted by their perceptions and the quantity of information accessible to them. It is common practice for students to be presented with a selection of potential career paths before making a definitive decision regarding their professional aspirations. The decision-making process of students regarding their career choices is often influenced by their perception of the ideal job and the subjects they studied in secondary school, as opposed to being informed about alternative professions. This lack of adequate information about alternative career paths can lead to limited career options for students (Anake et al., 2017).

Table 4. Influence of Role Perception to the Intention of Grade 12 students to enroll in the Radiologic Technology Program

	Unstandardized	Std. Error	Standardized	t-value	p-value
(Intercept)	0.109	0.432		0.252	0.801
Percent	0.775	0.107	0.417	7.263	< .001

Table 4 presents the results of regression analysis whose purpose is to show the significant predictor of the intention of Grade 12 STEM students. The results indicate that role perception was found to be a significant predictor of the Intention of Grade 12 STEM students to enroll in the Radiologic Technology program.

In particular, it shows that the influence of role perception on the Grade 12 STEM students has generated a p-value that is less than .05 (p<.05= < .001) and a positive standardized beta value of .0.417. This denotes that the regression weight for role perception in the prediction of STEM students' intention is significantly different from zero at the 0.05 level (two-tailed). Thus, for every unit increase in the level of role perception, there is a corresponding increase in the intention of the students by .417. This implies that role perception contributes to the intention of Grade 12 STEM students to enroll Radiologic Technology program.

Lastly**,** the findings were apparent in the results of the regression analysis, where 17.4 percent of the variance of the intention of STEM students was explained by the independent variable, as indicated by $R^2 = 0.174$. This means that 82.6 percent of the variation can be attributed to other factors not covered in the study. The present study was supported by (Liu et al., 2021), that role perception is an essential and critical component of the labor market. The necessity for students to establish a professional outlook has an impact on their professional identity creation, preparation for lifelong learning, self-organization, and marketability, as well as how well they reflect the qualitative aspects of their field of study (Poquet et al., 2021).

Table 5. Moderating Effect of Career Choice Influence (Parents) in the Relationship between Role Perception and Intention of Grade 12 STEM Students to Enroll Radiologic Technology Program

	Unstandardized	Std. Error	Standardized	t-value	pvalue
(Intercept)	6.329	2.211		2.862	0.005
Percent	0.899	0.562	0.484	0.600	0.111
Parents	1.599	0.547	1.168	2.922	0.004
Perce ✻ Parents	0.412	0.137	1.705	3.013	0.003

Table 5 presents that career choice influence (parents) has a moderating effect on the relationship between Role Perception and Intention. An increase in the role perception and

parents' career choice influence level increases the intention of Grade 12 STEM students to enroll in a radiologic technology program (t=3.013; p=0.003). The model shows that 20.3% of the variation of students enrolling in the program can be influenced by role perception and parents' level of career choice influence. Data also shows no multicollinearity of the datasets shown in the VIF value of 1.107. Durbin Watson's value closer to 2.0 confirmed no autocorrelation. The outcome aligns with the finding reported in the research conducted by Ibrahim et al. (2017), which posits that parents exert the most significant impact on students' inclination to pursue a profession in medical laboratory science due to their usual provision of financial support. Dagang and de Mesa (2017) similarly identified findings indicating that parents have a strong influence on their children's choice of tertiary school. The Filipino people have a deep respect for elders, which explains why parents have such a strong influence on their children's decisions. This is further supported by Đurišić & Bunijevac (2017), who stated that parents play a crucial role in influencing and being enthusiastic about their children's educational choices.

Table 5.1. Moderating Effect of Career Choice Influence (Gender) in the Relationship between Role Perception and Intention of Grade 12 STEM Students to Enroll Radiologic Technology Program

	Unstandardized	Std. Error	Standardized	t-value	p-value
(Intercept)	4.836	2.171		2.227	0.027
Perce	0.359	0.541	0.193	0.664	0.508
Gender	1.352	0.565	0.975	2.394	0.017
Perce ✻ Gender	0.309	0.138	1.303	2.245	0.026

Table 5.1 presents the data showing that career choice influence (gender) has a moderating effect on the relationship between Role Perception and Intention (t=2.245; p=.026. An increase in the interaction of gender and role perception increases the intention of Grade 12 STEM students to enroll in the Radiologic Technology program. The model shows that 19.4% of the variation of students enrolling in the program can be influenced by role perception and gender level of career choice influence. Data also shows no multicollinearity of the datasets shown in the VIF value of 1.186. Durbin Watson's value closer to 2.0 confirmed no autocorrelation. Many studies have established the impact of gender on career choices. Ramaci et al. (2017) reported that males exhibit a greater inclination toward pragmatic career paths, such as science and business, whereas females tend to demonstrate a stronger preference for social and artistic domains, such as teaching or nursing. Notwithstanding, females may exhibit interest in professions that are predominantly male-oriented as well as those that are female-dominated, whereas males tend to demonstrate interest solely in male-dominated occupations. The research conducted by Eyo (2019) demonstrated that occupation preference among Nigerian students is significantly influenced by gender, regardless of whether they have received counseling or not. The persistence of gender influence on students remains irrespective of whether or not the student received counseling.

Table 5.2. Moderating Effect of Career Choice Influence (School) in the Relationship between Role Perception and Intention of Grade 12 STEM Students to Enroll Radiologic Technology Program

	Unstandardized	**Std. Error**	**Standardized**	**t-value**	**p-value**
(Intercept)	0.769	1.623		0.474	0.636
Perce	0.419	0.390	0.225	5.074	<.001
School	0.246	0.498	0.233	0.494	0.622
Perce ✻ School	0.106	0.119	0.467	0.889	0.375

Table 5.2 presents the data showing the level of career choice influence (school) has no moderating effect on the relationship between Role Perception and Intention of Grade 12 STEM students to enroll Radiologic Technology program (t=0.889; p=0.375). The model shows that 21.0% of the variation of students enrolling in the program can be influenced by role perception and school level of choice. Data also shows no multicollinearity of the datasets shown in the VIF value of 1.004. Durbin Watson's value closer to 2.0 confirmed no autocorrelation. On the contrary, the finding of the study of Gacohi et al. (2017), discovered that career guidance in Kenyan schools had a positive impact on student's career decision-making, comprehension of career options, and adjustments related to their chosen career paths. Additionally, the research revealed that in the absence of guidance regarding their vocational pursuits, students lack clarity regarding their optimal career path and personal preferences. Consequently, the absence of adequate career counseling could result in students making suboptimal choices and enlisting in programs that are unfamiliar to them. As per Lupas and Farin's (2021) findings, the primary objective of school counseling is to enhance students' comprehension of potential educational and career interests, aptitudes, convictions, and possibilities, rather than directing them toward a particular professional career.

Table 5.3. Moderating Effect Career Choice Influence (Peer) in the Relationship between Role Perception and Intention of Grade 12 STEM Students to Enroll Radiologic Technology Program

	Unstandardized	**Std. Error**	**Standardized**	t-value	p-value
(Intercept)	6.800	2.716		2.504	0.013
Perce	1.187	0.671	0.639	2.968	0.003
Peer	1.810	0.752	0.968	2.408	0.017
Perce ✻ Peer	0.513	0.183	1.767	2.806	0.005

Table 5.3 presents the data showing the level of career choice influence (peer) has a moderating effect on the relationship between Role Perception and Intention of Grade 12 STEM

students to enroll Radiologic Technology program (t=2.806; p=.005). The model shows that 21.7% of the variation of students to enroll in the program can be influenced by role perception and level of career choice influence. Data also shows no multicollinearity of the datasets shown in the VIF value of 1.116. Durbin Watson's value closer to 2.0 confirmed no autocorrelation. This conforms to a study by Gwelo (2019), which identified peer pressure as a significant determinant of career selection. Individuals within a social group can examine and scrutinize the actions and emotions of others, potentially exerting influence to conform to group norms. This implies that individuals who have received formal education and have been exposed to diverse settings can serve as valuable sources of information when making academic decisions. This finding aligns with the research conducted by Kram and Isabella (2017), which suggests that peer influence plays a significant role in students' career decision-making process. Moreover, Mtemeri's (2020) study posits that students were impacted by their peers through peer advice and motivation. The utilization of peer education was identified as an additional mechanism through which students were impacted by their peers. In contrast, Ouano et al. (2019) have reported that the influence of peers on students' work decisions was insignificant. This finding is consistent with the research conducted by Kaneez and Medha (2018), who also found that the impact of peer influence on pupils' career decisions was minimal.

Conclusion and Recommendations

The level of role perception among Grade 12 STEM students in the Radiologic Technology program was high level, which proposes that STEM students often perceived the role of Radiologic Technologist. This suggests that the establishment of a professional outlook by students has a significant influence on the development of their professional identity. Moreover, the level of the intention of Grade 12 STEM students to enroll was interpreted as moderate, which proposes that STEM students sometimes intend to enroll in the Radiologic Technology program. This statement suggests that STEM students are inclined to select a professional trajectory predicated on their anticipated performance and outcomes. Meanwhile, role perception positively correlates with the Grade 12 STEM student's intention to enroll. An increase in role perception would also likely increase the intention of Grade 12 STEM students to enroll in the Radiologic Technology program. It could be implied from the findings the importance high perceived role of the Radiologic Technology profession to elevate the number of enrollees for this program, thus, resolving the increasing labor shortage in healthcare. Furthermore, role perception significantly predicts the intention of Grade 12 STEM students, thus, for every unit increase in the level of role perception, there is a corresponding increase in the intention of the students to enroll. Therefore, this implies that role perception contributes to the intention of Grade 12 STEM students to enroll Radiologic Technology program. Lastly, the career choice influence "parents, gender, and peer" has a moderating effect on the role perception and intention of Grade 12 STEM students. Among the four indicators, "school influence" appeared to be no moderating effect. It was evident that parents play a crucial part in having a direct effect on students' career decisions. Additionally, peer group induces influence in predetermined careers as well as gender. Furthermore, the career guidance programs offered in schools do not aid the students in choosing their careers.

This study suggests the following: school administrators, guidance counselors, registered radiologic technologists, schools or universities offering Radiologic Technology

programs, and future researchers. School administrators may develop a curriculum with purposeful learning opportunities for environments of training and education that will support all students in making informed decisions about their future careers and, as a result, encourage efficient participation in the workforce. To improve the school's career orientation programs and better support students in their career exploration, career guidance counselors may identify the elements impacting career development, uncover resources and sources of career information, and aid in the formulation of an educational framework. Moreover, to be viewed as significant contributors to the medical field, Radiologic Technologists may become more assertive and independent in their jobs. This entails adequately regulating the profession and outlining the obligations and standards of competence; hence, students who are considering this profession may be encouraged and inspired. Additionally, efforts should be further made to elevate the awareness of the Radiologic Technology profession. Schools or Universities offering Radiologic Technology programs may visit secondary educational institutions and conduct forums or conferences to provide valuable information about this profession. Finally, it is recommended that the forthcoming researcher take into account the possibility of obtaining a larger sample size from a more extensive population, given that the current study focused solely on a single region, educational level, and academic strand within the Senior High School program. The scholar posits that a more extensive investigation encompassing a broader and more diverse cohort is imperative to furnish a more universal depiction of the prevalence of the inclination to enroll in a Radiologic Technology educational program. Furthermore, they may also consider other variables and use a different methodology.

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Attitude Towards Radiation Protection and Self-Efficacy in Relation to Radiation Safety Behavior of Radiologic Technologists Working in Region XII

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Abstract

This study explored the attitudes of radiologic technologists and their relationship to self-efficacy and radiation safety behavior. A quantitative study design was used in this study. This investigation was conducted with radiologic technologists working in Region XII as qualified professionals performing diagnostic procedures at multiple hospitals in Region XII, yielding a total of 80 study participants. Structured questionnaires were also used to collect data from participants. The statistical methods used in the study were mean, Pearson product-moment correlation, and multiple linear regression analysis. The findings demonstrated that radiologic technologists' general attitude toward radiation protection was quite high, as was their self-efficacy and radiation safety behavior. Furthermore, no significant association between attitude and self-efficacy in radiation safety behavior was discovered. Meanwhile, there is a negative correlation between frustration coping and physical environmental factors. Thus, this implies that radiologic technologists in Region XII hospitals are moderately self-efficient with their expertise in the correct and proper practice of radiation protection towards the radiation safety behavior of individuals. For the radiologic technologists in Region XII to boost their current radiation safety measures, leaders should design a quarterly seminar and training program to generate fresh ideas for advancing high-quality healthcare.

Keywords: *Radiation Protection, Healthcare, Descriptive-Predictive, General Santos City*

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Introduction

Radiation safety has been identified as one of radiologic technologists' top concerns across all healthcare sectors. In reality, there is mounting evidence that radiation safety practices are crucial to improving hospitals' safety records. According to Arzahan et al. (2022), medical schools may use this as a key aspect in reducing radioactive exposure among healthcare students by linking safe radiation behavior to the dedication to the safety of radiologic technician students. To meet the demands of their patients and radiologists concerning radiologic safety, hospitals actively seek ways to improve their radiation safety standards and actively engage their students in radiation safety education. In addition,

training and information transfer are required to raise the performance of medical students in terms of safety requirements. (Schmiedhofer et al., 2021).

As stated by Carlsten et al. (2021), who researched 30,000 medical institution employees worldwide, between 28% and 56% of these healthcare workers who had high radiation exposure wanted to leave their jobs because they were afraid of getting cancer. As a result, there must be underlying causes for these high percentages.

In Seoul, Korea, even though medical radiation is categorized as low-dose, the body can still be negatively affected by even low doses because there are no human safety criteria for the lowest harmful dose. (Park et al., 2019). Similarly (Skoulidis et al., 2021), it was revealed that healthcare employee radioactivity raises the risk level, resulting in increased hazards for healthcare employees at work in a selected hospital in the Philippines. increased hazard of healthcare employees at work in a selected hospital in the Philippines. Both studies emphasize that hospitals' safety radiation problems have increased as a result of students' radiation safety-related problem behavior. Nonetheless, both recognized that safety behavior may play a critical role in coping with excessive radiation exposure, which may result in radiologic risk effects in both patients and medical students.

Among the noted antecedents of radiation protection attitudes are self-efficacy and radiation safety behavior at work. Doyen et al. (2020) discovered a significant and positive relationship between radiation safety behavior and safety efficacy. Furthermore, the battle against COVID-19 is being led by radiology professionals. But just a few of them have treated COVID-19 patients. (Park et al., 2019). And, according to the European Society of Radiology et al. (2019), cross-infection threat in the radiological section is increased by nonstandard preventative methods utilized during radiological investigations.

As per the WHO, hospitals in Asia and the Pacific are unwavering in their commitment to patient radiation safety. However, as a result of increasing safety radiation risk behavior among healthcare employees, hospitals in the Philippines are experiencing real-life problems with safety radiation (Birch et al., 2021). Similarly, Dy et al. (2021) found that medical employee exposure to radiation raises the risk level, resulting in higher-risk exposure of medical employees at work because of over-familiarization and a large number of patients for whom they cannot do radiation safety conduct such as shielding for both patients and workers in a selected hospital in the Philippines.

Methods

The descriptive-predictive method was used to determine the level of attitude towards radiation protection and self-efficacy about the radiation safety behavior of radiologic technologists working in Region XII hospitals in General Santos City. The respondents of the study were regular registered radiologic technologists working in Region XII private hospitals, with a sample size of 80. A complete survey questionnaire technique was employed to determine the sample size, and purposeful sampling was used to select the respondents. Only radiologic technologists with six months or more of working experience at the selected private hospital were included as respondents in this study. Due to the pandemic situation caused by COVID-19, on the day of data collection, the study used a web-based survey method to collect empirical data on the level of attitude and level of self-efficacy as predictors of the radiation safety behavior of radiologic technologists working in Region XII. There was no face-to-face interaction in the context of the new normal. Because respondents completed web surveys on their own time and at their own pace without waiting for an interviewer, they had less social desirability bias than interviewer-administered modes.

In the analysis of the data, the following statistical tool was employed: the mean was used to assess the level of attitude, level of self-efficacy, and radiation safety behavior of radiologic technologists working in Region XII. Pearson Product Moment Correlation was used to investigate the relationships between level of attitude, level of self-efficacy, and radiation safety behavior among radiologic technologists working in Region XII hospitals. Multiple linear regression analysis was used to investigate the role of attitudes towards radiation protection and self-efficacy as predictors of radiologic technologists' radiation safety behavior in Region XII.

Results and Discussion

Table 1

Summary of Level of Attitude of Radiologic Technologists Working in Region XII

Level of Attitude	Mean Rating	Std. Deviation	Descriptive Level
Personal Protection	4.227	0.594	Very High
Patient Protection	4.423	0.328	Very High
Environmental Protection	4.277	0.388	Very High
OVERALL Mean & SD	**4.309**	**0.378**	**Very High**

Level of attitude towards radiation protection among radiologic technologists working in Region XII

It can be assessed in Table 1 that combining the three facets of the level of attitude (4.227), patient (4.423), and environment (4.277) indicates a very high level of attitude among radiologic technologists working in Region XII with an overall mean of 4.309. This indicates that personal, patient, and environmental protection are always demonstrated among radiologic technologists. Thus, this shows a remarkable attitude towards radiation protection among radiologic technologists and their organizations that seek to bring in revenue.

Governments, companies, and workers' organizations can receive the support they require in creating and putting into place initiatives to improve working conditions and the environment thanks to the integrated approach used by occupational safety and health action. These methods include the dissemination of information, technological cooperation, and international standards in the form of conventions and recommendations, codes of conduct, and information. (Márquez-Sánchez et al., 2021).

Table 2. Summary of Level of Self-efficacy of Radiologic Technologists Working in Region XII

Self-Efficacy	Mean Rating	Std. Deviation	Descriptive Level
Frustration Coping	4.693	0.359	Very High
Enterprising Exploration	4.341	0.596	Very High
OVERALL Mean & SD	**4.517**	**0.421**	**Very High**

Level of self-efficacy of radiologic technologists

Table 2 presents the level of self-efficacy for radiologic technologists working in Region XII. Self-efficacy with two indicators has an overall mean of 4.517 and a standard deviation of 0.421, which indicates a very high level of self-efficacy. This simply denotes that the participants always exhibit self-efficacy in their jobs.

The findings revealed that radiologic technologists have a high level of self-efficacy. Results manifest that the highest mean (4.825) was for statement number 2: "I respect schedules and working deadlines," which means that the participants show a good level of agreement regarding this statement. Meanwhile, the lowest mean (4.250) was for statement 4: "I concentrate all energy on work," which means that the participants show a slightly good level of agreement regarding this statement. The frustration coping category mean is 4.693, which was described as high. This means that radiologic technologists agree that the frustration of coping will influence their practice toward radiation protection. About the standard deviation (0.359), values are presented as normal, which means that most of the numbers are close to the average. This result confirms the study: frustration coping and entrepreneurial exploration can all be brought. Dosimeters are tools for figuring out radiation exposure in its entirety. Wearing these devices is mandatory for all medical staff who will be subjected to planned ionizing radiation. In a large number of healthcare settings, there is regrettably a lack of monitoring, which results in a lack of reliable data. (Mozumder, 2022).

Table 3. Level of Radiation Safety Behavior of Radiologic Technologists Working in Region XII

	Overall Mean Rating	Overall Std. Deviation	Descriptive Level
Radiation Safety Behavior	**4.378**	**0.520**	**Very High**

Level of Radiation Safety Behavior

Table 3 demonstrates the radiation safety behavior of radiologic technologists working in Region XII. It is shown that the overall sub-scale mean value of 4.378 and standard deviation of 0.520 exhibits a very high level of radiation safety behavior. The results denote that they always consider radiation safety behavior. Meanwhile, their Radiation safety behavior is evident with the highest mean value of 4.638 for both statements 4 and 5: "*I practice reduction exposure*" and "*I practice maintenance of distance from radiation source''*, followed by the highest mean (4.438) was for statement 2: " I practice attention to prevention of radiation hazard/posting of the expected maximum exposure dose" which regarded as very high., the lowest mean (3.913) was for statement 4: "I practice furnishing of radiation measuring instrument" which regarded as oftentimes. The structure category mean is 4.177 which was described as High. This means that radiologic technologists agree that a good structure manifests in the physical environmental factor. Concerning standard deviation (0.725), values are presented as normal and this means that most of the numbers are close to the average. The result was affirmed by the Department of Labor (2020) The three key principles of radiation protection are justification, increased safety and protection, and the application of dosage limitations. Following these fundamental guidelines is the only way to ensure that any ionizing radiation-based medical application yields the most precise and reliable results while emitting the least amount of radiation. The degree to which medical professionals are aware of the negative

effects of radiation on human health is directly related to this.

Table 4. Relationship between Level of Attitude and Level of Radiation Safety Behavior of Radiologic Technologists working in Region XII

INDEPENDENT VARIABLE	Radiation Safety Behavior			
	0.661	<.001	Significant	Rejected

Relationship between Level of Attitude and Radiation Safety Behavior

The test of correlation for attitude and radiation safety behavior for radiologic technologists working in Region XII is presented in Table 4 above. Findings revealed a significant correlation between attitude and radiation safety behavior with a correlation coefficient of r = 0.661 and a p-value of .001; hence, the null hypothesis was rejected and that there is a significant relationship between the level of attitude and the level of radiation safety behavior of radiologic technologists. Meanwhile, the positive correlation revealed that the level of attitude and the level of radiation safety behavior are directly proportional. This in turn implies that an increase in attitudes towards radiation protection will likely increase radiation safety behavior.

This result can be confirmed by the research of Bitterman (2022), which indicates that the objective of radiological protection is to offer enough protection for humans without unnecessarily restricting the beneficial activities that lead to radiation exposure. A significant increase in radiologic technologists' radiation protection would fairly increase their radiation safety behavior in the organization. According to the International Atomic Energy Agency (2020), the greatest amount of radiation exposure for medical staff occurs during fluoroscopic procedures. Healthcare workers are exposed to low quantities of radiation through diagnostic imaging modalities such as computerized tomography, mammography scans, and nuclear imaging. Excessive usage of radiation puts at risk both patients and medical professionals.

Table 5. Relationship between Self-Efficacy and Radiation Safety Behavior of Radiologic Technologists Working in Region XII

INDEPENDENT VARIABLE	Radiation Safety Behavior			
	r	p-value	Remarks	Decision on Ho
	0.865	<.001	Significant	Rejected

Relationship between Self-efficacy and Radiation Safety Behavior

Data projected in Table 5 indicates that the null hypothesis is rejected since there is a significant

relationship between the level of self-efficacy and the level of radiation safety behavior of radiologic technologists working in Region XII. This can be clearly explained with the p-value of .001 and correlation coefficient r =0.865, wherein the variables are significantly related. The positive correlation coefficient indicates that self-efficacy and the level of radiation safety behavior of radiologic technologists are directly proportional. The result implies that those who are self-efficient with their job are more likely to exhibit excellent radiation safety behavior in organizations.

Previous studies by Lab Manager (2022) indicate that to reduce unnecessary and redundant exposure, the technician or doctor should prepare the necessary images before exposing the patient to radiation. Magnification significantly enhances the patient's exposure; as a result, it should be used with caution. have found a significant positive relationship between self-efficacy and radiation safety behavior. Furthermore, Bard (2022) discovered a positive and significant relationship between job self-efficacy and radiation safety behavior that would help reduce exposure. Another way to restrict exposure is to increase the distance between the X-ray beam and the component being scanned. The X-ray tube should be as close to the patient as possible, but the image intensifier or X-ray plate should be as far away as possible while still preserving the requisite picture resolution.

Table 6. Influence of attitude, and Self-efficacy on radiation safety behavior of radiologic Technologists working in Region XII

	Standardized Coefficients	Beta	p-value	Remarks
Level of Attitude	0.374	1.620	4.467	Significant
Level of Self-efficacy	0.884	0.316	11.788	Significant

Influence of Level of Attitude and Level of Self-Efficacy on Radiation Safety Behavior

Table 6 presents the results of the regression analysis, which aims to identify significant predictors of radiation safety behavior. The results indicate that both levels of attitude and level of self-efficacy have no significant influence on radiation safety behavior, with a p-value of less than 001. Meanwhile, this implies. That level of attitude and self-efficacy can be associated with radiation safety behavior but may not be a predictor. In particular, it shows that the influence of attitude on radiation safety behavior has generated a p-value that is greater than (p-value = 4.467) and a positive standardized beta value of 0.374.

This denotes that the regression weight for the level of attitude in the radiation safety behavior of radiologic technologists working in Region XII is significant. Thus, for every unit increase in attitude, there is a corresponding increase in radiologic technologists' radiation safety behavior in their organization by 0.374. The findings can be supported by the study by the Department of Labor (2020), where the level of awareness among medical experts about the harmful effects of radiation on human health is directly proportional to this and related to radiation safety behavior but not a predictor.

In the same way, the influence of self-efficacy does not influence the radiation safety behavior of radiologic technologists working in Region XII with a p-value that is greater than 11.788 and a positive beta value of 0.884. This indicates that for every unit increase in self-efficacy, radiation safety behavior increases by 0.884. The findings can be supported by the study of Tanveer et al. (2021), wherein safety and self-efficacy have a modestly beneficial influence on radiation safety behavior. This result implies that self-efficacy is related to radiation safety behavior but not a predictor. Kim, B., and Jung, S.'s (2019) findings revealed that many investigations have investigated the impact of

transformational leadership on safety behavior; those studies placed relatively less emphasis on the mediating function of job stress on employees as well as circumstances that alter the relationship. Because job stress has a significant impact on employees' perceptions, attitudes, and behaviors inside an organization, yet some contextual elements mitigate the correlations, we investigated mediating mechanisms.

Lastly, the findings were apparent in the results of the regression analysis, where 79.9 percent of the variance of the level of radiation safety behavior can be explained by the two independent variables, as indicated by R2 =0.799. However, it still leaves 79.9 percent for other factors aside from the two independent variables in the study. This indicates that other additional variables are vital to the participant's radiation safety behavior that have not been considered in this study. Based on this evidence, both have a standard attitude, and self-efficient radiologic technologists may have increased radiation safety behavior; therefore, more research is needed to determine why such an association exists. As a result, the higher their level of attitude and self-efficacy, the more successful they will be at work; otherwise, even in organizations that regularly work with radiation, studies evaluating healthcare workers' knowledge and awareness of radiation safety protocols reveal ignorance about the biological effects of radiation. (Mayo Clinic, 2022). There could also be other reasons for the radiation safety behavior of radiologic technologists.

Conclusion and Recommendations

The radiologic technologist's level of attitude towards radiation protection among the respondents in terms of personal protection, patient protection, and environmental protection was all very high. Therefore, attitudes towards radiation protection are always manifested among radiologic technologists. The radiologic technologists were very high in frustration coping and entrepreneurial exploration. Thus, self-efficacy was always exhibited among radiologic technologists. Therefore, radiologic technologists always exhibit radiation safety behavior. The level of attitude positively correlates with the radiation safety behavior of radiologic technologists. This means that as the level of attitude increases, the radiation safety behavior of radiologic technologists will likely increase. However, the relationship between attitude and radiation safety behavior was significant. The level of self-efficacy positively correlates with the radiation safety behavior of radiologic technologists. It shows the result of the test of the relationship between the dimension of self-efficacy and radiation safety practice. All the relationships are significant. Between the two independent variables, level of attitude and self-efficacy, only frustration coping and physical environmental factors significantly influence or predict the radiation safety behavior of radiologic technologists. Although the level of attitude has a positive relationship with the level of radiation safety behavior, its influence was significant in predicting radiation safety behavior. Therefore, only self-efficacy significantly contributes to the radiation safety behavior of a radiologic technologist. Meanwhile, it was revealed that the R-square value of 0.799 is attributed to self-efficacy as a predictor of radiation safety behavior. This means the remaining 79.9% may be attributed to other possible indicators predicting their radiation safety behavior.

This study suggests the following: hospital administrators, human resources departments, supervisors, registered radiologic technologists, and future research. It is recommended that hospital managers continue to increase their understanding of how people use technology to meet the needs of radiologic technologists and make an effort to support their efforts to develop radiation safety behaviors. Since radiation safety behavior can never be at the highest level, radiologic technologists must work harder and consider all available options to achieve their professional success goals and the physical environmental effects of radiation. It is advised that radiologic technologists continue to enhance their quarterly training and seminars to

generate new ideas and deliver more excellent and competent other radiological procedures to provide high-quality care. Future researchers should investigate the remaining 79.9% attributed to other indicators such as frustration coping and physical environment that could be influenced by attitude and self-efficacy to further improve the future study on the predictors of radiation safety behavior.

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Knowledge and Psychological Preparedness of Radiologic Technologist to Emerging and Re-Emerging Diseases in Region XII

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Abstract

One contributor to mental health issues is the occurrence of pandemics. Various responses, including psychological distress, are possible as an effect of potential traumatic circumstances brought about by pandemics. Depression, anxiety, and post-traumatic stress disorder are more likely to appear in people exposed to such highly contagious and often fatal diseases. This study determined how knowledge of newly emerging and re-emerging diseases affects Radiologic Technologists' psychological readiness. The respondents of this study were a total of 133 Radiologic Technologists from chosen public and private institutions in Region XII. The statistical tools employed in this study were Frequency and Percentage, Mean and Standard Deviation, Pearson Product Moment Correlation, and Linear Regression Analysis. The findings showed that Radiologic Technologists have the basic knowledge of the four emerging/re-emerging diseases: Zika Virus Disease (3.37), Monkeypox Virus Disease (4.07), Middle Eastern Respiratory Syndrome (4.13), and Ebola Disease (3.94). The findings also showed that Radiologic Technologists were highly self-efficient (4.02), moderately optimistic (3.74), and with normal resiliency (3.75). Pearson R Correlation confirmed a significant positive relationship between knowledge and psychological preparedness. Moreover, Linear Regression confirmed that the knowledge of emerging and re-emerging diseases of Radiologic Technologists significantly influences their psychological preparedness. The hierarchical regression analysis result shows that the moderating effect of sex, assigned area, and years in service do not influence the relationship between the variables. The researcher recommends developing intervention programs that will increase the knowledge related to emerging and re-emerging diseases and improve the psychological preparedness of Radiologic Technologists towards these potential pandemics.

Keywords: *Knowledge, Health, Descriptive-Predictive, Region XII*

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Introduction

According to Lawrance & Jennings (2022), one contributor to mental health issues is the occurrence of pandemics. Various responses, including psychological distress, are possible outcomes in response to the potential traumatic circumstances brought by pandemics. People exposed to contagious diseases were more likely to develop depression, anxiety, and post-

traumatic stress disorder (PTSD) (Hasanvandi& Saadat, 2022). As per Wynn (2017), it is observed that survivors may endure feelings of loss, sadness, worry, and depression; issues in sleeping, concentrating, decision-making, and determining priorities; and other difficulties. Psychological trauma may outnumber physical trauma after diseases and other crises (Zha &Foroudi, 2022).

During the COVID-19 pandemic, a significant frequency of mental disorders like depression, anxiety, and insomnia was revealed among healthcare personnel (Pappa &Ntella, 2020). A recent study indicated that between 55.2% and 51.4% of healthcare providers in Saudi Arabia had symptoms of depression and anxiety during the pandemic. Similarly, depression and anxiety were experienced by 17% to 45% of healthcare workers in Southeast Asia respectively (Rocha & Costa, 2021). Furthermore, 10% of the respondents present symptoms of stress, 26% of anxiety symptoms, and 18% of depressive symptoms in the Philippines (Carascal& Capistrano, 2022). AlAteeq et al. (2020) revealed that severe anxiety among healthcare professionals during COVID-19 was twice as high as that among emergency healthcare workers before the pandemic.

The goal of this study is to evaluate the psychological preparedness of Radiologic Technologists in Region XII for newly emerging and re-emerging diseases, to assess their level of self-efficacy, to determine their level of optimism, and to determine their level of resilient coping. Secondly, to investigate the connection between knowledge of emerging and re-emerging diseases to the psychological preparedness, self-efficacy, optimism, and resiliency of the respondents. Lastly, to determine the connection between the socio-demographic characteristics and the variables being studied.

The preparedness of Radiologic Technologists to respond to sudden and developing health hazards is thought to include knowledge, skills, talents, and value (Hassanie, 2022). However, there is a lack of exploration. In 2018, Lam (2018) did a literature study on Radiologic Technologists' preparedness; however, only a few quantitative studies were included for analysis. Due to the relatively small number of papers included, the underlying components of Radiologic Technologists' preparedness were not adequately synthesized. In addition, it is essential to thoroughly comprehend their psychological preparedness for newly emerging and re-emerging diseases. When factors affecting psychological preparedness are understood, insights can be gained such as the weaknesses and resources needed which can in turn be utilized to develop effective plans and interventions aimed at achieving the desired outcome. Disease management strategies against specific emerging and re-emerging diseases can be established as a result of this.

The matter concerning emerging and re-emerging diseases is not routinely common for Radiologic Technologists. This study helped Radiologic Technologists assess their knowledge on this subject. It also helped them identify their strengths and weaknesses and foresee the challenges they may experience. By doing so, the study hoped to encourage Radiologic Technologist Societies to create and implement pre- and post-outbreak plans and programs.

Knowledge of Emerging and Re-emerging diseases. Viral infections represent an ever-increasing risk to humanity due to the emergence and reappearance of previously eradicated diseases (Tryland, 2018). RNA viruses are the leading causes of respiratory infections in humans, ranging from the common cold to severe disease and even death. To be more specific, infections brought on by RNA

viruses are more dangerous than those brought on by other types of viruses because RNA viruses interact with human proteins that function in cellular processes that are unique to the cell as well as in intracellular transit inside the cell (Durmuş & Ülgen, 2017). Primary RNA viral infections include Middle East Respiratory Syndrome (MERS). MERS stands for Middle East Respiratory Syndrome (Reperant & Osterhaus, 2017). The increase in the number of infections that are caused by RNA viruses has resulted in a rise in the amount of research that is being conducted in the fields of genetic engineering, biotechnology, and other emerging technologies to develop more advanced methods of diagnosis, treatment, and vaccines.

Psychological Preparedness of Radiologic Technologist. Evidence for the effectiveness of psychological preparedness interventions in communities suffering natural disasters served as a foundation for modeling the concept of psychological preparedness for the outbreak (McLennan et al., 2020). According to Bighelli & Rodolico (2021), interventions that concentrate on psychological readiness effectively assist communities in this situation. In addition, Roudini et al. (2017) identified three essential elements of psychological readiness. These include a state of awareness and expectation of one's psychological reactions to a disaster, the ability to identify stress-related emotions and thoughts generated by the disaster, and the ability to deal with those stressful emotions and ideas in an adaptive manner that enhances one's ability to cope with the disaster. Essential aspects of psychological preparedness for communities and people are most transferable from one disaster to another (Clay & Goetschius, 2019). Controlling one's thoughts, feelings, and responses to the impending catastrophe — commonly referred to as coping with these issues"—is another aspect of being prepared.

Methods

The descriptive-predictive method was used to determine the knowledge and psychological preparedness of Radiologic Technologists working in selected private and public hospitals in Region XII. The actual number of respondents is 133 out of the possible 200 Radiologic Technologists from selected hospitals in Region XII. Participants of this study were chosen using a simple random sampling method—the procedure for choosing from a population where every individual has the same chance of getting picked. The number of samples was computed using Raosoft Calculator. Only Radiologic Technologists with six months or more of working experience in the selected private and public hospitals were eligible to be a respondent in this study. Due to the ongoing COVID-19 pandemic, the study used a web-based survey method on the day of data collection to collect empirical data on Radiologic Technologists' knowledge and psychological preparedness. There was no face-to-face interaction in the context of the new normal. Because respondents completed web surveys on their own time and at their own pace without waiting for an interviewer, they had less social desirability bias compared to interviewer-administered methods.

The researcher took the necessary steps during the data collection process to ensure that ethical integrity was kept. The Program Chair of the Master of Science in Radiologic Technology noted a letter authorizing the study which was then sent to each private and public hospital's official email addresses for approval, with the assistance of each institution's Chief Radiologic Technologists. As evidence of their voluntary participation in the study, respondents were asked to confirm their informed consent online via Google form, as specified in the instrument. This study only considered those who signed the consent form. The survey was carried out online, with all the study's explanations and test instructions included in the questionnaires. After all respondents submitted their entries, the data was then encoded, tabulated, and evaluated. To eliminate any

potential outliers, data were screened during the study. A statistician was consulted to ensure the precision of the mathematical computations.

In the data analysis, the following statistical tool was employed: Frequency and Percentage were used to reflect the socio-demographic profile of the respondents, specifically for gender, assigned area, years in service, and employment status of Radiologic Technologists in selected hospitals in Region XII. Mean and Standard Deviation were used to measure the level of psychological preparedness of Radiologic Technologists in terms of self-efficacy, optimism, resilience, and status of their knowledge of emerging and re-emerging diseases. Pearson Product Moment Correlation was used to measure the significant relationship between the knowledge of Radiologic Technologists in terms of emerging and re-emerging diseases and their psychological preparedness. Meanwhile, Linear Regression Analysis was used to further measure the influence of the knowledge of Radiologic Technologists in terms of emerging and re-emerging diseases on their psychological preparedness. Hierarchical Regression Analysis was used to determine if demographic profiles significantly moderate the relationship between knowledge of emerging and re-emerging diseases and the psychological preparedness of Radiologic Technologists.

Results and Discussion

Table 1. Demographic Profile of the Respondents

1.1 Profile Frequency Percentage Sex

Sex	Frequency	Percentage
Female	74	55.6
Male	59	44.4
Total	133	100.0
1.2 Assigned Area		
X-ray	93	69.9
Ct-scan	20	15.0
Ultrasound	16	12.0
Others	4	3.0
Total	133	100.0
1.3 Years of experience		
Five years and above	48	36.1
Three years to less than five years	27	20.3
One year to less than three years	43	32.3
Six month	15	11.3
Total	133	100.0

Table 1 shows the demographic profile of the participants — the final sample comprised 133 Radiologic Technologists. Respondents were mostly female (f=74, 55.6%) compared to male (f=59, 44.4%). Of the total respondents, 69.9% (f=93) work in the X-ray Department, 12% (f=16) work in the Ultrasound Department, 15% (f=20) work in the CT-Scan Area, and the remaining 3% (f=4) work in the other areas not mentioned. In terms of work experience, as Radiologic Technologists, 11.3% (f=15) worked for less than one year, 32.3% (f=43) have work experience of 1 year but not more than two years, 20.3% (f=27) worked for three years but not more than 4 years and 36.1% (f=48) worked for above five years.

Table 2. Summary of Level of Knowledge Emerging and Re-emerging Diseases.

	Mean Rating	Std. Deviation	Interpretation
Mers-Cov Knowledge	4.13	.827	High
Monkey Pox Knowledge	4.07	.855	High
Ebola Knowledge	3.94	.828	High
Zika Knowledge	3.37	1.054	Moderate
Overall Mean & SDs	3.877	.779	High

Summary of Level of Knowledge Emerging and Re-emerging Diseases

Table 2 presents that the overall mean score for the Knowledge of Radiologic Technologists of emerging and re-emerging diseases was 3.88 which indicates that Radiologic Technologists have a *basic knowledge of emerging and re-emerging diseases*. The data presents that Knowledge of Mers-Cov garnered the highest mean rating (4.13), which means that Radiologic Technologists have *adequate knowledge* of Mers-Cov. Meanwhile, Knowledge of the Zika Disease garnered the lowest (3.37) which means that the Radiologic Technologists have a *basic knowledge* of the Zika virus. This may imply that the threat of Mers-Cov was more impactful to the respondents than the threat of Zika, considering that they have more knowledge of the former than the latter. Although this study does not explore the factors that affect the respondents' knowledge level, a study by Nadeak (2019) suggested that knowledge has a positive correlational relationship with experience, including critical thinking skills and common sense. The study's outcome may be influenced by the recent COVID-19 pandemic, which shares an almost similar disease process with Mers-Cov being both coronaviruses that initially manifest as influenza-like illnesses

Table 3. Summary of Level of Psychological Preparedness of Radiologic Technologists in Terms of Self-Efficacy, Optimism, and Resilience

	Mean	Std. Deviation	Interpretation
Self-efficacy	4.018	.6550	High Self- Efficacy
Optimism	3.749	.6348	High Optimism
Resiliency	3.754	.694064	High Resilience
Psychological Preparedness	3.84		High

Summary of Level of Psychological Preparedness of Radiologic Technologists in Terms of Self-efficacy, Optimism, and Resilience

The overall mean score for the Psychological Preparedness of Radiologic Technologists after combining Self-Efficacy (4.01), Optimism (3.749), and Resilience (3.75) generated a 3.84 average mean score which indicated Radiologic Technologists have a *high* psychological preparedness. This may imply that respondents agree that giving effort highly encourages success in problem-solving and that, on the other hand, the opposition can be a factor that affects their self-efficacy. This implies that the respondents' qualities associated with coping with adversity are average (Riquelme& Pons, 2022). Thus, they can triumph over hardships or succumb to mental health issues such as anxiety or PTSD. In research by Bartlett (2021), resilience scores among frontline healthcare workers worldwide during the COVID-19 pandemic were generally determined to be in the moderate range.

Table 4. Summary of Relationship between Knowledge and Psychological Preparedness of Radiologic Technologists to Emerging and Re-emerging Diseases.

	R	P Value	Interpretation (null hypothesis)	Remarks
Knowledge Preparedness	.636	<.001	Rejected	Significant

Relationship between Knowledge and Psychological Preparedness

The table above shows the test of the correlation between the knowledge of Radiologic Technologists to emerging and re-emerging diseases and psychological preparedness. The results revealed that the relationship between knowledge and psychological preparedness is *moderately significant*, as can be gleaned from the p-value of less than 0.005 (.001) and the correlation coefficient R=.636. This means that the increase in knowledge on emerging and re-emerging diseases would also likely increase the psychological preparedness of Radiologic Technologists.

In other studies where knowledge has been linked to different aspects of preparedness, the results also support the finding that knowledge positively affects preparedness or its sub-elements. Research conducted by Auerbach (2022) resulted in a finding that there is a positive association between optimism and knowledge. The study found that the participants' levels of optimism increased when they were provided with pertinent information. According to the findings of a study by Alharthy (2018) on the relationship between the development of knowledge and the resilience of organizations, knowledge increases the capabilities of resilience. It plays an integral part in the resilience of organizations. In addition, individuals who rated themselves as having more excellent perceived knowledge tended to rate themselves as having higher self-efficacy, which means that they were more capable of completing research-oriented tasks, according to a study on perceived knowledge and self-efficacy in research conducted by Boswell (2018). As a result, they indicated that the more one learns about research, the more confident one grows in their ability to execute it. Applying the results the previous similar studies to the current study implies that the more knowledgeable Radiologic Technologists are on a disease leads to better reactions and coping towards it.

Table 5. Influence of Knowledge on Psychological Preparedness

	Standardized Coefficients	**t**	**p-value**	**Remarks**
Knowledge	.665	10.565	<.001	Significant
Preparedness	.665	10.179	<.001	Significant

R= .665 R^2 = .442 adjusted R^2=.437 F = 103.616

Regression Coefficients Between the knowledge of a Radiologic Technologist in terms of emerging and re-emerging disease and psychological preparedness of a Radiologic Technologist.

The table shows the result of linear regression analysis, which aims to show the significant predictor of psychological preparedness. The result indicated that knowledge of emerging and re-emerging diseases significantly predicted psychological preparedness. It showed that the influence of knowledge of emerging and re-emerging diseases on psychological preparedness generated a p-value less than .05 and a positive

standardized beta value of .665. This suggested that knowledge significantly predicts psychological preparedness (B=.665, p<.05). The regression weight for knowledge of emerging and re-emerging diseases in the prediction of psychological preparedness is significantly far from zero at the 0.05 level (two-tailed). Thus, for every unit increase in knowledge of emerging and re-emerging diseases, there is a corresponding increase in psychological preparedness of .665. This further supports that knowledge of emerging and re-emerging diseases contributes to the psychological preparedness of Radiologic Technologists. The findings of the regression analysis results apparently showed that the knowledge of a Radiologic Technologist can explain the variance (48.6%) of psychological preparedness of a Radiologic Technologist in terms of emerging and re-emerging diseases. The findings support the idea that acquiring knowledge improves an aspect of an individual's preparedness for a particular event or task, further supporting the idea that knowledge is power.

A similar study was conducted by Chiang (2020) on the knowledge, skill competencies, and psychological preparedness of nurses for disasters. In that study, the researchers concluded that to be prepared for disasters, the respondents, in general, need to possess enough knowledge and skills to minimize the impact and negative consequences of the disaster on a community, such as traumas, injuries, the spread of diseases, stress, and psychological distress. Ghasemi (2022) also explained that a lack of awareness often leads to an unconcerned attitude, which may adversely affect the preparedness to meet challenges during epidemic and pandemic periods. The fear and anxiety related to epidemics and pandemics also influence people's behavior in the community. As all epidemics and pandemics have unique characteristics regarding causality, progression, and control measures, providing health education and creating awareness during such situations is crucial to prevent disease spread effectively.

Table 6. Moderating Effect of Sex in Relationship with Knowledge and Psychological Preparedness

Model I - Sex	Beta	Std. Error	t-value	p
Constant	2.630	.613	4.292	.000
Know	.316	.156	2.034	.044
SEX	-.409	.394	-1.038	.301
Int_1	.103	.100	1.029	.306
R= .640; R^2 =.409; F=29.75; p<.000				
Model II - Assigned Area				
Constant	2.312	.472	4.895	.000
Know	.416	.120	3.466	.001
Assigned Area	-.220	.345	-.638	.524

Int_2	.042	.188	1.029	.636

R= .639; R^2 =.408; F=29.93; p<.000

Model III - Years of Experience

	Beta	Std. Error	t-value	p
Constant	1.547	.538	2.877	.005
Know	.590	.136	4.347	.000
Years of Experience	.168	.174	.966	.336
Int_3	-.043	.045	-.966	.336

R= .641; R^2 =.411; F=29.68; p<.000

The Model I shows the result of the moderating effect of Sex in the relationship between knowledge and psychological preparedness of Radiologic Technologists. The result shows that Sex does not influence the relationship of the variables. This implies that the magnitude and direction of the relationship between knowledge and psychological preparedness is not dictated by Sex. Statistical analysis using Hierarchical Regression Analysis yielded a beta value of .103, with t-value of 1.029, at p-value of >.05 which indicates that there is no significant interaction effect and therefore the interaction is highly not significant. This means that the gender of the respondents does not necessarily influence their knowledge and psychological preparedness for emerging and re-emerging diseases.

Tran (2019) mentioned that several studies on sex differences in general knowledge differed about exact instrumentation, language and country, respondent age, socioeconomic and educational background, and schooling. Furthermore, sex differences in intelligence and cognitive abilities may fluctuate from childhood to adolescence and adulthood (Nguyen, 2022). These studies suggest that many factors can influence individuals' mental capabilities, regardless of their sex, which can have varying research outcomes depending on the point of comparison. However, the current study ultimately suggests that knowledge and psychological preparedness for emerging and re-emerging diseases are not affected by gender.

The Model II shows the result of the moderating effect of the Assigned Area in the relationship between knowledge and psychological preparedness of Radiologic Technologists. The data shows that the area of assignment of Radiologic Technologists also do not influence the relationship between the variables. This implies that the assigned area does not dictate the magnitude and direction of the relationship between knowledge and psychological preparedness. The interaction is also highly not significant (b =.042, t =.475, p >.05) which indicates that the Assigned Area does not moderate the relationship between knowledge and preparedness, whether Radiologic Technologists work in the X-ray Department, CT-Scan Unit, MRI Unit, etc.

In Contrast, a study by Al Shaikh (2022) indicated that speciality, among others, was significantly associated with infection control knowledge of MERS-Cov among healthcare workers. This was implied to be due to the country being widely affected by MERS-Cov. A similar result was also suggested by another study by Alrajhi (2022), where there was a significant association between the HCWs' profession in the radiology department and their knowledge of COVID-19 and good clinical practices of infection control measures during the pandemic. A correlation may be determined in both related studies because the respondents had experience with patients infected with MERS-Cov or COVID-19, meanwhile the respondents in the current study have only experienced COVID-19 and therefore, may not have been impacted by other infectious diseases.

Model III shows the result of the moderating effect of Years in Service in the relationship between the knowledge and psychological preparedness of Radiologic Technologists. The data shows that years in service also do not influence the relationship between the variables. This means that the magnitude and direction of the relationship between knowledge and psychological preparedness is not dictated by the years of experience. As such, moderation is shown as not having a significant interaction effect, and therefore is considered not highly significant (b = -.043, t= -.966, p> .05). This means that the respondents' knowledge and psychological preparedness to emerging and re-emerging diseases is not affected regardless of how many years they have worked. The result is consistent with the trend the other moderating factors tackled above, where it may be due to the lack of actual cases with the concerned emerging and re-emerging diseases in the region that the respondent's years of experience do not make a difference.

In a similar study by Jalandra (2022) involving the psychological preparedness of nursing staff in India against COVID-19, contrary to the current study, it revealed that the respondents' psychological preparedness was positively correlated with older age and more years of experience. This was implied to be due to COVID-19 affecting India; therefore, healthcare workers had first-hand encounters with active patients having the disease.

Conclusion

The study respondents were mostly composed of females compared to males. In the research on gender disparities in general knowledge, it is possible that gender differences in intelligence and cognition. The department of X-ray is where most respondents are employed. It was discovered that specialization was significantly connected with increased infection control expertise among healthcare workers, who are most likely to handle patients before sending them to other diagnostic procedures. Meanwhile, a considerable portion of the respondents have work experience for either more than five years or between 1-3 years. It was shown that the number of years of experience significantly connected with improved knowledge of infectious diseases among radiologic technologists, who have most likely dealt with multiple instances in the past.

Radiologic Technologists have comprehensive knowledge of both newly emerging diseases and those that are re-emerging. The mean rating for the Mers-Cov infection was the highest, while the mean rating for the Zika Virus was the lowest. This suggests that the respondents regarded the threat posed by Mers-Cov as being more

significant than the threat posed by Zika, which is understandable given that they have a higher understanding of the former than they do of the latter. The recent COVID-19 pandemic, which has a disease course that is almost identical to that of Mers-Cov, most certainly played a role in influencing the survey's findings. COVID-19 and Mers-Cov are examples of coronaviruses that initially manifest as symptoms quite similar to influenza.

Radiologic Technologists exhibit high levels of self-efficacy, optimism, and resilience, which represent three components of psychological preparedness. It suggests that the existing circumstances of the respondents (i.e. work life, family life, social life, etc.) provide a suitable environment that supports sound mental health and thus proves beneficial to the respondents. Ultimately, this may allow individuals to deal with the stress brought on by future or present pandemics in a manner that prevents anxiety, sadness, and post-traumatic stress disorder (PTSD).

The findings demonstrate a significant relationship between obtaining prior knowledge and being psychologically well-prepared. The results show that those with a high level of knowledge also present a high level of psychological preparedness based on optimism, self-efficacy, and resilience. It has been shown in other studies that knowledge and optimism go hand in hand. When the participants were provided with information relevant to the study, the researchers found that their levels of optimism improved. Conversely, there is a significant association between expanding organizations' knowledge and their ability to remain resilient in adversity. Knowledge strengthens resilience abilities and substantially contributes to an organization's organizational resilience. People who rated themselves higher for perceived knowledge also tended to rate themselves higher for self-efficacy, suggesting they were better equipped to handle activities requiring inquiry because they had higher confidence in their abilities.

According to the data, it seems to indicate that the knowledge Radiologic Technologists possess on new and re-emerging diseases influences their psychological preparedness. This appears to suggest an associated improvement in psychological preparedness for every unit increase in information regarding newly emerging and re-emerging diseases. The responders as a whole need to be equipped with the knowledge and skills necessary to lessen the adverse effects that a tragedy has on a community for the community as a whole to be adequately prepared for catastrophes. These unfavorable outcomes include traumatic experiences, injuries, the spread of infectious diseases, stress, and emotional pain.

The knowledge and psychological preparedness of Radiologic Technologists in Region XII is not significantly moderated by demographic features such as gender, allocated region, or years of experience. Even though several studies have produced conflicting findings regarding the correlation between demographics and other factors, the current investigation found no correlation between the two variables. It is possible that this is due to a lack of practical experience working with patients who are infected with the diseases in question, and it is also possible that this is the case because none of the respondents, regardless of their demographic profile, have any first-hand points of reference from which they may formulate an initial response.

Recommendation

Since the demographic profile of the study is limited to sex, assigned area, and years of experience, it is recommended that future researchers explore the knowledge of other demographics, such as students and other healthcare workers, to determine whether the same phenomenon applies to a broader range of respondents.

Since the descriptive level of the Radiologic Technologist to the knowledge of emerging and re-emerging diseases is adequate, it suggests that there is a need for the administrators of the hospitals to maintain and ensure that their Radiologic Technologists are aware, updated, and educated on the latest news on infectious diseases. The management may come up with routine health education seminars and programs that will provide a venue for Radiologic Technologists to acquire accurate information on trending diseases and increase their knowledge on domains related to emerging and re-emerging diseases, such as clinical presentations, transmission routes, and prevention and control, which will enable them to prepare individually and institutionally proactively.

Since the descriptive level of Radiologic Technologist's psychological preparedness is high, it suggests that there is a need for administrators of hospitals to monitor the psychological well-being of Radiologic Technologists regularly to ensure that they are prepared for potential epidemics. This may be done by developing programs that will improve the psychological preparedness of the respondents in domains related to emerging and re-emerging diseases such as anxiety, PTSD, and depression.

The correlation between knowledge has a significant positive relationship to their psychological preparedness. Since the current study is limited to four diseases (Zika, Ebola, Mers-Cov, and Monkeypox), it is recommended that future researchers explore other diseases.

Since the study suggested that the knowledge of Radiologic Technologists in terms of emerging and re-emerging diseases influences their psychological preparedness, and since the current study is limited to three factors of psychological preparedness (self-efficacy, optimism, and resilience), it is recommended that future researchers explore other factors that can affect psychological preparedness such as media influence, personal experience, workplace environment, etc.

It is suggested that future researchers conduct similar studies using mixed-methods research to explore further the relationship between the respondents' knowledge of emerging and re-emerging diseases and psychological preparedness. Such a study may provide more personal information and themes that validate this study through the respondent's narratives and shared experiences.

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Patients' Health-Related Behavior and ufaction Undergoing Mammogram Procedure

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Abstract

The purpose of this research was to determine the patient's level of satisfaction and health-related behaviors along with their demographic profile. The study employed a descriptive-correlational research design. There were one hundred seventeen respondents who participated in this research. This study was conducted between March and April of this year 2023. The data were then collated and processed using descriptive statistics, and inferential statistics as statistical tools. Most of the patients have finished college degrees and have a good earning income of above Php 41,000. Remarkably, 42.6%, which is almost half of the patients who have undergone mammography for March and April 2023 have no records of a history of family disease. Further, these patients expressed a very satisfied description of the medical staff's service attitude. Their health-related behaviors are good since they observe healthy practices. In the analysis of the moderating effect of profile on the relationship between satisfaction and health-related behavior, results revealed that the interaction of satisfaction and education (β=-.049, p>.681), satisfaction and income (β=.193, p> .097), and satisfaction and disease (β=-.100, p>.310) have p-values above .05. This suggests that profile variables do not significantly moderate the relationship between satisfaction and health-related behavior. It is hoped that breast cancer patients will continue to observe their health-related behaviors and adhere to schedules. Radiologic technologists on the one hand must continue to promote good relationships among the patients to render their utmost service to the patients.

Keywords: *Patient-health-related behavior, Health, Descriptive-Correlational, Cagayan De Oro City*

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Introduction

Since the late 1980s, breast cancer mortality rates have not dropped more rapidly in locations where mammography is available (Boniol, 2018). It can be observed that the number of women who have had a mammogram is still increasing despite advancements in medical diagnosis and treatment in the area of mammography, despite breakthroughs in medical diagnosis and treatment in the field of mammography, the number of women who have undergone a mammogram continues to rise (DOH Phils, 2019 & Moreira et al., 2020). While some people follow doctors' advice with enthusiasm and adherence (Reece et al., 2021) others tend to do the opposite. Some are clothed in fear, affecting their adherence to medical procedure screening.

This situation could be linked to a person's health-related behavior as patients screened and diagnosed with breast cancer follow certain procedures and guidelines that somehow reduce risk

and death (Reece et al., 2021). Ping et al., (2018) mentioned that the importance of health behaviors in disease prevention has long been recognized. Reece et al., (2021) mentioned that successful breast cancer screening relies on timely follow-up of abnormal mammograms. Delayed or failure to follow up abnormal mammograms undermines the potential benefits of screening and is associated with poorer outcomes. Lam et al., (2018), found that unmet health information demands and higher levels of depression throughout the first treatment period predicted lower patient satisfaction later. This demonstrates the necessity of emphasizing the value of a patient-centered care strategy during care for advanced breast cancer. Women suffering from severe breast cancer may require continual cancer treatment due to the nature of the disease. As a result, it is crucial to look at how these women rate their cancer care services. As for patients who have been afflicted with chronic or life-threatening diseases, patient satisfaction is a crucial outcome measure.

The standard care in breast cancer screening is digital mammography, which is associated with a 20% reduction in breast cancer-related mortality in women at average risk of breast cancer (Reece et al., 2021). Regular mammography accounts for half of the recent declines in breast cancer mortality. However, breast cancer is still the most common cancer among Filipinos, followed by lung, colon, liver, and prostate (DOH Phils, 2019). In the Philippines, approximately 70% of breast cancers occur in women with undetermined risk factors, and about five percent of breast cancers are hereditary. In the past, the risk of breast cancer was 1 in 22. Today, it is already 1 in 8 cases. The figures are alarming, prompting the government and private institutions to vow to help fight off the disease (Argenal et al., 2019). The possibility that the rise in these numbers is due to the health behavior of the person involved could not be discounted.

It has been noted that the majority of international studies discuss how patients' health-related behavior relates to their demographic profile. At the national and local levels, there is a paucity of literature on this subject. This time, the researcher would like to take into account both the demographic characteristics and the patient's level of satisfaction with their health behaviors.

This study aimed to investigate the level of satisfaction and potential causes of patients' health-related behaviors following a mammography operation.

Health-related Behaviors

Cancer disparities are caused by a lack of health literacy, which is connected with less participation in medical decisions. Decisions on mammography screening are an example of how health literacy can influence decision-making and outcomes (Gunn et al., 2020). Health behavior according to Chawlowska et al., (2022) comprises either health-promoting or health-protective behaviors and unhealthy or health-risk behaviors. These health-promoting behaviors include, for example, a healthy diet, physical activity, and adaptive coping strategies for stress management. It is a well-known fact that eating a balanced diet is important for everyone. Certain behaviors have been associated with health promotion, including mammography screening, in women worldwide (Patrao et al., 2021).

Various health-related behaviors interact and influence the way of life modifications. These adjustments depend on whether a person thinks that their health habits will all work together to achieve a desired result, or what is known as higher-level objectives (Lippke et al., 2021).

Diet and Mental Health

Food influences, to a great extent our disposition, whereas our mood dictates our cravings and the type of nourishment we choose. Emotions affect eating, while the nutritional properties of food impact brain functions related to mood and feelings. The dietary choices are a complete and complex circuit. Provided we influence one option, the other will follow suit, as increasing evidence has shown that food choices have a positive impact on several mental disorders (Constantin & Fonseca, 2020).

Individual Healthy Behavior

Engaging in healthy behaviors—such as regular physical activity and following a nutritious and balanced diet—brings about numerous health, social, and self-evaluative benefits (Sylvester et al., 2018). Ping et al., (2018) mentioned that the importance of health behaviors in disease prevention has long been recognized. It is important to increase understanding on the factors associated with regular mammography screening, particularly those related to lifestyle and health promotion. Given their role in the onset and progression of current chronic diseases, the practice of physical activity, smoking, alcohol consumption, and diet are the health behaviors most associated with a healthy lifestyle. Furthermore, they are beginning to be reported as indicators of other behaviors linked to lifestyle and have also been thoroughly investigated in the field of breast cancer prevention (Patrao et al., 2021).

More recently, these behaviors have been associated with the periodicity of breast cancer screening in women worldwide.18–30 In general, those studies have pointed to a trend toward health promotion and a greater commitment to healthy behaviors in women who undergo mammography screening at more regular intervals, while a greater association has been found between risk behaviors and a longer time interval between mammography screenings. Reece et al., 2021 mentioned that successful breast cancer screening relies on timely follow-up of abnormal mammograms. Delayed or failure to follow up abnormal mammograms undermines the potential benefits of screening and is associated with poorer outcomes. However, a comprehensive review of inadequate follow-up of abnormal mammograms in primary care has not previously been reported in the literature. This review could identify modifiable factors that influence follow-up, which if addressed, may lead to improved follow-up and patient outcomes. The effects of poor nutritional status on health resource use and mortality rate emphasize the significance of incorporating techniques for accurate diagnosis and provision of appropriate nutritional assistance into normal clinical practice. (Schiergens et al., 2017; de Oliveira AL, 2018). A nutritional consultation will look at what is and is not beneficial for your body. Because every person is different, they can be consuming something or lacking in something that is specifically hurting their health and vitality (Minkoff, 2020).

Preventive Behaviors

Preventive health behavior is any activity undertaken by an individual who believes himself to be healthy for preventing or detecting illness in an asymptomatic state. It generally follows from a belief that such behavior will benefit health. Preventive actions can reduce, but not eliminate, the chances of acquiring a disease or illness. The strength of the cause-and-effect relationship between a certain behavior and the health problem one is trying to prevent will determine the impact performing the behavior will have on reducing the risk. This impact is measured in terms of attributable risk. Attributable risk is a measure of the chance of acquiring a disease if the risk factors for it are eliminated or preventive health behavior is engaged in. The chances are influenced by the relationship of the preventive behavior to the etiology of the disease.

Preventive health-related behaviors are also undertaken specifically to improve or enhance health. These types of behavior include both primary prevention and early detection. Primary prevention behaviors aim to prevent the incidence of disease (the number of new cases occurring within a given time frame). People who increase their levels of physical activity have been found to have reduced levels of risk factors such as high blood pressure, high blood cholesterol, and excess body fat. Early detection (or secondary prevention) behaviors aim to prevent early forms of disease from progressing. This involves people who have already developed preclinical disease or risk factors for the disease but in whom the disease has not yet become clinically apparent. Behaviors such as having a breast screen (mammogram) or a pap test for cervical cancer are intended to detect disease early so it can be treated promptly (encyclopedia.com).

Physical Activity

Further, Patrao et al., (2021) revealed that the practice of physical activity, not smoking, moderate alcohol consumption and a healthy diet were the health behaviors most adopted by the women who had last had a mammogram $\leqslant$2 years previously. A statistically significant association was found between a lapse of $\geqslant$3 years since last undergoing mammography screening and excessive alcohol consumption, while a borderline association was found between the same screening interval and leisure-time physical inactivity.

Regular mammograms are the best way to catch breast cancer early. When the screening method shows abnormalities, an oncologist can prescribe an ultrasound to confirm the findings. Generally, mammograms are suitable for women older than 45 and can detect tiny tumors in less dense breasts. A mammogram uses low-dose radiation X-rays, while a breast ultrasound uses high-frequency sound waves. Mammography is a breast imaging procedure that gives an X-ray image of the breasts. Regular mammograms are the best way for oncologists to find breast cancer at an early stage. Sometimes, a mammogram can help detect breast cancer for up to three years before patients can feel a cyst, lesion, or any abnormal change in their breast tissue. A breast ultrasound or a diagnostic mammogram may be used after an abnormal mammogram. It can also guide a health practitioner through a breast biopsy (Rhoda, 2021).

Level of Patient Satisfaction

Analysis of patient satisfaction survey feedback results can provide healthcare workers with a sufficient understanding of factors and areas that require improvement and can lead to effective improvements in medical service quality (Meng et al., 2018). In a similar vein, Fang et al., (2019) also express that in today's highly competitive medical environment, satisfaction has become the core competitiveness of medical and health institutions. Therefore, it was very important for medical institutions and their superior departments to find out the factors that affect patients' satisfaction with medical services. Chandra et al., (2019) also said that patient satisfaction surveys have been used as a meaningful and essential tool for identifying gaps and developing effective strategies for quality improvements in the healthcare industry.

The patient’s opinion is becoming more important in the improvement process of a health care delivery system. Patient satisfaction is the state of pleasure or happiness that the patients experience while using a health service. Thus, patient care is the basic function of every health service provider. It is one of the standards to measure efficiency and effectiveness, where the efficiency of a hospital is associated with the provision of service delivery and quality care. Patient satisfaction is the actual evidence of the effectiveness of the healthcare services providing administration (Manzoor et al., 2019).

Medical Service Staff Attitude

In China, tense physician-patient and nurse-patient relationships, insufficient mutual communication, and poor understanding are important factors that cause dissatisfaction (Meng et al., 2018). Some countries tried to improve medical satisfaction through health care reform. The Netherlands gradually introduced a competition mechanism in the field of health care through a series of administrative reforms to improve efficiency in the field, as well as satisfaction in medical services. To increase the patient's right of choice, Britain implemented a patient-centered concept and introduced a competition mechanism in the general practitioner (Fang et al., 2019).

Improved patient care has become a top aim for all healthcare practitioners, with the ultimate goal of obtaining high levels of patient satisfaction. At the same time, good healthcare service delivery, when compared to their peers, provides enterprises or public trusts with the potential to distinguish their facilities in a competitive industry. Currently, due to increased expectations for standard services and increased customer needs, hospitals are required to provide superior healthcare services to patients and meet their wants (Manzoor, 2019).

Some studies believed that the patient's characteristics were the decisive factor of satisfaction; in addition, some studies had shown that men tended to have higher satisfaction scores than women. Conversely, others believed that patients' demographic variables were not associated with patient satisfaction. In the study of Fang, et al., (2019), they found out that "Gender", "Age", "Place of Residence", and "Type of medical insurance" had no significant effect on satisfaction. They also found that the medical services utilization of patients had a certain impact on satisfaction. Moreover, the hospital's affiliation determined the medical resources it received and its comprehensive medical capacity. This might have affected the patient's feelings. Consequently, the satisfaction of inpatients was higher than that of outpatients, which was consistent with previous research. The researchers concluded that perhaps the inpatients had more contact with the medical staff and had a better understanding of the hospital's complicated service processes; thus, could have been more considerate of the hard work of the medical staff.

This section summarized the study's two variables. One is on the level of patient satisfaction, which represents studies that support the necessity for medical institutions to identify the elements that influence patients' satisfaction with medical services. The second is about health-related behaviors, and it mentions four sub-variables: diet and mental health, individual health behaviors, preventive behaviors, and physical activity. These sub-variables, referred to as preventative measures, are thought to delay the development of a disease or sickness.

From all these reviews, the researcher was able to identify some variables present in one study and missing in other studies and are correlated to a particular kind of variables. This led the researcher to fill the gap in determining the correlation between the demographic profile and the level of satisfaction with health-related behaviors among mammography patients. This study positioned itself in considering the combination of most if not all of the necessary variables, but this time will be correlated to the patient's health-related behaviors.

Methods

The descriptive-correlational method was used to determine the patient's level of satisfaction and health-related behaviors along with their demographic profile. Patients who have undergone

mammogram procedures this year were considered participants in this study. Approximately 117 patients participated in a two-month study in March and April 2023. A convenience sampling method was employed. The researcher adapted survey tools for measuring mammography patient satisfaction and health-related behaviors manifested by the patients. The respondents were asked to evaluate statements by answering a numeric response on the indicators. In this study, a 3-point Likert scale was employed.

For the interpretation of the respondents' responses, the following scale was used:

Table A. The Mean-score Interpretive Table for the Patients' Satisfaction Level

Mean Score	Description	Interpretation
1.00 - 1.66	Never	Very dissatisfied very bad, very inconvenient, and very expensive
1.67 – 2.33	Sometimes	Moderately satisfied which meant not too bad
2.34 – 3.00	Always	Very satisfied which meant very good, very convenient, and very cheap

The research survey questionnaire, which contains components I (personal information), II (degree of satisfaction), and III (health-related behavior) for reliability, was delivered to thirty patients who have undergone mammography procedures but are no longer included in the actual data collection. Their responses were statistically treated using the Cronbach alpha. The nine items for the level of satisfaction scored 0.909. The Cronbach alpha value for the sixteen items on health-related behavior was 0.824. The Cronbach value for the total items is 0.852. This signifies that the items are good since the values are closest to one.

The correlation coefficient range indicated below was utilized to determine the degree of strength of the linear relationship (Best & Kahn, 1998).

Table B. Classification of Pearson's correlation coefficient

Coefficient (*r*)	Interpretation
±0.81 – ±1.00	High to Very high relationship
±0.61 – ±0.80	Substantial relationship
±0.41 – ±0.60	Moderate relationship
±0.21 – ±0.40	Low relationship
±0.00 – ±0.20	Negligible relationship

The researcher took the necessary steps during the data collection process. She obtained a research ethics clearance from the Ethics committee of the institution. Following that, the researcher validated the survey questionnaire. Then, a letter was sought from the Department Head of Davao Doctors College and the Radiology Department of CUMC respectively asking permission to conduct the study. The researcher then obtained informed consent from the participants who were willing to participate.

Survey questionnaires were then distributed to the identified participants who gave consent. A brief orientation was given to the patient respondents. A validated survey questionnaire was floated to them. Data collected were then tallied, analyzed, and interpreted.

In the analysis of data, the following statistical tool was employed: Frequency was used to describe the demographic profile in terms of educational attainment, family history [disease], and monthly income. Percentage was used to describe the demographic profile in terms of educational attainment, family history [disease], and monthly income. Mean was used to assess the level of the patient's health behavior and the level of satisfaction. T-test was used to test for the significant difference between the demographic profile of the patients and health-related behaviors to the patient's level of satisfaction.

Results and Discussion

Table 1. Proportion of the Educational Attainment of Patients in Different Levels

Educational Attainment	Frequency	Percent
High School	12	10.3
College	68	58.6
Graduate Studies	28	24.1
Post Graduate Studies	8	6.9
Total	116	100

Demographic profile of the respondents undergoing mammogram procedures. As for the educational attainment of the participants of this study, most of them have baccalaureate degrees, having a percentage of 58.6; this means they have finished college level. Contrary to this, participants who have post-graduate studies only have a percentage of 6.9. The percentage of participants who finished graduate studies and high school are 24.1 and 10.3 respectively. This can be supported in the study of Grimm et al., (2022), where their patient demographics had a broad educational representation with bachelor's degrees and with master's degrees as the dominant degrees.

Table 1.1. Record of the Different Family History of Diseases of the Patients

Family History [Disease]	Frequency	Percent
None	54	46.2
Hypertension	21	17.9
Diabetes and Hypertension	8	6.8
Diabetes	4	3.4
Diabetes, Hypertension, and Breast Cancer	3	2.6
Diabetes & Breast Cancer	2	1.7
Breast Cancer & Hypertension	3	2.6
Breast Cancer	22	18.8
Total	117	100

Tracing the history of the family in terms of disease, the major diseases mentioned are hypertension, diabetes, and breast cancer. It is worth noting that most of the patients who have undergone mammography procedures have no mention of any type of prior family disease, with a percentage of 46.2. However, this was followed by patients who have a family history of breast cancer with a percentage of 18.8. Close to this percentage, is the history of having hypertension reflecting 17.9% in Table 1.1. Smaller percentages are being reflected for the combination of some diseases, with diabetes and breast cancer garnering the lowest percentage of 1.7. In the study by Winn (2022), she found out that earlier mammograms for women with a family history of breast cancer may not be needed. Women with a first-degree family relative diagnosed with breast cancer, who are otherwise at average risk, are often advised to get screened 10 years earlier than the relative's diagnosis age. However, there is little evidence to support the long-standing recommendation. Seiffert et al. (2021) on the one hand, mentioned the importance of tracing family history as it has an association with improved survival after a breast cancer diagnosis, irrespective of a positive family history.

Monthly Income	Frequency	Percent
Php 5,000 – 10 000	20	17.9
Php 10 000 – 15 000	7	6.3
Php 15 000 – 20 000	7	6.3
Php 20 000 – 25 000	12	10.7
Php 25 000 – 30 000	19	17.0
Php 30 000 – 35 000	6	5.4
Php 35 000 – 40 000	10	8.9
Php 41 000 above	31	27.7
Total	116	100

Showing the Count of the Patients' Monthly Income

The monthly income of the participants was also sought. Results show that a monthly income of Php 41 000 above has a percentage of 27.7, which is deemed the highest. The lowest on the other hand are participants earning between Php 30 000- 35 000 with a percentage of 5.4. The monthly income of Php 25 000 – 30 000 and Php 5, 000 – 10 000 has a percentage of between 17-18 among the participants. Meanwhile, the income of Php 35 000 – 40 000 showed a percentage of 8.9. Incomes of Php 10 000 – 15 000 and Php 15 000 – 20 000, got a percentage of 6.3.

Table 2. A Table Showing the Level of Satisfaction of the Patients in terms of Medical Staff Service Attitude

Items	N	Mean	Std Deviation	Interpretation
1. Scheduling personnel were helpful in scheduling my mammogram at a convenient time.	117	2.88	.397	Very satisfied
2. Upon my arrival to the department, my presence was acknowledged.	117	2.85	.428	Very satisfied
3. Questions regarding my exam today were answered by the technologist before I left.	110	2.75	.562	Very satisfied
4. All personnel wore nametags/IDs that easily identified them.	115	2.73	.518	Very satisfied
5. The mammographer who performed your exam greeted and introduced themselves to you.	117	2.68	.567	Very satisfied
6. The mammographer explained the entire procedure in a way that you easily understood.	116	2.72	.521	Very satisfied
7. The mammographer explained the importance of breast compression.	116	2.50	.653	Very satisfied
8. The mammographer exhibited concern for your privacy.	117	2.85	.421	Very satisfied
9. The mammographer took time to answer any questions regarding the procedure, breast self-exam, and how you would be notified of your exam results.	115	2.70	.546	Very satisfied
Total	117	2.74	.513	Very satisfied

Level of satisfaction of the patients. Table 2 showed the result for the level of satisfaction of the patients in terms of medical staff service attitude. It is noteworthy that all the nine items received a very satisfied interpretation. The item that showed the highest is *"Scheduling personnel were helpful in scheduling my mammogram at a convenient time"* which has a mean of 2.88. The item which got the lowest mean among the very satisfied

interpretation is *"The mammographer explained the importance of breast compression"*. Overall mean score for the level of satisfaction falls within the range of very satisfied also.

The patient's opinion is becoming more important in the improvement process of a health care delivery system. Patient satisfaction is the state of pleasure or happiness that the patients experience while using a health service. Thus, patient care is the basic function of every health service provider. It is one of the benchmarks used to measure efficiency and effectiveness, with a hospital's efficiency being related with service delivery and quality care. Patient satisfaction is tangible evidence of the administration's effectiveness in providing healthcare services. (Manzoor et al., 2019). Chandra et al., (2019) said that patient satisfaction surveys have been used as a meaningful and essential tool for identifying gaps and developing effective strategies for quality improvements in the healthcare industry. Given the change in the healthcare industry toward a patient-centered orientation, input from patients' perspectives is valuable (Prakash, 2010). Fang et al., (2019) also express that in today's highly competitive medical environment, satisfaction had become the core competitiveness of medical and health institutions. Therefore, it was very important for medical institutions and their superior departments to find out the factors that affect patients' satisfaction with medical services.

Table 3. A Table Showing the Level of Health-Related Behaviors of Patients Undergoing Mammograms

A. Diet and Mental Health

		Mean	Std Deviation	Description
	Diet and Mental Health			
1.	I eat regularly.	2.79	.406	Always
2.	My diet is varied.	2.29	.546	Sometimes
3.	I find the time to rest and relax.	2.60	.510	Always
4.	I limit the consumption of sugar and foods which contain it.	2.42	.592	Always
5.	I eat breakfast.	2.63	.551	Always
6.	I provide my body with enough sleep.	2.59	.512	Always
7.	I limit the consumption of salt and foods which contain it.	2.45	.609	Always
8.	I can effectively manage stress.	2.32	.541	Sometimes
	Total	**2.51**	**.533**	**Always**

Level of health-related behaviors among patients undergoing mammograms. Of the eight items in the diet and mental health variable, six got an interpretation of Always while two items were noted as sometimes. The item that got the highest mean, 2.79 is *"I eat regularly"*. While the least mean is 2.29 for item, "*My diet is varied".* It is good to note that the participants give value to eating their breakfast. Indeed, breakfast is one important meal for the body. On the contrary, the participants only observed a varied diet *Sometimes*, with a mean of 2.29 as reflected in Table 3A.

Constantin and Fonseca (2020) affirm that food influences, to a great extent our disposition, whereas our mood dictates our cravings and the type of nourishment we choose. Emotions affect eating while the nutritional properties of food impact brain functions related to mood and feelings. Poor nutrition may be a causal factor in the experience of low mood, and improving diet may help to protect not only the physical health but also the mental health of the population (Firth et al., 2020).

In recent years, the relationships between nutrition and mental health have gained considerable

interest. Indeed, epidemiological research has observed that adherence to healthy or Mediterranean dietary patterns—high consumption of fruits, vegetables, nuts, and legumes; moderate consumption of poultry, eggs, and dairy products; and only occasional consumption of red meat—is associated with a reduced risk of depression (Lassale et al., 2019).

B. Individual healthy behaviors

		Mean	Std Deviation	Descriptive Interpretation
	Individual Healthy Behaviors			
9.	When buying food products, I check their composition.	2.27	.652	Sometimes
10.	I look for information on healthy eating.	2.37	.568	Always
11.	I check my body for physical lesions or abnormalities.	2.41	.544	Always
	Total	**2.35**	**.588**	**Always**

For the individual healthy behaviors, it is remarkable that participants have time to check their bodies for physical lesions or abnormalities with a mean of 2.41. Following this is the item looking for information on healthy eating with a mean of 2.37. The least for this category is when participants buy food products, they check their composition, with a mean of 2.27.

Engaging in healthy behaviors—such as regular physical activity and following a nutritious and balanced diet—brings about numerous health, social, and self-evaluative benefits (Sylvester et al., 2018).

Health behaviors are a key component for reducing the risk of diseases such as diabetes, heart disease, and cancer, which together account for 68% of the causes of death worldwide (Patricia et al., 2017). Reece et al., (2021) mentioned that successful breast cancer screening relies on timely follow-up of abnormal mammograms. Delayed or failure to follow up abnormal mammograms undermines the potential benefits of screening and is associated with poorer outcomes.

C. Preventive behaviors

		Mean	Std Deviation	Descriptive Interpretation
	Preventive Behaviors			
12.	I check my blood sugar levels.	2.21	.650	Sometimes
13.	I check my cholesterol levels.	2.19	.601	Sometimes
14.	I perform a breast self-examination.	2.30	.633	Sometimes
	Total	**2.23**	**.628**	**Sometimes**

As all the items in this variable fall within the range of *sometimes*, it appears that participants saw preventive behaviors at least occasionally. Ranking it from the highest mean to the lowest, participants revealed that they perform a breast self-examination, with a mean of 2.30; they also check

their blood sugar levels with a mean of 2.21; and they also check their cholesterol levels, with a mean of 2.19. It is good to note that the participants somehow exhibit preventive behaviors.

Primary prevention behaviors aim to prevent the incidence of disease (the number of new cases occurring within a given time frame). People who increase their levels of physical activity have been found to have reduced levels of risk factors such as high blood pressure, high blood cholesterol, and excess body fat. Early detection (or secondary prevention) behaviors aim to prevent early forms of disease from progressing. This involves people who have already developed preclinical disease or risk factors for the disease but on whom the disease has not yet become clinically apparent. Behaviors such as having a breast screen (mammogram) or a pap test for cervical cancer are intended to detect disease early so it can be treated promptly.

D. Physical activity

		Mean	Std Deviation	Descriptive Interpretation
	Physical Activity			
15.	I lead an active lifestyle.	2.32	.555	Sometimes
16.	I use daily activities as an opportunity for physical activity (e.g. I climb the stairs instead of using the elevator, park my car at a distance so that I can walk, I move around by bicycle).	2.36	.566	Always
	Total	**2.34**	**.561**	**Always**

For the two physical activity variables, results show a split description as one item is sometimes while the other one is always. The item that got an always description is [*they*] *use daily activities as an opportunity for physical activity* with a mean of 2.36. The item with a mean of 2.32 and with a sometimes description is [*they*] *lead an active lifestyle*.

Patrao et al., (2021) revealed that the practice of physical activity, not smoking, moderate alcohol consumption and a healthy diet were the health behaviors most adopted by the women who had last had a mammogram ⩽2 years previously. A statistically significant association was found between a lapse of ⩾3 years since last undergoing mammography screening and excessive alcohol consumption, while a borderline association was found between the same screening interval and leisure-time physical inactivity.

As to the level of health-related behaviors among patients undergoing mammograms for the four variables, it is remarkable to note that the participants have good results description as majority of the items are observed always, while only one left which is observed sometimes. The variable that has the highest mean is on the observance of their diet and mental health with a mean of 2.51. The least variable is on the practice of preventive behaviors, which only got a mean of 2.23.

Participants are conscious enough of their diet and mental health status despite experience to mammogram procedure. Though they tend to not to focus on observing preventive behaviors, the researcher hopes that they consider practicing the preventive behaviors especially if a mammogram result is unfavorable. Chawłowska et al., (2022) said that healthy behaviors not only contribute to better health and well-being, but also to overall quality of life, which is defined as "an individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation

to their goals, expectations, standards, and concerns."

Table 3.1. A Table Showing the Mean Scores of the Health-Related Behavior Variables of the Patients

		Mean	Std Deviation	Description
1.	Diet and Mental Health	2.51	.533	Always
2.	Individual Healthy Behaviors	2.35	.588	Always
3.	Preventive Behaviors	2.23	.628	Sometimes
4.	Physical Activity	2.34	.561	Always
	Total	**2.36**	**.578**	**Always**

Table 4. Relationship between the Level of Satisfaction and Health-Related Behavior as responded by the Patients

Variables	Correlation coefficient	p-value	Remarks
Satisfaction	1.000	.971	Not Significant
Health-related behavior	-.003	.971	Not significant

Note: significance $p<.05$

Relationship between the Level of Satisfaction and Health-Related Behavior. The level of satisfaction of the participants was checked to see if it had a direct relationship with their health-related behaviors. Table 4 showed that the mentioned variables do not bear influence on each other as their p-values are .971 respectively and are above .05. This allows the researcher to accept the null hypothesis, stating that there is no significant relationship between the level of satisfaction and health-related behavior among patients undergoing mammogram. According to studies, some of the criteria connected with patient satisfaction include patient age and gender, continuity of care, waiting time, communication, and patient trust. Patients' trust in their doctors, as well as effective communication between doctors and patients, have been found to have a favorable impact on health outcomes. Trust has been demonstrated to have a good impact on patients in terms of medication adherence, patient satisfaction, and a better indication of follow-up treatment. Patients who have more faith in their doctor have more good health behaviors, less symptoms, a higher quality of life, and are more satisfied with their treatment (Chandra et al., 2019).

As Meng et al. (2018) says, analysis of patient satisfaction survey feedback results can provide healthcare workers with a sufficient understanding of factors and areas that require improvement and can lead to effective improvements in medical service quality.

Table 5. Summary of the regressions analysis for variables on the Relationship between Satisfaction and Health-Related Behavior

Model	Dependent variable	Independent variable	t-ratio	r	Interpretation	R^2	p-value	Conclusion
Model 4	Satisfaction	Education	-.413	.185	Negligible relationship	.034	.445	Not significant
		Income	1.672					
		Family history	-1.019					
Model 3	Satisfaction	Education	-.426	.157	Negligible relationship	.025	.442	Not significant
		Income	1.519					
Model 2	Satisfaction	Education	.328	.061	Negligible relationship	.004	.819	Not significant

Note: significance $p<.05$

Table 5 shows the result of regression analysis. The level of satisfaction of patients was matched against the three variables namely, Education, Income, and Family History. Results revealed that scores in Education, Income, and Family History are not positively correlated with the level of satisfaction as manifested by the p-value of .445, which is above 0.05 ($p < 0.05$). The r value showed a negligible relationship too. Variables having the top-most p-values are also the ones having the highest t-ratio values, Pearson Correlation of coefficient (r) and even coefficients of determination (R^2). Among the three variables, education and income show the highest p-value of 0.442 with a t-ratio of -.426 and 1.519 respectively. The (r) showed a negligible correlation with a strength of about 0.157. The R^2 value of 0.025 indicates that 2.5% in the variation of the level of satisfaction can be explained by these variables. Given this result, it signifies that patients' demographic variables were not associated with patient satisfaction as it has a negligible relationship, thus accepting the null hypothesis. Fang et al., (2019) in their study also found out that patients' demographic variables were not associated with patient satisfaction.

Conclusion

Most of the patients have finished college degrees and have a good earning income of above Php 41 000. Remarkably, patients who have undergone mammography for the months of March and April 2023 have no records of history of family disease. This implies that patients have a good demographic profile. Further, mammogram patients are not always those who have a history of family disease. Mammography may be available even to those who have no history of family disease.

Further, the patients received a very satisfied description of the medical services rendered by the medical staff. This suggests that the medical staff were able to render the services expected of them.

The patients observed good practices when it comes to their health-related behaviors. The majority of the items revealed that participants observed their Diet and Mental Health, Individual Healthy Behaviors, Preventive Behaviors, and Physical Activity, with a result of Always. This implies that patients are very aware of the

significance of their health behaviors. It is also good to note that they are paying close attention to this matter.There was no correlation between patient satisfaction and health-related behaviors. This suggests that patients' satisfaction is not affected by their health behavior. The practice of healthy habits does not directly influence the satisfaction of patients. The results of the demographic profile of the participants revealed an insignificant association between the level of satisfaction and health-related behavior. This implies that regardless of one's demographic status, it does not influence the patient's level of satisfaction or health-related behavior. The patients' impressions of satisfaction and health behavior are independent of each other.

The study on the level of satisfaction and health-related behavior, along with the demographic profile of patients who have undergone mammograms, was not found to be significantly correlated with each other. This suggests that their demographic profile is independent of their level of satisfaction as well as their health-related behavior. Their high educational attainment and having a good income influenced them to be better decision-makers when it comes to their satisfaction and health condition. Their statement of satisfaction reflects well on the institution and inspires it to provide the greatest medical care to any future patients. Nonetheless, an individual's point of view and responsibility for their health practices must be considered. They must be mindful of the consequences.

Recommendations

The study's findings shed light on more promising avenues for contributing to efforts to enhance patients' health. Health behaviors should be prioritized because they play a significant effect in the prevalence of any disease. Individuals and medical personnel should work together to prevent chronic diseases. Everyone's health should be their top priority.

Since the importance of breast compression received the lowest level of satisfaction in terms of medical staff service attitude, it is suggested that healthcare providers must consider patients' pain tolerance while upholding a high standard of care and good quality service.

Since the item "I can effectively manage stress" earned the lowest scores in diet and mental health variables, it is recommended that it is essential to look for positive attitudes to foster an impact on feeling emotionally happy and fulfilled.

Since the item "When buying food products, I check their composition, got the lowest mean in health-related behavior, it is suggested that it is essential to put importance on the food products we consume for it can affect how our body absorbs healthy nutrition.

Since the item "I check my cholesterol levels" obtained the lowest score among health-related behaviors, it is suggested that they be aware of their health issues since early detection behavior can stop early forms of disease from advancing.

Since the item "I lead an active lifestyle" had the lowest rating among health-related habits, it is recommended that they must be engaged in physical activities that are good for their health to reduce the risk of complications and the serious effects of health deficiencies.

Since the item "preventive behaviors" obtained the lowest score among the health-related behavior variables, it is suggested that they must prioritize schedule adherence to contribute to better health well-being and quality of life.

Since the patient's level of satisfaction had no association with health-related behavior with a p-value of .971, it is suggested that medical practitioners must continue to render the best medical services and cultivate excellent patient

connections. Also, they must be constantly reminded of the importance of healthy living.

Since the demographic profile of the patients had no direct influence on the level of satisfaction and health-related behavior with p-values of 0.445, 0.442, and 0.819 it is suggested that medical practitioners should continue to render fair treatment and medical service regardless of demographic status.

The future researcher will use this information as a baseline if a similar study will be carried out in the future. They might also consider having a qualitative research design relating to this matter.

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Unraveling the Phenomenon of Radiation Safety: A Study of Radiologic Technologists' Perspective and Practices

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Abstract

This study aimed to analyze the perspective and practices of radiologic technologists concerning radiation safety, aiming to unravel this phenomenon. This study examined the experiences of several respondents who had worked in radiation-producing modalities concerning the implementation of radiation safety practices. Moreover, the researcher used the Qualitative Approach in conducting the study. This approach aimed to collect data through participant observation and interviews. Fifteen participants in this study were purposefully selected as full-time radiologic technologists with more than a year of experience in Tuguegarao City. Participants were gathered through online meetings for in-depth interviews and focused group discussions. Additionally, the researcher also used questionnaires and recordings while interviewing. Data were gathered, recorded, and verbatim transcribed, then classified and evaluated following the research questions using Braun and Clarke's qualitative data analysis method. The importance of Radiation safety and protection, inadequate and absent radiation safety practices, and difficulties and impediments were some of the radiologic technologists' lived experiences in terms of radiation safety practices. Some coping mechanisms were maintaining quality assurance safety and preventive maintenance, applying radiation safety protocols (ALARA), and utilizing personal protective equipment. While enhancing professional knowledge, skills, and attitude, strictly observing and implementing radiation safety, work commitment, seminars, and training on radiation safety protocol were some insights towards radiation safety practices.

Keywords: *Radiation Safety, Radiologic Technology, Phenomenology, Tuguegarao City, Philippines.*

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Introduction

Radiation safety protects the environment and humans from the detrimental effects of exposure to ionizing radiation (Fiagbedzi et al., 2022). With that, radiologic technologists play a crucial role in conducting radiographic examinations and ensuring the safe use of radiation in medical imaging. However, radiologic technologists' inconsistent use of PPE in radioactive machines poses risks. Some failed to wear necessary equipment, like lead aprons, thyroid collars, dosimeters, and others, during ionizing radiation procedures (Smith et al., 2022), which endangered workers and patients, increasing radiation exposure risk despite established guidelines and protocols.

With the broad usage of ionizing radiation in medicine, radiographers need to be better informed and equipped with radiation safety measures that should be taken. Increased communication was required among them. In the early years, it was common for radiographers to suffer from cancer and fatalities due to extended exposure to ionizing radiation, which exceeded the maximum permissible doses of 20 mSv. This was primarily attributed to insufficient adherence to radiation safety precautions, as highlighted by Forouharmajd et al. (2021). Additionally, a study in Pakistan revealed that only 47.76% of the participants took all the safety measures, such as lead aprons, thyroid shields,

and lead glasses (Niaz et al., 2021), while in Egypt, it was only 18% (NG et al., 2020). As a result, international organizations like WHO, IAEA, and ICRP acknowledged the significance of safety measures, furthermore education and training on radiation hazards (Bardyova et al., 2021). Thus, managing radiation safety in a department requires much time, effort, and commitment to foster training and safety practices among radiologic technologists.

Radiation safety among radiographers has always been crucial and challenging, yet the issue still needs to be considered seriously (Maharjan et al., 2020). Extensive research has been done on the assessment of radiation safety across different countries (Batista et al., 2019; Kurtul & Kurtul, 2018; Goula et al., 2021), but to the best of the researcher's knowledge, there was less on the exploration of practices. Consequently, they had yet to be conducted here in the Philippines. Also, international evidence suggested different results in assessing radiation safety awareness, with most of it aligned with legislated guidelines. Still, when it came to their practices, it was found to be limited, and compliance resulted in just a personal choice (Lewis et al., 2022).

Several issues concerning radiation safety protection in the radiology department must be addressed. A study in Mali showed that most respondents did not take radiation safety measures for their patients (Diarra et al., 2022). Even more than that, the National Council on Radiation Protection and Measurements encouraged the need for further exploration and implementation of radiation safety practices in medical imaging (NCRP, 2019). In light of this, the researcher was interested in exploring and understanding the practices followed by radiologic technologists for radiation safety in diagnostic radiography to grasp further any potential problems that might have affected its use in selected hospitals in Tuguegarao City, Philippines. The research outcome would inform administrators, organizations, and policymakers about potential issues and support the development of policies and programs to further enhance radiation safety at work.

Methods

The study employed the phenomenological method and utilized a descriptive qualitative research design to examine the experiences of 15 selected radiologic technologists from Tuguegarao City, Philippines. The participants were chosen through purposive sampling, including only those with more than a year of working experience in radiation-producing modalities at the selected hospital. Of the participants, 7 participated in in-depth interviews, while 8 participated in focus group discussions. The observed data gathered from these interviews and discussions were analyzed using thematic analysis.

To overcome the limitations imposed by the pandemic and conflicting schedules, the researcher conducted online focus group discussions via video conferencing and individual in-depth interviews using Zoom. During these interviews, the participants were asked to share their experiences with their practices in Radiation Safety, how they dealt with the challenges, and what insights they could share with the general public regarding practicing radiation safety protection, specifically on radiation-producing modalities like X-ray, CT scan, and Mammography.

The researcher followed a systematic data collection process. A letter authorizing the study was obtained from the Program Chair of the Master of Science in Radiologic Technology, and a formal letter requesting to conduct the study was then sent to the heads of selected hospitals in Tuguegarao City for approval. The Chief Radiologic Technologists from each institution assisted in securing the approvals. Prospective participants were also given an informed consent letter and the interview guide, which had been crafted and validated based on expert validators' suggestions. Only those who signed the consent form were included in the study.

During the online interviews, which lasted between 15 minutes to an hour, depending on the depth of the discussion, participants were informed that the Zoom meetings were recorded for

documentation purposes. The recorded audio was later transcribed and returned to the participants to verify accuracy. The data were then encoded, tabulated, and evaluated. A professional data analyst was consulted to interpret the tabulated data and extract themes, which formed the basis for developing personal insights.

Overall, this study utilized a rigorous methodology, effectively adapting to the pandemic's challenges and ensuring the participant's data's informed consent and confidentiality.

Results and Discussion

Profile of the Participants

Table 1 presents the profile of the participants in this study. The table had four labels: code name, age, sex, and area. A total of 15 participants voluntarily participated, 7 in the in-depth interview and 8 in the focus group discussion. Meanwhile, each participant in the IDI and FGD was named after colors and flowers, respectively. The researcher used these code names to preserve the participants' privacy and keep their identities confidential.

Code Name	Age	Sex	Area
Red	27	M	Xray and CT
Orange	26	M	Xray
Yellow	26	F	Xray and CT
Green	40	F	Xray and Mammography
Blue	24	M	Xray
Indigo	35	F	Xray
Violet	26	F	Xray
Sunflower	34	F	Xray and CT
Rose	34	F	Xray
Violets	26	F	Xray and CT
Daisy	31	F	Xray
Iris	30	F	Xray
Lily	32	F	Xray
Tulip	27	M	Xray and CT
Orchid	37	F	Xray

All participants were employed as full-time radiologic technologists and were assigned for more than a year in radiation-producing diagnostic modalities such as X-ray, CT scan, and mammography.

The thematic map below shows the themes extracted and how they relate to exploring the lived experiences of the Radiologic Technologists in Radiation Safety Practices.

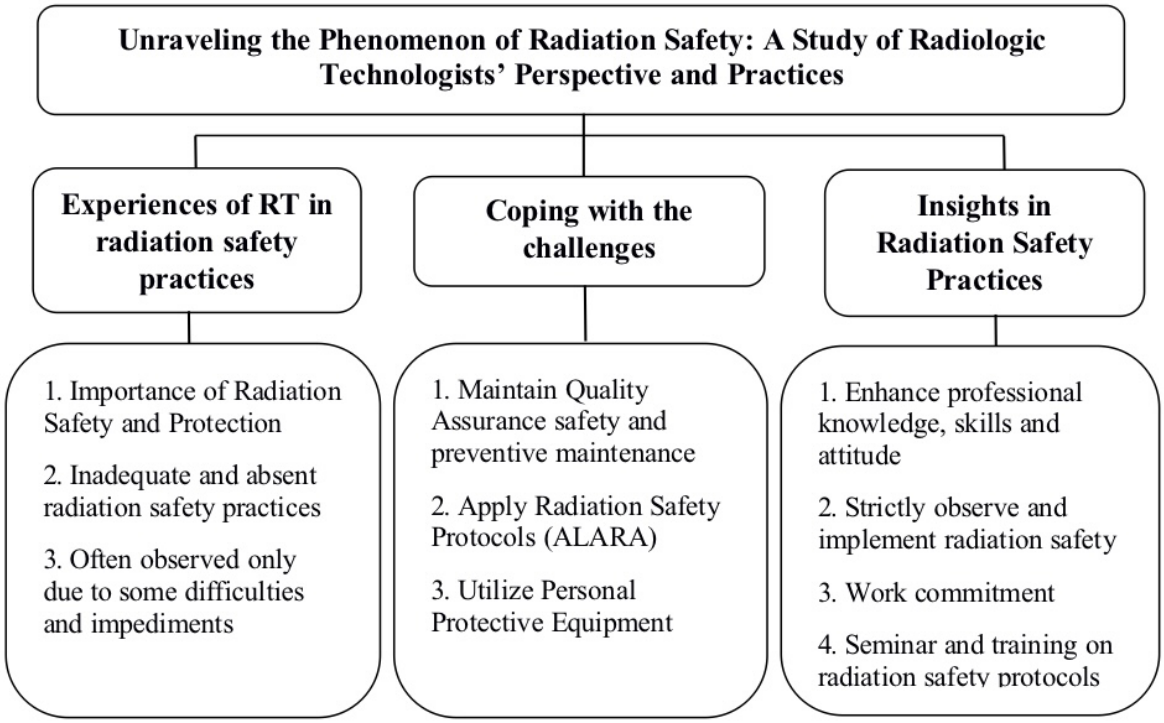

Figure1. Thematic Map

Table 2. Summary of results on participants' experience in radiation safety practices

Issues Probed	Core Ideas	Code	Themes
On their experiences in Radiation Safety Practices	-Protection of patients and healthcare workers -Very important for the benefit of both radiologic technologists and patients -Minimizing the risk or the adverse effect that we can get from radiation	-Protection from the risks of radiation exposure	Importance of Radiation Safety and Protection

	-Laziness of giving thyroid shields to the patient's watchers or assistants -Forgetfulness on wearing a TLD badge -Overconfident as a rad tech -Making work easy and fast -Negligence of the staff -Not following the radiation safety practices for low radiation dose cases	-Inefficient work behavior	Inadequate and absent Radiation safety practices
	-Because of lack of PPE -Due to PPE conditions -Wearing a PPE is a waste of time -Sometimes due to the number of patients and workloads -Often depending on the patient's medical needs and attention	-PPE's unavailability, functionality, and interference with the work performance Imbalance RT-to-patient ratio -Uncooperative patients	Often observed only due to some difficulties and impediments

Emergent 1. Experiences of RT in Radiation Safety Practices

On the experiences of radiologic technologists in radiation safety practices, the participants highlighted the importance and significance of radiation safety in protecting patients and healthcare workers from unnecessary exposure to ionizing radiation. They emphasized the need to minimize the risks associated with radiation and considered it a crucial aspect of their practice. Participants also identified various shortcomings in radiation safety practices among radiologic technologists. This included negligence in providing necessary protective equipment, such as thyroid shields, forgetfulness in wearing monitoring devices, overconfidence, and an inclination to prioritize speed and efficiency over safety was also observed. In addition, participants disclosed and acknowledged that radiation safety practices were sometimes compromised due to challenges and constraints. These difficulties included the scarcity or suboptimal condition of personal protective equipment (PPE), the pressure of heavy workloads and limited resources, and the need to prioritize urgent patient care over safety protocols.

Table 3. Summary of results on participants' ideas in handling challenges in applying radiation safety practices

Issues Probed	Core Ideas	Code	Themes
Their ideas in handling challenges in applying radiation safety practices	-Frequent inspection of the radiation safety equipment and machines	-Regular radiation safety inspection	Maintain Quality Assurance safety and preventive maintenance
	-Consistency in the application of radiation safety -Applying the standard radiation protocol- the time shielding and distance -Follow ALARA- as low as reasonably achievable	-Principle of radiation safety- ALARA	Apply radiation safety protocol (ALARA
	-Consistent use of lead aprons, TLD, and other radiation safety equipment	-Use of radiation personal protective equipment	Utilize Personal Protective Equipment

Emergent 2. Coping with the challenges

With the participants' ideas in handling challenges in applying radiation safety practices, the participants emphasized the importance of regular inspections of radiation safety equipment, including lead gowns, and ensuring the quality assurance of radiation machines. They highlighted the need to identify signs of wear and tear, damage, or degradation in the equipment. They emphasized promptly repairing or replacing damaged gowns to maintain effective radiation safety practices. Also, consistency in applying radiation safety practices (ALARA) was considered necessary by participants. They highlighted the importance of following standard radiation protocols, such as time shielding and distance, and adhering to the ALARA principle, which aimed to minimize radiation doses to the lowest possible level. By incorporating these practices, risks associated with ionizing radiation exposure can be minimized. Moreover, the participants stressed the importance of consistently using personal protective equipment (PPE), such as lead gowns, thermoluminescent dosimeters (TLDs), protective gloves, aprons, thyroid shields, and leaded eyewear. They recognized that PPE was vital in ensuring the well-being and protection of individuals working in environments with ionizing radiation.

Table 4. Summary of results on participants' ideas or insights about radiation safety practices

Issues Probed	Core Ideas	Code	Themes
On their insights about radiation safety practices	-Strategize on proper radiation safety and protection -Be more aware and conscious in implementing and using protective devices -Do things right and apply what needs to be done -Understand that radiology is not about radiation risk; it's all about the diagnostic significance that matters	-Enhance and increase the knowledge and skills of colleagues and patients in radiation safety protocols	Enhance professional knowledge, skills, and attitudes
	-Follow and stick to radiation safety practices -Don't underestimate the importance of radiation safety precaution	-Follow the implementation of radiation safety	Strictly observe and implement radiation safety
	-Commitment to duties, to the institution, and serving patients with care	-Increased perceived work commitment	Work commitment
	-The management should conduct or provide seminars or training about radiation safety	-Holding and attending seminars for radiation safety	Seminar and training on radiation safety protocols

Emergent 3. Insights in Radiation safety practices.

Lastly, on the participant's insights that can be shared with society about radiation safety practices, participants emphasized the need to enhance professional knowledge, skills, and attitude in radiation safety practices. They highlighted the importance of strategizing on proper radiation safety, being aware and conscious of using protective devices, doing things right, and understanding that radiology was about diagnostic significance rather than just radiation risk. Also, the participants underscored the importance of strictly observing and implementing radiation safety practices. They stressed the need to adhere to safety protocols, not underestimate the low doses of ionizing radiation, and the importance of radiation safety precautions. Participants highlighted the significance of wearing lead gowns, using thyroid shields, and cautiously approaching procedures to protect against radiation exposure.

Additionally, work commitment emerged as a theme, with participants stressing the dedication required to radiation safety practices. They highlighted the commitment to duties, the institution,

and serving patients with care. Participants expressed that prioritizing radiation safety protocols increased their commitment and minimized negligence, aligning patient care with the institution's mission. Furthermore, the participants highlighted the importance of conducting seminars and training sessions on radiation safety protocols. They advocated for regular educational initiatives to raise awareness and enhance knowledge among radiologic technologists. Participants believed these seminars and training sessions would help remind them to practice radiation safety protocols and increase their knowledge and skills with radiation safety practices in their work.

Conclusion and Recommendations

The analysis highlights the importance of practicing radiation safety measures to protect the well-being of patients and healthcare professionals. They also underscore the need to address deficiencies in safety practices and overcome the obstacles that hinder their consistent implementation.

With the participants' ideas in handling challenges in applying radiation safety practices, the participants emphasized the significance of maintaining quality assurance, following radiation safety protocols, and utilizing personal protective equipment to address challenges applying radiation safety practices. These measures aim to minimize risks, protect individuals from unnecessary radiation exposure, and create a safer environment for patients and healthcare professionals.

Lastly, on the participant's insights that can be shared with society about radiation safety practices, the participants pointed out the need to enhance professional knowledge, strictly observe radiation safety practices, demonstrate work commitment, and provide seminars and training to ensure optimal radiation safety in radiology. They highlighted the importance of prioritizing patient care, raising awareness, and continuously educating healthcare professionals to maintain high safety standards.

It was important to remember that research findings from a qualitative, phenomenological-focused study like this were rarely generalizable or transferable to other situations. It contended that phenomenology aimed to thoroughly explain the phenomena that led to understanding the basic framework of lived experiences. Furthermore, this research study could be adaptable to future related research studies to support Radiologic technologists in delivering radiation safety practices. Only fifteen (15) people participated in the research, which was a relatively small number. Future research should thus expand their sample size and recruit participants from a wider variety of regional hospitals. Using a quantitative approach to learn from this population regarding radiologic technologists' practices toward radiation safety could lead to very different results.

Finally, future research might need to focus on specific topics such as inefficient work behavior among radiologic technologists, PPE's unavailability, functionality and interference with work performance, the pressure of increased speed due to increased workload and imbalance radiologic technologists-patient ratio as well as the circumstances that directed radiographers in prioritizing urgent patient care over safety protocols.

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Silent Battle Cries: Travails of Radiologic Technologists Working Condition During Covid-19

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Abstract

This research study aimed to investigate the challenges Radiologic Technologists faced in dealing with the COVID-19 pandemic, their coping mechanisms, and the insights they can share with their peers and the Radiologic Technology profession. The study employed face-to-face interview sessions using a purposive sampling technique, with seven participants in in-depth interviews and eight in focus group discussions. Only Radiologic Technologists with a minimum of 1 year of experience during the pandemic were included in the study. The research was conducted in health facilities located in Region XII, comprising both government and private hospitals. Thematic analysis with a hermeneutic-phenomenological context was used to identify themes and create codes based on the gathered data. The study's findings revealed three essential themes that captured the challenges Radiologic Technologists face in their working conditions, particularly the difficulties they encounter as front-liners. Also, seven essential themes were identified to explore the coping mechanisms employed by Radiologic Technologists during the COVID-19 pandemic. Lastly, the study identified one theme related to the insights participants can share with their peers and the Radiologic Technology profession to gain a deeper understanding of these themes and further explore the experiences and challenges related to them during the COVID-19 pandemic and future studies are recommended to employ a larger sample size and delve into additional themes acknowledged in this study.

Keywords: Working condition, Social Sciences, Phenomenological Hermeneutic, SOCCSKSARGEN.

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Introduction

Radiologic Technologists working in a COVID-19 facility faced various challenges in their working conditions during the pandemic. The workflow of Radiologic Technologists has undergone numerous adjustments, considering factors such as increased workloads, unfamiliar tasks outside of their usual practices, disruption of existing teams, and rapidly changing regulations and procedures. These developments threaten occupational health and safety (Buljac-Samardzic et al., 2020). Furthermore, (Ulusoy & Celik, 2022) conducted a study to determine the levels of burnout among Turkish healthcare professionals, including HCWs and Radiologic Technologists, after a year of the epidemic in pandemic services or outpatient clinics. According to the survey, emotional tiredness was revealed by 51.6% of HCWs, and a lack of personal success was shown by 75.8%.

The challenges faced by Radiologic Technologists in their daily work during the pandemic have resurfaced due to the increasing number of positive patients in some regions of the Philippines. Among Filipinos, Radiologic Technologists have experienced the worst types of discrimination, including unpleasant remarks, physical or verbal assault, disparaging gestures, and social media shame (De Guzman et al., 2022). Similarly to the study by Itani et al. (2021) Lebanon's radiology departments, including its radiographers

and Radiologic Technologists, have faced numerous negative consequences due to the ongoing pandemic and the heavy workload it has imposed. Additionally, according to (Tan et al., 2021) Radiologic Technologists have faced the challenge of doubling their rotations in emergency radiology with an increased number of staff handling COVID-19-positive patients. Moreover, the research (Çelmeçe & Menekay, 2020) concluded that the stress, worry, and burnout experienced by healthcare staff caring for those patients who were COVID-19 patients' quality of life was impacted.

Workload and physical exhaustion were significant challenges that Radiologic Technologists faced in their working conditions during the pandemic (Akudjedu et al., 2020). A more substantial percentage of participants (447 out of 522) who were front-line healthcare management teams fighting against the pandemic reported an increased workload during the survey. Additionally, more fatigue could be felt by Radiologic Technologists due to discrimination, in the SOCCSKSARGEN region because, according to Dayupay (2020), during the pandemic, Radiologic Technologists and other healthcare workers have also feared leaving their houses due to discrimination from people around them rather than solely due to the fear of COVID-19. This anxiety is a result of an incident in which five people attacked a front-line healthcare practitioner and bathed them in bleach, possibly resulting in permanent eye damage and blindness. They surmounted these challenges because of their dedication to their vocation, perseverance, excellent patient care, expertise, and competence. It has been difficult to adapt to the "new way of working described in the study by Lewis and Mulla (2021). Given that none of the previous studies have examined the working conditions of Radiologic Technologists during COVID-19 in the SOCCSKSARGEN Region, this study aimed to document the experiences of Radiologic Technologists during the pandemic. Further investigations should be conducted to explore these variables in more detail and gain a comprehensive understanding of the challenges front-line workers face. Such information would be instrumental in formulating policies to safeguard Radiologic Technologists against discrimination and enhance the evaluation of the quality of medical care provided to patients.

Methods

In this study, the researcher used a qualitative hermeneutic-phenomenological strategy. This qualitative research method allows researchers to study Radiologic Technologists' experiences in the COVID-19 facility and everyday practice to comprehend Radiologic Technologists' perspectives on the COVID-19 pandemic.

The SOCCSKSARGEN Region, commonly known as Region XII, was the site of the research study. The study participants were Radiologic Technologists in health facilities affiliated with the government and private hospitals. The researcher used a purposive sampling technique to select participants who best represented the population of interest. This study identified seven (7) participants for in-depth interviews, including eight (8) focus group discussions meeting these criteria. The researcher ensured that only Radiologic Technologists who voluntarily served during the first year of the pandemic were included in the study. Graduates of the Bachelor of Science in Radiologic Technology (BSRT) who did not have firsthand experience and Radiologic Technologists who did not serve during a pandemic outbreak were excluded from the study.

In qualitative research, the researcher served as the primary data collection instrument, as Creswell (1994) stated. In a phenomenological study, the researcher interacts with participants and conducts in-depth interviews and focus groups. Participants' experiences, viewpoints, and actions were gathered in qualitative research, which aims to understand a specific experience by gathering data from people who have experienced it and then using thematic analysis to reveal the significant themes and basic structure of the experience (Creswell, 2013). The Creswell approach was used to analyze the data. This was a data reduction technique used to analyze

the data. The objective was to find recurring patterns in the participant descriptions to gain a comprehensive picture of the topic studied. Thematic analysis was conducted in six phases: (1) Data familiarization: The researcher became familiar with the data by reading and rereading the transcripts or other data sources. This allowed the researcher to identify key themes and concepts from the data. (2) Initial coding: The researcher coded the data by identifying keywords and phrases representing the themes and concepts identified in the data familiarization phase. (3) Theme development: The researcher identified patterns and themes in the data by reviewing the codes and grouping them into more prominent themes. (4) Theme refinement: The researcher reviewed the data and ensured that the themes were accurately represented. (5) Theme analysis: The researcher analyzed the themes by examining the data to see how they relate to each other and the research question. (6) Theme report: The researcher wrote a report that describes the themes and their relationship to the research question.

In addition, this thematic analysis has advantages and also a few drawbacks: The researcher's personal experiences and biases may affect the analysis because it is a subjective method; it could take a lot of time and effort; and in vast datasets, finding themes could be challenging.

Results and Discussion

The challenges faced by Radiologic Technologists in their working conditions during COVID-19 were broken down into three themes. The themes discovered concerning the Radiologic Technologists' actual challenges were presented. The second table covers topics such as Radiologic Technologists' participants' coping with the challenges in their working conditions during the COVID-19 pandemic. The theme related to Radiologic Technologists' collaboration among health professionals was presented in the final section.

Table 1 presents the profiles of participants in this study. The table was divided into five labels: code name, age, sex, years in service, and study group.

For this study, 15 Radiologic Technologists from public and private hospitals were invited for interviews, seven in-depth interviews, and eight focus group discussions. Members received a name based on an attribute of their physical appearance. The researcher employed these code names to preserve the participants' privacy and guarantee that their identities remained undisclosed.

Code name	**Age**	**Sex**	**Years in service**	**Study group**
Muscularity	34	M	11	IDI
Full lips	28	F	5	IDI
Long legs	29	F	4	IDI
Petite	28	F	7	IDI
Dimple	28	F	7	IDI
Brown eyes	30	F	9	IDI
Luxurious hair	29	F	7	IDI
Curly hair	39	F	11	FGD
Young heart	53	M	25	FGD
Tall	25	M	4	FGD
Chinita	23	F	2	FGD
White Skin	28	F	4	FGD
Slim	25	F	4	FGD
Pretty	28	F	7	FGD

FIGURE 1

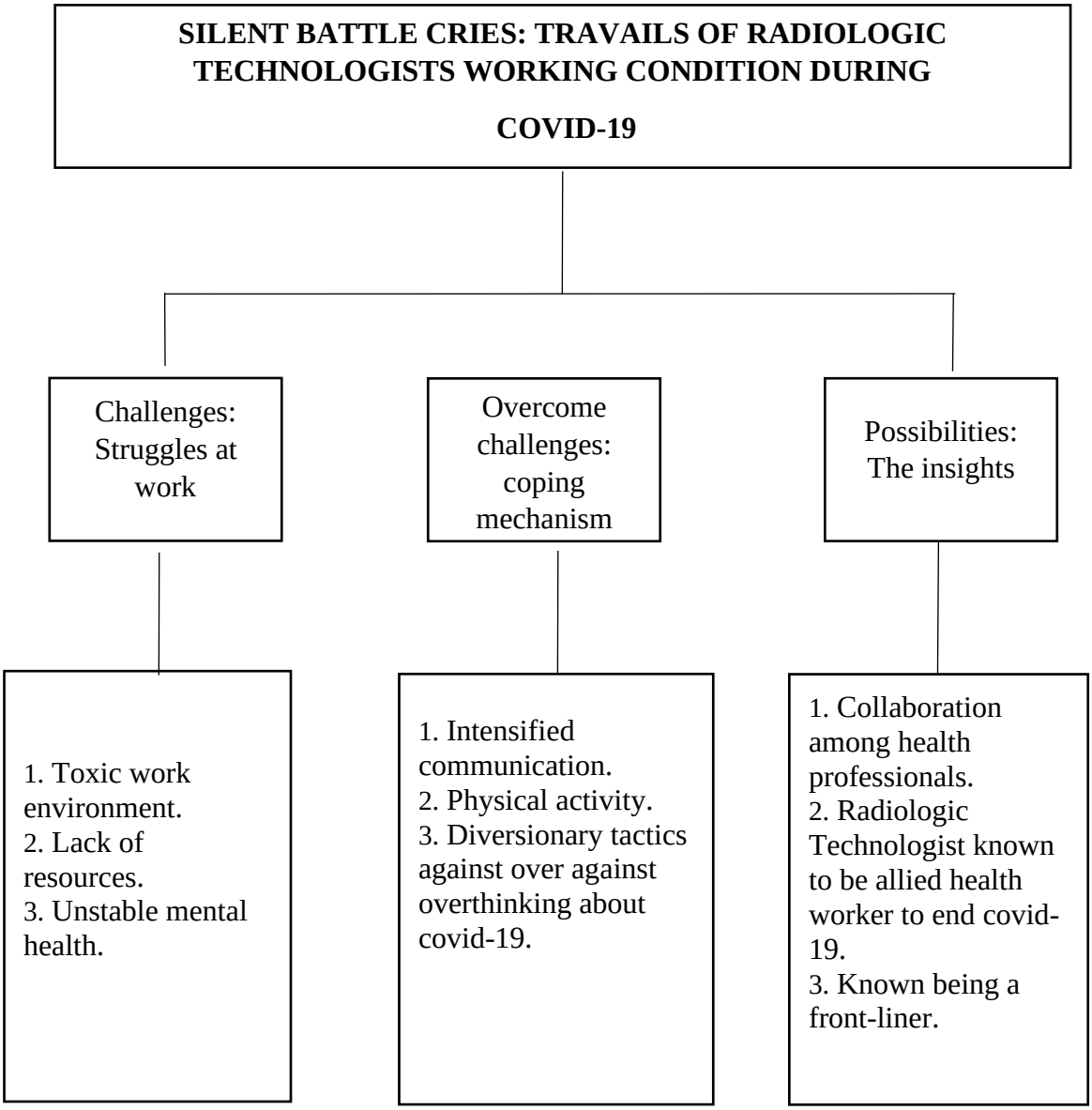

Figure 1 shown above, reveals the themes and categories that emerged from critical informants' interviews and focus group discussions with the challenges of Radiologic Technologists' working conditions during COVID-19

using the Creswell method of data analysis in which the researcher aimed to understand Radiologic Technologists experiences in their working conditions.

TABLE 2

ISSUES PROBED	CORE IDEAS	CODES/CATEGORIES	ESSENTIAL THEMES
Radiologic Technologists' experiences in dealing with COVID-19 patients	● Discrimination by co-health workers and the public, who are the front-liners ● Not belongs to the front-liner	Being discriminated	Toxic work environment
	● Fear of contracting the virus, ● infectious overthinking, and worry about returning home because of the risk of spreading the disease. ● Fear as there is yet no treatment for COVID-19. ● Discrimination by front-line co-health professionals and the general public ● They said that the Radiologic technologist was not a front-liners	Paranoia	
	● Enduring away from the family ● Burnout to duties and quarantine protocols	Work overload	
Observations of covid-19 patients and their needs	● Lack of X-ray machine ● Lack of PPE.	Limited resources of the hospital/COVID-19 facility.	Lack of resources
	● Lack of preparation and orientation to do radiography procedure ● Late infectious control policy ● Not the same quarantine protocols	Weak and ambiguous implementation of Rules and guidelines to all front-liners.	
Observation of "watchers "behavior	● Problematic; and attempted to escape the COVID-19 facility. ● Panicked because they were isolated in the covid-19facility ● A family member was unable to select the role of the watcher. ● They were Emotional ● Afraid to stay at the hospital ● Denial of watchers	The COVID-19 virus was challenging to embrace.	Unstable mental health conditions

Table 2 shows the challenges faced by Radiologic Technologists in their working conditions during the COVID-19 pandemic. The table presents the results of categorizing the responses as transcribed from the in-depth interviews. Three essential themes under the challenge of Radiologic Technologists were generated: (1) Toxic work environment; (2) Lack of resources; and (3) Unstable mental health conditions. These themes were analyzed from the in-depth interview (IDI) and focus group discussion (FGD). Toxic environment theme as COVID-19 front liner explained: Radiologic Technologists frequently operate in stressful settings because they are stigmatized by the public as members of the COVID-19 front liner. Additionally, they might be exposed to COVID-19, radiation, and fear. Technologists could therefore experience an unhealthy work environment where they are overworked, stressed out, and undervalued. Another theme was the Lack of resources: Radiologic Technologists frequently use shoddy or out-of-date personal protection equipment and understaffed facilities during COVID-19. This might make it challenging to give patients high-quality care and can cause burnout in technologists. One more was that Radiologic Technologists are more likely to experience unstable mental health problems such as anxiety, sadness, and post-traumatic stress disorder (PTSD). This is a result of the nature of their role as frontline personnel for COVID-19, which can be stressful and emotionally demanding.

TABLE 3

ISSUES PROBED	CORE IDEAS	CODES/ CATEGORIES	ESSENTIAL THEMES
Management and handling other co-workers	● Talking with co-workers/team partner ● Small gatherings after work and quarantine	Building teamwork to survive	Intensified communication
	● Physical activities to be fit and healthy ● Find a distraction to forget covid-19 pandemic.	Diversionary tactic against overthinking about COVID-19	physical activity
Aspects Radiologic technologists as front-liners in the hospitals	● Physical exhaustion on duty and environment ● Drained physically ● Rapid breathing	Extreme fatigue	Persistent tiredness
	● Nervous breakdown ● Stress because alone in quarantine ● Sudden because the family got infected ● Sudden because there is no work and no pay ● Longing for home ● Damaging peace of mind. ● Anxiety about being infected	The suffering of Radiologic Technologists' working condition	Anxiety builds up
	● Only on Messenger and Facebook could socialize. ● Disconnection because friends discriminated as a front-liner. ● No social gatherings because of the 1-meter distance	Disconnected with friends, family, co-workers, and environment.	Social stagnation

	● No socialization, Radiologic Technologists were comfortable being by themselves. ● Limitation of going out		
On availability/non-availability of COVID-19 facility concerning working conditions	● Not enough PPE provided ● Not fair to the category of PPE provided. ● Not well provided by institutions the needs of Radiologic Technologist ● No swab, no antigen, no x-ray of the patients ● No distribution of KN-face masks at the supply office ● Not well ventilated COVID-19 facility	Controlled resources of PPE for Radiologic Technologists	Poor working conditions in the COVID-19 facility
On patient management during COVID-19 concerning working condition	● Safety precautions with patients ● Patient care, Instead of hassling the patients, Radtech go to their respective room for X-ray	Preventive measures used to interact with COVID-19	Proactive patient care

Table 3 shows participants' coping with the challenges in their working conditions during the COVID-19 pandemic. The results revealed seven essential themes: intensified communication, physical activity, persistent tiredness, anxiety building up, social stagnation, poor working conditions in the COVID-19 facility, and proactive patient care. From the in-depth interview and focus group discussions, these themes emerged. **Intensified communication.** Front-line healthcare workers say that they need to communicate more frequently with their colleagues, supervisors, and patients to cope with the challenges of the pandemic. This included communicating about fear of COVID-19, experiences, and treating loneliness. **Physical activity.** Diversionary tactic against overthinking about COVID-19. Many front-line healthcare workers found that physical activity was an important way to cope with stress and fatigue. This could include anything from taking a walk to going for a run. **Persistent tiredness.** Extreme fatigue was a common challenge reported by front-line healthcare workers. This may help to forget the loneliness and the COVID-19 scenario. This was due to long hours, an increased workload, and the stress of working in a high-risk environment. **Anxiety builds up.** Anxiety was another common challenge reported by front-line healthcare workers. This was due to the fear of contracting COVID-19, the risk of exposure to sick patients, and the uncertainty of the pandemic.**Social stagnation.** Frontline healthcare workers reported feeling socially isolated during the pandemic. This was due to restrictions on social gatherings, travel, quarantine, and even visiting with family and friends. **Poor working conditions in the COVID-19 facility** Many front-line healthcare workers reported that the working conditions in COVID-19 facilities were poor. This included inadequate PPE, a lack of personal space, and long hours. Proactive **patient care.** Front-line healthcare workers reported that taking proactive steps to care for their patients helped them cope with the challenges of the pandemic. This included providing emotional support, educating patients about COVID-19, and advocating for their needs. These themes are just a few of the ways that frontline healthcare workers coped with the challenges of working during the COVID-19 pandemic. It is important to note that everyone copes with stress differently, and what works for one person may not work for another. It is also important to seek professional help if you are struggling to cope with the challenges of the pandemic.

Table 4 **d**emonstrates the participants' perspectives that they could impart to their colleagues and the field of Radiologic Technology. The findings highlight an important message: professional collaboration. This may result in improved patient outcomes: when health professionals collaborate among health professionals. This can lead fight covid-19, shorter hospital stays of the patients, fewer complications, and improved quality service. The participants' conversations in the focus groups and the in-depth interview helped develop the theme.

ISSUES PROBED	CORE IDEAS	CODES/CATEGORIES	ESSENTIAL THEMES
Success stories that Radiologic technologists can share with regard to providing health services.	● Rad tech, known as the eye of the medicine during covid-19 ● Known being a front-liner ● Build teamwork with co-workers and other healthcare worker ● Help Medical professionals to diagnose.	Radiologic Technologists are known to be allied health workers to end covid-19.	Collaboration among health professionals.

Implications

This will help to understand the difficulties that Radiologic technologists are experiencing during the COVID-19 pandemic. Additionally, it will offer suggestions for how to enhance their working conditions. These suggestions might consist of: Giving Radiologic Technologists greater aid, including financial and mental health resources; and making PPE more accessible to Radiologic Technologists. Also, the creation of novel imaging systems suitable for remote applications. This study has crucial ramifications for the direction of healthcare. Because they are crucial to providing high-quality care, Radiologic Technologists must be supported to continue working. This research will contribute to providing Radiologic Technologists with the resources they require to maintain health and safety and continue providing vital services. The conclusions drawn from the study highlight that finding ways to stay positive and motivated could help Radiologic Technologists fight not only the COVID-19 virus but also burnout and boredom in working conditions during COVID-19. Also, Radiologic Technologists could educate their colleagues on how to handle the virus with the strategies gathered by the researcher, based on the researcher's interview, by educating themselves about the virus and how to protect themselves.

Moreover, the most important thing the researcher could apply to the Radiologic Technology profession was working together as a team to support each other. This was the insight the researcher could share based on their answer. Since they were more at risk of contracting an infection during the pandemic, they should have at least two Radiologic Technologists on duty every shift because they went through a lot of stress. While protecting each other, they also took precautions to safeguard themselves and their patients, such as wearing personal protective equipment (PPE) and adhering to stringent infection control standards. Despite the difficulties, Radiologic Technologists were serious in the fight against COVID-19. In addition, it gave the Hospital insights into preparing themselves for the newly evolved pandemic and the demands and responsibilities they may encounter in their future careers. Furthermore, the conclusions also highlight the relevance of the study findings for individuals considering a career in Radiologic Technology and those currently enrolled in Radiologic Technology programs. By understanding the challenges and experiences of Radiologic Technologists during the pandemic, prospective and current students could gain insights and a new approach to handling the realities. Additionally, the identified themes from the

qualitative data analysis offer valuable guidance for future research in this field. Researchers could delve deeper into these topics to better understand the experiences and requirements of Radiologic Technologists during pandemics and comparable crises. This could contribute to the development of targeted interventions and support systems to assist Radiologic Technologists in delivering quality healthcare services.

Recommendation

Dealing with a toxic environment during COVID-19 as a healthcare provider meant taking a break, talking to a supervisor or trusted colleagues, and taking care of physical and mental health. This study also recommends making a policy and procedure to protect Radiologic Technologists against discrimination. Next, the Radiologic Technologist has been overworked and has faced psychological and emotional stress and knowledge-related challenges. The hospital should give them a fair salary equivalent to their sacrifices. In addition, the Philippine Association of Radiologic Technologists, hospital administrators, and the Department of Health should actively address the issues raised by Radiologic Technologists. This includes advocating for fair treatment and benefits for Radiologic Technologists across different healthcare settings. Efforts should be made to ensure that Radiologic Technologists receive the recognition and support they deserve as essential healthcare professionals. Moreover, it is crucial to prioritize self-care. Radiologic Technologists should be encouraged to care for their physical and mental well-being by practicing healthy habits such as eating regular meals, getting sufficient sleep (at least 8 hours), and engaging in stress-reducing activities. Promoting self-care among Radiologic Technologists can contribute to their overall resilience and well-being. Furthermore, hospital administrators can implement activities focused on mental health support for Radiologic technologists. This can include providing opportunities for breaks, organizing retreats, and offering resources for stress management and mental well-being. Creating a supportive environment and recognizing Radiologic Technologists' challenges can help alleviate their burden and improve their working conditions. These recommendations aim to promote Radiologic Technologists' well-being and professional satisfaction by addressing their concerns and providing support during challenging times. By implementing these recommendations, healthcare organizations can create a more supportive and conducive working environment for Radiologic Technologists.

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Occupational Stress and Organizational Commitment of Overseas Filipino Radiographers: Basis for Personal and Professional Development Plan

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Abstract

The continuous concern in exploring the relationship between occupational stress and organizational commitment among Radiographers in different countries reflects the importance of understanding how these factors interplay in the work context. By focusing on Filipino Radiographers, specifically those working abroad, this study aimed to shed light on the unique experiences and challenges they faced. This investigation sought to provide valuable insights into the link of occupational stress to organizational commitment, contributing to the development of targeted interventions such as personal and professional strategies to support and improve the well-being and commitment of Filipino radiographers working in international settings. The results of this research suggest no significant relationship between occupational stress and organizational commitment among Filipino radiographers working overseas, supporting the null hypothesis. Additionally, occupational stress does not directly cause organizational commitment and vice versa. This quantitative study employed a descriptive-correlational approach, mean, and Spearman's rho for data analysis and utilized snowball sampling. A total of 235 respondents from hospitals and medical facilities in Singapore's central region completed the online survey forms.

Keywords: *Occupational Health, Social Sciences, Descriptive-Correlational, Central Singapore*

Introduction

Being capable of delivering quality patient care within the healthcare sector is regarded as the utmost distinction in a profession (O'Regan, 2022). Healthcare professionals, including Radiological Science Professionals, face numerous work-related stresses (Robertson et al., 2022 Anim-Sampong et al., 2022). Research has shown that occupational stress is a complex concept influenced by various individual and organizational factors (Taris et al., 2019).

Moreover, Santos et al. (2019) investigated the levels of occupational stress among Filipino radiographers. The research revealed that Filipino radiographers faced notable stress, primarily attributed to factors such as a demanding workload, limited time, and insufficient resources. Radiographers experience a variety of stress-inducing situations at work, including radiation exposure, long hours, shift work, and a heavy workload (Durairaj, 2021). Hence, an imbalance between the demands of the workplace and a worker's capacity to perform is how occupational stress is defined (Joshi et al., 2022).

Organizational commitment can be simplified as the dedication and loyalty individuals demonstrate towards the organization's objectives and values. It encompasses a strong sense of belonging, reliance on the organization, and a moral obligation to remain committed and engaged within the organization (Guohao et al., 2021 Wang Y., 2020).

According to the examination of Suharto et al. (2019), performance at work is influenced by organizational commitment. It is crucial to conduct an examination or investigation into the organizational commitment of the radiographers since it demonstrates that when employees are committed to an organization, they exhibit strong

belief in and acceptance of an organization's values and goals, which positively impacts their job performance, characterized by their effort, skills, and the quality of the work environment (Al Balushi et al., 2022 and Kang et al., 2019).

Furthermore, the study conducted by Santos et al. (2019) examined the concept of organizational commitment among Filipino radiographers and identified the various factors that impact their level of commitment. It highlights the potential consequences of organizational commitment for healthcare organizations, including employee retention, quality of care, and employee engagement. This description suggests that organizational commitment has a positive correlation with job performance. And its significance for healthcare organizations in terms of retention, quality of care, and employee engagement. It provided insights into the importance and impact of organizational commitment in the context of Filipino radiographers (Gün et al., 2021 & Santos et al., 2019).

While studies on occupational stress among medical staff have been conducted in different countries, including Slovenia, there is a lack of research specifically addressing this issue among radiographers (Jagodič et al., 2020). Additionally, it is vital to examine this understudied field of radiology since it has been demonstrated that occupational stresses are the main culprits for work-related health concerns (Anim-Sampong et al., 2022). In this globalized world, it is of paramount importance to examine how occupational stress and organizational commitment influence the experiences of Filipino radiographers who are employed overseas. The context of this study highlighted the need for additional research, suggesting that further investigation is required to gather additional evidence and expand the understanding of the topic.

Occupational Stress

A scenario that requires an individual to deviate from their regular functioning owing to a fluctuation in their physical or psychological state is referred to as occupational stress (Babapour et al., 2022). Furthermore, Job stress refers to the physiological, psychological, and behavioral responses that occur in the body when faced with internal and external stimuli, commonly referred to as stressors. These stressors can be factors in our environment that cause changes, leading to a specific reaction within our organism (Chu et al., 2022). They can disrupt an individual's inner balance temporarily. It is crucial to recognize that different people may react differently to the same stressor, highlighting the importance of interpreting these experiences on an individual level (Jagodič et al., 2020).

Occupational stress, as defined by the World Health Organization (2020) pertains to the reaction individuals display when they confront work-related pressures and expectations that surpass their skills and capacities, posing a challenge to their ability to effectively manage and cope. This response arises from an imbalance between the demands placed on individuals in their work environment and their abilities and knowledge.

Organizational Commitment

The term organizational commitment can be defined as the voluntary allocation of significant efforts to advance the organization's interests, accompanied by a sense of belonging and a desire to sustain membership (Herrera, and De Las Heras-Rosas, 2021). It encompasses individuals' devoted involvement and active participation, utilizing their time, energy, and abilities to foster the organization's goals and objectives. The level of organizational commitment is indicative of individuals' sense of affiliation with the organization and their drive to contribute to its achievements (Sunarsi et al., 2020).

Organizational commitment entails a deep sense of connection and belonging that employees develop towards their organizations (Wang et al., 2020). Committed employees generally cultivate positive relationships, share

the organization's values, and possess a clear grasp of its objectives (Mahmood Aziz et al., 2021 Houston, 2019). As a result, they exhibit heightened dedication and motivation in their work, resulting in added value for the organization. Committed individuals tend to demonstrate heightened productivity and proactively offer support, thereby making valuable contributions to the organization's overall success (Arumi et al., 2019).

The Connection between Occupational Stress and Organizational Commitment

Numerous studies have determined a substantial correlation between job stress and organizational commitment (Hoeve et al., 2019 Vickovic et al., 2019). Hence, when occupational stress levels rise, there is a tendency for organizational commitment to decline. Certainly, the well-being of employees, both in terms of physical and psychological state, significantly influences their level of organizational commitment (Saadeh and Suifan, 2020). Thus, job stress has adverse effects on employees' attitudes and behaviors, resulting in a decline in their performance and efficiency. Inadequate management of job stress can lead to negative consequences for employee performance, including higher rates of absenteeism, increased turnover, and elevated medical compensation expenses. Additionally, it can result in reduced productivity and commitment within the organization (Cross, 2019).

Referring to the study conducted by Jun et al. (2021), the prevalence rate of workplace stress among healthcare professionals in hospital settings exhibits considerable variation, with estimates ranging from 5% to as high as 50%, depending on factors such as specific nursing specialties and geographical locations. Healthcare provider occupational stress is more than just an individual problem; it is an occupational hazard that affects the personnel, patients, organizations, and society on a larger scale (Sinclair, et al., 2020 Chen et al., 2021). The studies of Garcia et al., 2019 and AlDhaen, 2022 found that job stress is linked to adverse consequences such as compromised patient safety and quality of care, lower patient satisfaction, decreased productivity, and reduced levels of organizational commitment among healthcare providers. Acknowledging occupational stress as a collective issue within the organization enables a broader viewpoint that is crucial for effectively addressing and managing work stress.

Methods

The descriptive-correlational method was used to determine the relationship between occupational stress and organizational commitment among Filipino radiographers working overseas. The research was carried out in the hospitals and medical centers situated in Singapore's central region. With the snowball technique, data was collected from 235 eligible participants who were radiographers of Filipino origin. Provided that the individuals are employed as radiographers in Singapore regardless of their age, gender, marital status, or clinical expertise level. Radiographers who were not of Filipino descent or working in a hospital or medical facility in the specified location were not included in the study.

The assessment tools applied in the study were chosen based on recommendations from three validators, who provided their expertise and insights. To ensure validity and reliability, the questionnaires underwent a rigorous inter-rater validity test. During this process, multiple raters or experts evaluated the instruments to assess the consistency and agreement. This thorough examination was conducted to establish the instruments' credibility, accuracy, and appropriateness for measuring the targeted variables. The pilot testing, involving 20 participants produced a Cronbach's Alpha value of 0.846. This implied a strong internal

consistency among the adapted test items for both occupational stress and organizational commitment survey questionnaires. The participants' responses demonstrated reliability and coherence, indicating that the items effectively measured the intended construct. The questionnaires will be in the form of a self-administered online survey with two sections. Each section can be completed in 5 minutes or less, and respondents will simply need to place a tick mark within the circle corresponding to their chosen answer.

The participants were requested to evaluate and assess statements by furnishing numerical responses about the indicators. In this research, a five-point rating scale was employed, where 1 denoted "strongly disagree" and 5 represented "strongly agree."

To interpret the answers from the participants, the subsequent scale was utilized:

Mean Interval	Descriptive Level	Descriptive Interpretation
4.51-5.00	Very High	Radiographers from the Philippines who are employed abroad are always mindful and aware of their occupational stress.
3.51-4.50	High	Radiographers from the Philippines who are employed abroad are often mindful and aware of their occupational stress.
2.51-3.50	Moderate	Radiographers from the Philippines who are employed abroad are occasionally mindful and aware of their occupational stress
1.51-2.50	Low	Radiographers from the Philippines who are employed abroad are seldom mindful and aware of their occupational stress.
1.00-1.50	Very Low	Radiographers from the Philippines who are employed abroad are not mindful and aware of their occupational stress.

The researcher ensured the safeguarding of the legal rights of the participants under investigation, avoided any intrusion, and protected their privacy rights. The research questions were formulated objectively to maximize the study's breadth and maintain confidence in the research process. Additionally, the research process took into account potentially sensitive conflicts arising from cultural and social differences. To conduct the study, the researcher primarily submitted and acquired the ethical review clearance from the research committee and board of Davao Doctors College Inc. Upon approval, the study commenced the process of collecting essential research data. This began with reaching out to pertinent medical organizations via emails and letters, seeking permission to carry out the study. Subsequently, consent forms were distributed to the participants before conducting the study and administering the survey questionnaires. Following that, the process of encoding, tabulating, and evaluating took place. The data was screened during the study to identify and eliminate any potential outliers. The assistance of a statistician was enlisted to ensure the precision of mathematical data calculations.

The statistical techniques employed in this investigation are as follows: Mean was used following the study aimed to assess occupational stress and organizational commitment among Filipino radiographers working abroad. It provided insights into the challenges and levels of dedication experienced by these healthcare professionals. The lowest observed means in each

variable informed the creation of personalized development plans, allowing for targeted interventions to address concerns and enhance well-being. Spearman's rho analysis (Spearman's rank correlation coefficient) the study investigated the connection between occupational stress and organizational commitment among Filipino radiographers working abroad. The analysis unveiled their relationship, considering non-linear links, and providing insights into their interplay beyond linear assumptions.

Results and Discussion

Table 1. Summary of Level of Occupational Stress of Filipino Radiographers Working Abroad

Occupational Stress	Mean Rating	Descriptive Level
Role Expectation Conflict	2.97	Moderate
Coworker Support	3.27	Moderate
Work-Life Balance	3.15	Moderate
OVERALL AVERAGE:	**3.13**	**Moderate**

Legend: *4.51.-5.00 = Very High; 3.51-4.50 = High; 2.51-3.50 = Moderate; 1.51-2.50 = Low; 1.00-1.50 = Very Low*

Level of Occupational Stress of Filipino Radiographers Working Abroad. As per the data presented in Table 1, Filipino radiographers who worked overseas reported a moderate level of occupational stress, with a general average value of 3.13. Among the examined factors, Coworker Support received the highest mean rating of 3.27, indicating that these radiographers experienced intermittent positive and helpful interactions with their colleagues. This finding aligned with the study conducted by Kokoroko and Sanda (2019), which suggested that a moderate level of coworker support indicated employees felt well-supported and had constructive interactions with colleagues, contributing to a positive work environment. This underscored the department's commitment to fostering a supportive work environment where colleagues actively assisted and contributed to each other's well-being, consequently reducing occupational stress. Previous studies emphasized coworker support's significance in alleviating job stress and psychological distress (Norling et al., 2020). According to Peart (2019), establishing a supportive work environment was recognized as a practical and effective strategy for promoting well-being and reducing stress. This approach highlighted the importance of not only addressing and mitigating occupational stress in the radiology department but also actively nurturing a positive and supportive atmosphere. Through cultivating such an environment, organizations could enhance employee welfare and satisfaction, ultimately leading to a more productive workforce.

On the other hand, the study's participants, Filipino radiographers working overseas, reported a moderate level of stress, with Role Expectation Conflict receiving the lowest mean rating of 2.97. This suggested that radiographers encountered periodic conflicts and contradictions in expectations and demands from various sources, such as leaders, colleagues, or multiple assigned tasks. This finding was consistent with the research conducted by Giménez-Espert et al. (2020), which emphasized the importance for organizations and managers to acknowledge and address role conflicts to improve employees' well-being and overall job performance. Previous studies demonstrated that individuals facing role conflict were more likely to experience higher levels of distress. The demanding nature of Filipino radiographers' roles at work, coupled with conflicting expectations and demands, contributed to elevated stress levels

among them. Recognizing and addressing these conflicts was crucial for organizations to establish a conducive work environment and enhance the well-being of radiographers.

Table 2. Summary of Level of Organizational Commitment of the Respondents

Organizational Commitment	Mean Rating	Descriptive Level
Affective Commitment	3.41	Moderate
Continuance Commitment	3.24	Moderate
Normative Commitment	3.45	Moderate
OVERALL AVERAGE:	**3.37**	**Moderate**

Legend: *4.51.-5.00 = Very High; 3.51-4.50 = High; 2.51-3.50 = Moderate; 1.51-2.50 = Low; 1.00-1.50 = Very Low*

Level of Organizational Commitment of Filipino Radiographers Working Abroad. As indicated in Table 2 regarding levels of organizational commitment among Filipino radiographers working abroad, Normative Commitment obtained the highest mean rating of 3.45, reflecting a moderate descriptive level. This demonstrated that Filipino radiographers working abroad were moderately motivated by a sense of moral duty and a belief that they should uphold their dedication to the organization. This suggested that these radiographers possessed a strong inclination to remain committed to the company based on their values and beliefs. Consistent with Moore's study (2021), employees with strong normative commitment were more likely to adhere to organizational policies and actively contribute, resulting in an elevated level of overall organizational commitment.

Conversely, the lowest mean rating was 3.24 for Continuance Commitment, falling within the moderate descriptive level. This indicated that Filipino radiographers working abroad were occasionally mindful of the potential consequences and drawbacks that might arise if they were to sever their ties with the organization. Gül et al.'s study (2022) supported this finding and the idea that an intermediate level of continuance commitment among healthcare providers significantly and positively impacted their job satisfaction and commitment. This implied that when healthcare providers perceived a sense of continuance commitment, potentially driven by factors like limited alternative options or high costs associated with leaving their current employment, it could lead to higher levels of job satisfaction and commitment to the organization. These results aligned with the understanding that continuance commitment played a pivotal role in shaping healthcare providers' attitudes and behaviors toward their work. The study proposed that when healthcare providers felt a strong attachment or obligation to remain in their current job, it could contribute to their overall job satisfaction and commitment to the organization. These findings had implications for healthcare organizations and management, underscoring the importance of enhancing and maintaining continuance commitment among Filipino radiographers to elevate their job satisfaction and overall commitment to the organization.

Table 3. Significant Relationship Between Occupational Stress and Organizational Commitment

Organizational Commitment		Organizational Commitment	Interpretation
Occupational Stress	Spearman's rho	1.00	H01 is accepted; hence, there is no significant relationship between occupational stress and organizational commitment.
	p-value	.099	

**The variables were tested at a 0.05 level of significance, there is no significant relationship between occupational stress and organizational commitment.*

Significant Relationship Between Occupational Stress and Organizational Commitment. As presented in Table 3, the p-value was .099, which was greater than .05. This signified that there was no significant relationship between occupational stress and organizational commitment among Filipino radiographers working overseas. Consequently, the null hypothesis was accepted. The Spearman's rho coefficient of correlation was 1.00, indicating a very strong correlation between the independent and dependent variables. Thus, the variables in this study exhibited a positive correlation, indicating that as one variable increased, the other variable also tended to increase and vice versa (Ramzai, 2020). Furthermore, the strength or magnitude of this relationship was large and strong, indicating a robust and significant association between the variables. It is important to highlight that correlation analysis does not establish a causal relationship. While this analysis helped explore the association between occupational stress and organizational commitment, it did not imply that one variable directly caused the other. The observed correlation between two variables may have been influenced by the presence of a third variable that affected both variables (Gupta, 2021; Hartin, 2022; Zhu, 2023).

Conclusions

The occupational stress levels of Filipino radiographers working abroad specifically focusing on three factors: Role Expectation Conflict, Coworker Support, and Work-Life Balance were all sporadically levels. These factors collectively contribute to the general descriptive result which is a moderate level of work-related stress experienced by participants. The findings suggest that these factors play a significant role in shaping the occupational stress levels of radiographers.

The overall organizational commitment level of the respondents, as measured by Affective Commitment, Continuance Commitment, and Normative Commitment, falls within the moderate range. This implies that the respondents exhibit a moderate level of emotional attachment, perceived costs and benefits, and a sense of obligation and loyalty towards the organization.

The study results propose that there is no significant relationship between occupational stress and organizational commitment among Filipino radiographers working overseas, supporting the null hypothesis. The level of occupational stress experienced by the radiographers does not directly cause their organizational commitment.

By implementing a comprehensive personal and professional development plan that includes strategies such as stress management, work-life balance, creating a supportive work environment, and providing professional development opportunities, organizations can effectively reduce occupational stress and

enhance the organizational commitment of Filipino radiographers working abroad.

Recommendations

Occupational stress arises from a misalignment between work demands and individual coping abilities, emphasizing the need for balance and support to manage its detrimental effects on well-being. This research suggests the significance of introducing measures targeted at tackling occupational stress and recognizing the possible impact it can have on the overall well-being and dedication of Filipino radiographers working in the organization. Based on the research findings these are the recommendations to address occupational stress among Filipino radiographers working abroad include implementing targeted measures such as stress management programs, ensuring appropriate workload distribution and resource allocation, fostering a supportive work environment, providing employee assistance programs, and offering professional development and growth opportunities.

The deeper meaning of organizational commitment lies in the profound connection and allegiance that employees have toward the organization. The findings of this study make a point of the importance for administrators and leaders to implement interventions that enhance dedication of the Filipino radiographers to the organization. This highlights the vital function of promoting a higher level of organizational commitment within the healthcare field. As a consequence of the significance of organizational commitment and the findings of the study, administrators and leaders are advised to take action to enhance the commitment of Filipino radiographers to the organization. Viable suggestions to promote a higher level of organizational commitment in the healthcare field include clear communication of mission and values, recognition and rewards, supportive leadership, professional development opportunities, and employee engagement initiatives.

While this analysis explores the relationship between occupational stress and the organizational commitment of Filipino radiographers employed internationally, it does not imply direct causation. The observed correlation between the two variables may be influenced by the presence of a third variable that impacts both. By gaining a deeper understanding of the alignment between employees and their work environment, organizations can identify areas of synergy and those in need of improvement. Managers can assess the compatibility between employee values and the organizational culture, making necessary adjustments to create a supportive and motivating workplace. This optimization of the fit between employees and their environment reduces stress levels, and ultimately boosts organizational commitment, leading to increased productivity and overall organizational performance. Organizations can take feasible actions to enhance organizational commitment among internationally employed Filipino radiographers. Recommendations include assessing employee-work environment alignment, creating a supportive work environment, adjusting organizational policies and practices, offering professional development and growth opportunities, and fostering employee engagement.

Recognizing occupational stress as a collective issue within the organization necessitates a holistic approach. By adopting a broader perspective, organizations can implement personal and professional development strategies to address the occupational stress of Filipino radiographers and foster higher levels of organizational commitment. This identifies the importance of a supportive and inclusive culture prioritizing employee well-being for a thriving workforce. Consequently, these are the implementable measures to promote occupational stress and enhance organizational commitment among Filipino radiographers employed in other countries, providing support programs for stress

management and work-life balance, promoting open communication channels for addressing stressors and concerns, giving training and skill development opportunities, encouraging work-life balance through flexible arrangements. and cultivating a supportive and inclusive culture.

The results can be improved by conducting a more extensive future study on the variables that predict occupational stress. It is important to highlight that only organizational commitment was examined and taken into account in this study as a determinant of occupational stress.

Considering that the current study primarily concentrated on a specific area of Singapore, it is recommended that future research expands the sample size to include a larger population. This will provide a more comprehensive view and analysis of the prevalence of occupational stress. The researcher suggests that a more extensive and representative study with a broader sample is necessary to gain deeper insights into this topic.

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An Exploratory Sequential Mix Method Approach on the Underlying Dimensions of Meaningful Learning: Extracted from the Lens of Radiologic Technology Students

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Abstract

Students experienced an abrupt shift from regular to online classes due to the COVID-19 pandemic and ensuring meaningful learning is essential to warrant desirable outcomes. This study aims to generate a meaningful learning model in Radiologic Technology extracted from the lenses of Radiologic Technology Students. The study utilized an experimental sequential mixed-method research design. Eight (8) students participated in the qualitative phase, and 181 respondents answered the developed survey tool for the quantitative phase. Kaiser-Meyer Olkin Test of Sampling Adequacy is 0.892, suggestive of remarkable sample size, and 4502.839 for Bartlett's Test of Sphericity also suggests that data is appropriate for exploratory factor analysis. The underlying dimensions were extracted using exploratory factor analysis (EFA). The six factors determined include the following: (1) Students' Efficient Self-Regulation (M=3.31), (2) Varied Assessment Types (M=3.30), (3) Instructors Favorable Personal Attributes (3.24), (4) Interactive Online Learning Sessions (M=2.83), (5) Readily Available Self-Learning Materials (M=3.36), (6) Remarkable Professional Competence (M=3.12) with an over-all mean of 3.19. This suggests that the students perceived the six factors as high. To ensure meaningful learning in Radiologic Technology despite the global health threat, this learning model might be incorporated into the learning delivery plan to ensure a meaningful learning experience.

Keywords: *Meaningful learning model, Health Science, Exploratory Factor Analysis, Philippines*

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Introduction

The recent health threat due to Coronavirus disease (COVID-19) has challenged the structural capacity of our existing educational system to respond (Petrie et al., 2020). Several learning modalities were introduced to ensure that students learn meaningfully despite this global health threat. It was noted that the use of distance learning and the recent social development of the education domains alters how teachers and students communicate (Yang et al., 2021). This resulted in increased student isolation which became a significant source of pressure and a loss of motivation to learn (Tan, 2020). Radiologic Technology training must be accorded contextualized and meaningful learning approaches to warrant desirable outcomes. However, this becomes illusive, as evident in the decline of interest among students to learn due to the COVID-19 health threat that has been experienced globally (UNICEF, 2020).

In a study by Hammerstein et al. (2021), the public health threat has declined students' interest in learning, thereby affecting their achievement. In some

parts of the world, students are struggling specifically with learning investigations and on remote platforms, and they even consider the online format "not conducive to learning". Even in science and mathematics among college students, there is a fall in education (Kaffenberger, 2021).

Different learning modalities in the country have experienced a variety of hazards, issues, and concerns for both professors and students, particularly in higher education institutions (Tria, 2020). The decline in learning has been documented and has significantly impacted undergraduate students' academic performance resulting in stressful situations (Oducado &Estoque, 2021; Yapo et al., 2021). Fewer students consider themselves physically and mentally ready for the different learning platforms. This has made improving students' performance in this field much more difficult to address (Baticulon et al., 2020).

A comprehensive range of learning platforms for selected allied health science professions has been implemented, investigated, and published since 1960 (Williams, 2010; Alamer & Alharbi, 2021). With the sudden shift to the learning modality, it is necessary to determine how the students learn the subject best amidst this pandemic. When students are allowed to classify and describe how they know best, valuable information can be acquired to develop a long-term solution to the problem (Pandolpho, 2018).

Methods

The research was conducted using an exploratory sequential mixed-method design that included qualitative and quantitative methodologies. This is a type of research design in which the researchers start with qualitative data analysis and then use the findings in the second quantitative phase for the extraction of the dimensions (Creswell, 2017, as cited by Subedi, 2016). Additionally, mixed research methods entail collecting, analyzing, and interpreting data in a single study or series of studies using quantitative and qualitative methodologies to investigate a phenomenon or attempt to answer a research question. Questions were generated out of the data gathered from the interview during the qualitative phase. The quantitative approach used these questionnaires to identify the dimensions that defined Radiologic Technology students' meaningful learning amid the COVID-19 pandemic.

The participants for the study's qualitative and quantitative phases are the Radiologic Technology Students of Davao Doctors College. These students in general, are qualified to participate in the study based on the following criteria: Be currently enrolled at Davao Doctors College Radiologic Technology program and have experienced the online learning system in the Radiologic Technology Program.

Qualitative Phase

The first step, or exploratory phase, selected two students representing each year level from first to fourth-year students. Purposive sampling was used to choose which students to be interviewed. This is a type of non-probability sampling in which the researcher decides who should be included in the sample based on several criteria, such as expert knowledge of the research problem or capability and willingness to participate in the study (Oliver, 2013). Additional participants were added contextually as needed to saturate the data. This study phase explored the preferences, experiences, and problems encountered by Radiologic Technology students on distance learning amidst the COVID-19 pandemic.

An unstructured interview guide was used during the study's initial phase. This section offers open-ended questions aimed to elicit responses from students about how they chose to learn the Radiologic Technology program in their various

contexts during the pandemic. Three (3) experts validated the study before it was used during the in-depth interview done by the researcher. During the interview process, the researcher obtained the student's consent to participate in the study and asked for its approval to record the online interview via Google Meet.

The transcribed conversations during the recorded in-depth interview held on Google Meet served as the study's research data. Ideally, This IDI was considered the primary data collection phase under the qualitative research design. Participants for the recorded in-depth interview (IDI) will be eight (8) Radiologic Technology students currently enrolled in Davao Doctors College and have experienced distance learning. The participants for the IDI were chosen using purposive sampling, a non-probability sampling wherein the sample was selected based on the populations' characteristics and the study's objective. Purposive sampling is also subjective, judgmental, or selective sampling (Crossman, 2018). After the in-depth interview, the data was transcribed for thematic analysis.

Quantitative Phase

In the quantitative phase, a total of one hundred eighty-one (181) Radiologic Technology student respondents currently enrolled in Davao Doctors College who experienced distance learning were selected using a stratified random sampling technique. This is a sampling technique in which each sample has an equal chance of being selected. The selected random samples were subjected to be an unbiased representation of the overall population (Bennett, 2018).

In the second phase, the researcher next created a survey questionnaire based on the answers from the interview. Significant statements were extracted based on the responses of the participants. The researcher gathered statements that expressed similar thinking and categorized them correctly. Three (3) experts validated the study instrument, which was then tested using the Content Validity Ratio. Items with a CR value of 1 and up were taken into consideration. A pilot testing of the instrument was facilitated after the validation. Results showed that the reliability index is greater than 0.70, suggesting a highly reliable tool.

In Google Forms, the survey was divided into three sections. The first is an informed consent form and declaration relevant to the Data Privacy Act, which asks respondents for permission to participate in the survey. Those who indicated an interest in participating in the study were routed to the final survey; this served as the respondents' informed consent for taking part in the study. The respondent profiles in terms of sex and year level were shown in the second section. The final section was the survey, in which students assessed their level of agreement with the assertions about learning the RT course during the COVID-19 program. The researcher used a 5-point Likert scale to identify qualities necessary for completing the course more effective and relevant for the students. The semantic differential pairs of "Strongly Agree or Strongly Disagree" were anchored on the 5-point Likert scale.

After the respondents had completed the survey questionnaire, a prompt appeared informing them that they had given their consent to participate in the study and that all of their responses were protected under the Data Privacy Act.

For data analysis, the following statistical tools were used: Frequency Distribution was used to determine the responders' actual number based on their sex and year level. This responded to the initial research question. Exploratory Factor Analysis (EFA) was utilized to extract the underlying dimensions of meaningful learning from the lenses of the radiologic technology students. Weighted Mean was used to ascertain respondents' perceptions

of the fundamental aspects affecting meaningful learning in Radiologic Technology.

Results and Discussion

Profile of the Respondents

Included in the survey are the profiles of the respondents presented in tabular form.

Sex. The distribution according to sex is varied. Results displayed in Table 1, 4.4 percent preferred not to mention their gender, 30.8 percent are males, and 64.8 percent of the total respondents are female. The results confirm that females have the highest number of Radiologic Technology student respondents.

Sex	Frequency	Percent %
Male	56	30.8
Female	117	64.8
I prefer not to say	8	4.4

Table 1, Distribution of Respondents in terms of Sex

Year Level. In terms of year level, as shown in Table 2, 28 percent of the RT students belong to the first year, 13.2 percent of the RT students belong to the second year, 25.3 percent of the RT students belong to the third year, and lastly with the highest number of RT student respondents which is composed of 33.5 percent belongs to the fourth year. This implies that the Radiologic Technology Student respondents in terms of year level are distributed diversely.

Year Level	Frequency	Percent %
First Year	51	28
Second Year	24	13.2
Third Year	46	25.3
Fourth Year	60	33.5

Table 2, Distribution of Respondents in terms of Year Level

Underlying Factors that Characterize Meaningful Learning in Radiologic Technology

Kaiser-Meyer-Olkin Index of Sampling Adequacy. The Kaiser-Meyer-Olkin (KMO) Index is a tool for determining sample adequacy and is used as an index to compare the magnitudes of observed and partial correlation coefficients to identify if the data are likely to converge on components. This measurement ranges from 0 to 1; values closer to 1 are desirable, but a value of 0.6 is the basis for a satisfactory factory analysis to proceed. A value of 0.6 is recommended for satisfactory factor analysis, but values closer to 1 are preferable.

The test result in Table 3 is 0.892, which exceeds 0.6, which is the acceptable value; this implies that the sample size is sufficient and "meritorious" (Kaiser & Rice, 1974). This data supports the application of EFA, and that data can be sub-grouped into underlying factors. The results thus confirm that data sets are suitable for factor analysis.

Table 3. Kaiser-Meyen-Olkin (KMO) and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.892
Bartlett's Test of Sphericity	4502.839
df	946.000
p-value	< .001

Bartlett's Test of Sphericity. In this study, Table 3 illustrates that the test value is high (4502.839) under the degree of freedom (df) of 946, and the level of significance is <0.001. Therefore, the null hypothesis is rejected, and the data set is deemed appropriate for factor analysis (Stewart, 1981). Note that the significant value should be less than 0.05 for Bartlett's sphericity test to reject the hypothesis.

Latent Roots Criterion. The total value of the variances explained can be used to identify the expected outcome of exploratory factor analysis using the latent root criterion. The value of the Sum Square Loadings of the factors and the proportion variance of each factor are shown in the total variance explained. Table 4 shows that six factors can be retrieved from the set of items submitted for factor analysis using the latent root criterion. These six factors or dimensions account for 52.30 percent of the variance in the data.

Table 4. Factor Characteristics

Factors	Sum Sq. Loadings	Proportion var.	Cumulative
1	4.925	0.112	0.112
2	5.313	0.121	0.233
3	5.048	0.115	0.347
4	3.043	0.069	0.417
5	2.543	0.058	0.474
6	1.890	0.049	0.523

Catell's Scree Plot

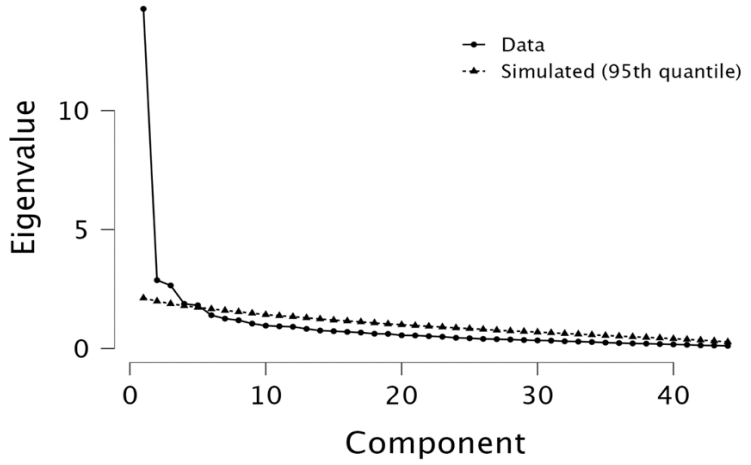

Figure 4. Catell's Scree Plot

The Cattell scree test plots the components as the X-axis and the corresponding eigenvalues as the Y-axis. As one moves to the right, the eigenvalues drop toward later components. When the drop ceases, and the curve makes an elbow toward a less steep decline, Cattell's scree test says to drop all further components after the one starting the elbow (Bartholomew, et al., 2008). Figure 5 shows that by laying a straight edge across the bottom portion of the roots, there are six (6) factors before the curve becomes approximately a straight line. All factors that have eigenvalues of 1.00 or higher were considered. Therefore, the results indicate that the extraction of six (6) factors is appropriate for this analysis.

Rotated Component Matrix

Table 5. Rotated Component Matrix

	Components					
	1	2	3	4	5	6
EFA40	0.798					
EFA43	0.745					
EFA41	0.667					
EFA44	0.644					
EFA42	0.644					
EFA34		0.676				

EFA38		0.661				
EFA36		0.565				
EFA18		0.545				
EFA2			0.786			
EFA1			0.761			
EFA3			0.686			
EFA4			0.597			
EFA8			0.564			
EFA7			0.563			
EFA6			0.411			
EFA25				0.8		
EFA30				0.787		
EFA27				0.772		
EFA5				0.655		
EFA26				0.563		
EFA19				0.474		
EFA31					0.423	
EFA29					0.68	
EFA39					0.556	
EFA32					0.51	
EFA13						0.523
EFA16						0.519
EFA17						0.495
EFA9						0.442
EFA15						0.482

The 44 significant statements generated a total of six-factor structures. The extracted factors are then subjected to different labels according to each of the item's common theme of nature, namely: (1) Students' Efficient Self-Regulation, (2) Varied Assessment Types, (3) Instructors Favorable Personal

Attributes, (4) Interactive Online Learning Sessions, (5) Readily Available Self-Learning Materials, and (6) Remarkable Professional Competence.

FACTOR 1- Students' Efficient Self-Regulation

Table 6. Constructs and Loadings under the First Underlying Factor of Meaningful Learning Model for Radiologic Technology

Item #	**Students Efficient Self-Regulation**	Coefficient
40	I study on my own.	0.798
43	I make sure that everything is organized before the start of the class discussion.	0.745
41	I made my review from the notes provided by our instructor.	0.667
44	I am committed, disciplined, and motivated to study the course.	0.644
42	I accomplish my task ahead of time	0.644

Table 6 shows us that Factor 1 contains five extracted items. The pattern coefficient of the items under this factor ranges from 0.644 to 0.798. The item with the lowest coefficient is "I accomplish my task ahead of time" and "I am committed, disciplined, and motivated to study the course" with both 0.644, while the one with the highest coefficient of 0.708 is "I study on my own.". Each item under the first factor surpasses the acceptable value of +0.40 as the minimum requirement for the coefficient of the factor analysis. The five items grouped in Factor One have a common theme concerning the student's self-learning management and coping techniques. The factor structure is labeled as "**Students Efficient Self-Regulation."**

In the study of Jung et al. (2017), academic self-efficacy and self-regulation have been recognized as strong non-cognitive factors of academic performance in college students and influence the relationship between personal attributes and academic performance among college students. This was supported by the study of Alipio (2020) in the context of Radiologic Technology learners in the Philippines, who concluded that self-regulation indirectly influenced self-efficacy through social support and motivation. Therefore, healthcare educators should design and promote techniques to boost students' adaptability and social support perceptions. These can increase students' Academic Self-Efficacy in both online and classroom settings. Faculty should also facilitate the establishment of online learning environments that are tailored to the needs and abilities of students (Warshawski, 2022). Notably, self-regulated learning does not begin on its own. It must cultivate or train students to be aware of their cognitive process and motivate them to participate actively in the process of achieving the desired objective of being self-regulated (DOE Victoria, 2022; Stephen & Szapkiw, 2021; Mou, 2021). Students must be able to self-regulate their learning in online learning settings because they must take responsibility for their learning (Mou, 2022). Learning institutions should concentrate on supporting self-regulated learning since it is relevant to the context of distant learning

(Berger,2021). Several ways to improve self-regulated learning have been established by previous researchers. These methods can be grouped into social connections, teaching techniques, and the educational environment (Mou, 2021; Panadero, 2017).

Amid a pandemic, it is critical to use motivation, monitoring, feedback, reflection, and metacognition to help students regulate their learning. Students set the learning goals they want to achieve through motivation or goal setting. This is the first step in self-regulated learning and serves as the foundation for all subsequent plans and behaviors. Monitoring includes both self-monitoring and monitoring by the teacher. Monitoring allows students to be aware of their learning process example of which is a learning diary which is a tool used for this purpose in many studies (Mou, 2021; Bruin et al., 2022; Kramarski & Rozen, 2018; Broadbent et al., 2020; Dignath et al., 2015). Additionally, Knowles, as cited by Stephen & Szapkiw (2021), suggested the use of a learning log-in to help students develop self-regulation in which students defined goals, identified the resources and tactics they'd need to attain them, and assessed their progress to link actions to outputs.

FACTOR 2- Varied Assessment Types

Table 7. Constructs and Loadings under the Second Underlying Factor of Meaningful Learning Model for Radiologic Technology

Item #	**Varied Assessment Types**	Coefficient
34	Essays are given during exams and activities	0.676
38	Identification types of questions are given during exams.	0.661
36	Enumeration and elaboration types of activities are given for learning evaluation.	0.565
18	Summative exams are given weekly	0.545

Table 7 shows us that Factor 2 contains four extracted items. The pattern coefficient of the items under this factor ranges from 0.545 to 0.676. The item with the lowest coefficient is “Summative exams are given weekly” with 0.545, while the one with the highest coefficient of 0.676 is “Essays are given during exams and activities.” Each item under the first factor surpasses the acceptable value of +0.40 as the minimum requirement for the coefficient of the factor analysis. The four items grouped in factor two have a common theme about the assessment delivery. The factor structure is labeled as “**Varied Assessment Types.**”

Assessment has been a central part of the learning delivery process (Sekyi, 2016; Umar, 2017). It is better to have a deeper understanding of the relation of assessment to student learning since it has been found to significantly impact students’ achievement (Nobre, 2021). Results of the study by Khankeh et al. (2019) revealed that educators are vital and significant components of assessment's educational influence. Their drive to conduct a proper assessment, competence to formulate test, attitude, understanding, and knowledge of the assessment's objective, as well as their clemency, can all have an impact on students' learning. Additionally, it has been found that assessment method characteristics such as format, content, score evaluation, duration of the

assessment, frequency, and the interval between assessments can have an impact on students' learning. Currently, Summative evaluations are the most typical assessments in universities. Summative assessments are used to determine what students have learned at the end of a course to go to the next level and guarantee they have satisfied the requirements for a degree (Umar, 2017). Lynch (2016) highlighted five critical points for a summative assessment to be effective. First is "*Authenticity*," in which assessment should reflect real-life practice. The second is "*Reliability*," which means consistency of results or standard results in a given condition. The third is "Volume," which refers to the educators avoiding overloading of exams. The fourth is "Validity," in which assessments should closely reflect the objective of the given topic. Lastly is "Variety", which has the largest impact on learners; thus intellectual, perceptual, and emotional learning domains should always be included while assessing.

FACTOR 3- Instructors' Favorable Personal Attributes

Table 8. Constructs and Loadings under the Third Underlying Factor of Meaningful Learning Model for Radiologic Technology

Item #	**Instructors' Favorable Personal Attributes**	Coefficient
2	The instructors are always available to answer student inquiries and concerns.	0.786
1	The instructors are approachable, understanding, and fair in every aspect.	0.761
3	The instructors are considerate regarding valid reasons (submission, financial, attendance) and provide enough time for the submission of activities and exams.	0.686
4	The instructor is strict with the deadline for submission.	0.597
8	The instructor maintains a healthy relationship with the students and constantly checks on us to see if we have learned something during lectures.	0.564
7	The instructor asks questions and randomly calls students to answer.	0.563
6	Frequent interactions between the instructor and the students during class immerse students in the learning process.	0.411

Table 8 shows us that Factor 3 contains seven extracted items. The pattern coefficient of the items under this factor ranges from 0.411 to 0.786. The item with the lowest coefficient is "Frequent interactions between the instructor and the students during class and immerse students in the learning process." with 0.411, while the one with the highest coefficient of 0.786 is "The instructors are always available to answer student inquiries and concerns.". Each item under the third factor surpasses the acceptable value of +0.40 as the minimum requirement for the coefficient of the factor analysis. The seven items grouped in factor have a common theme about teachers' personalities towards students. With this, the factor structure is labeled as **"Instructors Favorable Personal Attributes."**

The instructor is both an educator and a scholar. In the classroom, however, students behave in the instructor's manner. During a course of study, the way the instructor acts, teaches the lesson and interacts with the student has a significant impact on their performance and

learning goals (Maazouzi, 2019). More so, instructors' positive and negative behavior in the classroom impacts student learning to a considerable extent. Instructors' bad attitudes in the classroom may result in poor performance, while good attitudes expressed by teachers in the classroom may result in excellent performance. Therefore, a teacher's attitude, consciously or unconsciously, directly or indirectly affects students' academic performance. (OJO, 2018; Maazouzi, 2019; Ali, Ashraf, & Shuai 2019; Blazar & Kraft 2017). The study of Varga (2017), suggested that students' involvement and motivation in class will improve if positive relationships between teachers and students are built and maintained. Furthermore, the researcher observed the effects on the students' attitudes and demeanors after interventions were made. According to Maazouzi (2019), If an instructor has a pleasant attitude and strives to do his work properly, he can make teaching more entertaining and productive. Furthermore, if he sees himself not only as an educator who imparts knowledge to students but also as an individual who is concerned about their needs and provides a healthy environment for learning (intrapersonal approach), he will achieve positive results (Madukwe, Onwuka & Nyejirime, 2019). Educators who can optimize students' learning capacity in a classroom setting are the best, and this can be accomplished by fostering academic success by creating a pleasant, respectful, and strong relationship with their students. But, this doesn't mean that teachers should neglect their teaching duties to become friends with their students. Instead, instructors who go out of their way to get to know their students on a personal level assist not only the learners' capacity to engage in the classroom but also the instructors' ability to engage the students (Sandlin, 2019).

FACTOR 4- Interactive Online Learning Sessions

Table 9. Constructs and Loadings under the Fourth Underlying Factor of Meaningful Learning Model for Radiologic Technology

Item #	**Interactive Online Learning Sessions**	Coefficient
25	There are scheduled laboratory activities that I could perform in the physical laboratory	0.8
30	There are real-time virtual simulation software and makeshift lab equipment created by the students to stimulate real hospital/laboratory applications.	0.787
27	Synchronous/ live return demonstrations are done during laboratory assessments	0.772
5	RT students undergo interactive synchronous classes frequently where cameras and microphones are turned on to stimulate real-time classroom lectures and exams.	0.655
26	There are laboratory activities that I could perform remotely using materials found in our home	0.563
19	Cameras and microphones are turned on during synchronous examinations to stimulate face-to-face exams.	0.474

Table 9 shows us that Factor 4 contains six extracted items. The pattern coefficient of the items under this factor ranges from 0.474 to 0.8. The item with the lowest coefficient is "Cameras and microphones are turned on during synchronous examinations to stimulate face-to-

face exams." with 0.474, while the one with the highest coefficient of 0.8 is "There are scheduled laboratory activities that I could perform in the physical laboratory." Each item under the fourth factor surpasses the acceptable value of +0.40 as the minimum requirement for the coefficient of the factor analysis. The six items grouped in factor four has a common theme regarding the utilization of various learning equipment and the application of interactive teaching technique. With this, the factor structure is labeled as **"Interactive Online Learning Sessions."**

Student involvement is one of the most significant factors in understanding how students respond to the teaching-learning process. Understanding student engagement at academic institutions will provide a better idea of how the university's instructions and academic procedures work, especially in an online environment (Delen & Liew, 2016; Delfino, 2019; Ginting, 2021; Kumar et al., 2021). According to Alamer & Alharbi (2021), most radiologic technology students evaluated distant online learning higher than traditional learning regarding instructor-learner interaction. Additionally, Interactive learning actively engages students, revitalizes the classroom for both students and instructors, encourages students to take charge of their learning, and fosters effective learning qualities (Begum, Ali & Panda, 2020). Various strategies for delivering interactive learning sessions during online learning have been presented in the various research studies. Gray & DiLoreto (2016) described Interactive technology as an effective educational method for improving student meaningful learning outcomes and academic achievement. In the field of medical imaging technology, it was suggested that E-learning should be adopted by educational institutions, as well as innovative teaching tools and digital transformation. Technological advancements in radiography education must meet the issue of fostering remote or "off-site" radiography interpretative skills while encouraging self-motivated study. Radiologic Technology educators should also continue to incorporate the usage of recorded cases, improve online lectures, purchase simulator-based training equipment, and create digital archives of educational cases. More so, various formats of interactive videos and multimedia animation have also been employed to improve information delivery and drive interactivity on multiple levels. With rich learner content and interactive video lectures, interaction can be enhanced. Teaching institutions should invest in relevant technology and incorporate the dynamic capabilities of an actual Radiology viewing platform, which enhances the medical imaging students' learning experience by simulating a real-life scenario case (Gaur et al., 2021; Hung & Chen, 2018; Tuma, 2021).

FACTOR 5- Readily Available Self-Learning Materials

Table 10. Constructs and Loadings under the Fifth Underlying Factor of Meaningful Learning Model for Radiologic Technology

Item #	Readily Available Self-Learning Materials	Coefficient
31	The instructors are hands-on in providing recorded video demonstrations and lectures performed inside the hospital and school facility.	0.423
29	I receive other learning materials such as modules and educational videos for self-study.	0.68
39	The activities and lectures are posted on a virtual classroom platform.	0.556
32	References and learning materials (books, websites, articles, PPTs, PDF files, notes, etc.) are provided by the instructor.	0.51

Table 10 shows us that Factor 5 contains four extracted items. The pattern coefficient of the items under this factor ranges from 0.423 to 0.51. The item with the lowest coefficient is "The instructors are hands-on in providing recorded video demonstrations and lectures performed inside the hospital and school facility." with 0.423, while the one with the highest coefficient of 0.51 is "References and learning materials (books, websites, articles, Ppt, Pdf files, notes, etc.) are provided by the instructor.". Each item under the fourth factor surpasses the acceptable value of +0.40 as the minimum requirement for the coefficient of the factor analysis. The four items grouped in factor five have a common theme regarding the utilization of self-learning materials and activities. With this, the factor structure is labeled as **"Readily Available Self-Learning Materials."**

Autonomous learning materials are critical to the successful implementation of independent learning goals and the development of student's ability and motivation for self-regulated learning. They became self-directed learners by providing them with relevant Autonomous learning materials to meet their self-evaluated learning needs (Xie, 2020). According to DepEd Secretary Leonor Briones, "The SLMs and other alternative learning delivery modalities are in place to accommodate the needs, situations, and resources of every student, and they will cover all the bases in ensuring that basic education will be accessible despite the current COVID-19 problem," (DepEd, 2020). About radiologic technology, various studies revealed that successful completion of the e-learning module and an increased number of sessions were factors predictive of improving Medical Radiation knowledge (CT, Radiation protection, and X-ray), where students preferred didactic lectures and clinical attachments to e-learning for medical radiation instruction. The development of a radiologic technology e-learning module is feasible and results in improved knowledge of medical radiation among medical undergraduates. Combining e-learning with more traditional educational programs, such as a clinical rotation, will likely enhance student learning (Kumar, Jothi, & Mathivanan, 2016; Leong et al., 2012; Fourré et al., 2020; Groth et al., 2018). Additionally, Xia (2020) suggested two important key factors to better deliver self-learning materials. First, instructors should be proficient at utilizing self-directed learning materials. Second, in selecting self-learning materials, schools and teachers should be evaluated. Different schools in distinct regions have different academic environments, with noticeable variances in students' cognitive levels. Therefore, students can improve their academic

performance by designing matching autonomous learning materials in a targeted manner and using these resources in conjunction with the associated autonomous learning mode.

FACTOR 6- Remarkable Professional Competence

Table 11. Constructs and Loadings under the sixth Underlying Factor of Meaningful Learning Model for Radiologic Technology

Item #	**Remarkable Professional Competence**	Coefficient
13	Instructors provide a detailed explanation of every question asked by the students.	0.523
16	An overview and introduction of the next topic are presented to the students before the day of its discussion.	0.519
17	Pre-reading activities about the next topic are given before the day of the discussion.	0.495
9	The topics are well-explained, and the instructor guides us during the learning process.	0.442
15	The content of the instructor's presentation has creative visuals.	0.482

Table 11 shows us that Factor 6 contains five extracted items. The pattern coefficient of the items under this factor ranges from 0.482 to 0.523. The item with the lowest coefficient is "The topics are well-explained, and the instructor guides us during the learning process." with 0.442, while the one with the highest coefficient of 0.523 is "Instructors provide a detailed explanation of every question asked by the students.". Each item under the sixth factor surpasses the acceptable value of +0.40 as the minimum requirement for the coefficient of the factor analysis. The five items grouped in factor six have a common theme regarding instructors' strategy for delivering meaningful learning. With this, the factor structure is labeled as **"Remarkable Professional Competence."**

Teaching at every stage of education is intended to bring forth a fundamental shift in the learners' knowledge process. Teachers should use appropriate instructional strategies and methods that best suit specific aims and outcomes in every situation (Inyang, 2020). Learning will not be effective without a learning method. As a result, numerous researchers have suggested various efficient learning approaches to ensure that the learning process runs smoothly. Every instructor must have a unique technique for delivering material to students. Therefore, instructors should apply methods of teaching such as Q & A, demonstration, training, recitation, small group discussion, problem-based, case scenarios, and discussions (synchronous or asynchronous) which are very important in online teaching and many new methods that are emerging especially in the times of the pandemic (Sudjana, 2010 as cited by Munawaroha, 2017; Pressbook, n.d.; Wu, 2016; Tseng et al., 2019). According to the study by Bala et al. (2020), teaching technique has a significant impact on students' academic performance. The analysis demonstrates that discussion and demonstration teaching methods significantly improve students' academic performance over the passive and instructor lecture approach. Additionally, in the context of online learning, Wu (2021) suggested in his study that people have been unable to leave their homes

due to the outbreak. Instructors should implement an addition to synchronous activities in class during lectures, instructors should plan after-class asynchronous activities so that students can complete learning activities when they are unable to leave the classroom. More so, instructors should plan how they will respond to problems by adopting practical and experimental online courses.

As shown in Figure 5, with the use of Exploratory Factor Analysis, six factors characterize or comprise the meaningful learning model in Radiologic Technology. These six factors are labeled thematically with the following (1) Students' Efficient Self-Regulation, (2) Varied Assessment Types, (3) Instructors' Favorable Personal Attributes, (4) Interactive Online Learning Sessions, (5) Readily Available Self-Learning Materials, and (6) Remarkable Professional Competence.

These generated factors comprise a meaningful learning model for Radiologic Technology in the context of the pandemic, where distance education (blended, online, and modular) is implemented in every Radiologic Technology training institution across the country. This Meaningful learning model can be adopted by the Commission on Higher Education and every Radiologic Technology institution as a framework that would guide them in developing their approach and delivery in this sudden transition of educational delivery. With this, the researcher suggests that decision-makers and radiologic technology professional education society should prioritize the six factors in creating mandates and programs for the universities and colleges in the country.

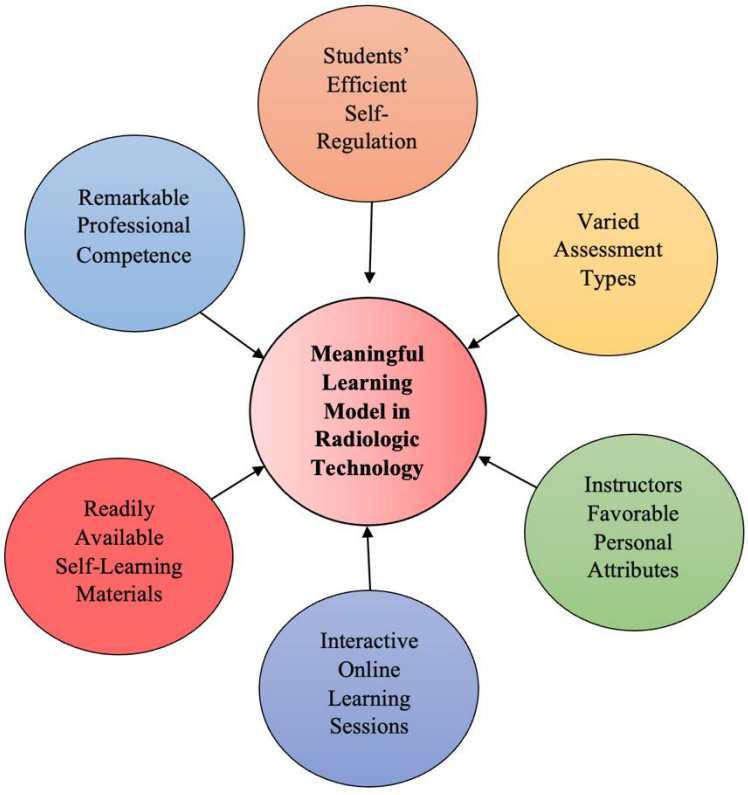

Figure 5. Framework showing the Factors that characterize the Meaningful Learning Model in Radiologic Technology

Perception of Respondents to the Underlying Factors that Characterize Meaningful Learning in Radiologic Technology

Table 12 shows the descriptive results of the six generated factors that characterize meaningful learning of Radiologic Technology students. Their level is high based on the six factors' overall mean (M= 3.19). This means that most of the indicated items that characterize meaningful learning in radiologic technology are agreed upon by the RT students within the context of distance learning. This indicates that most of the 181 students who participated in the second phase of the study share the same perspective as to how radiologic technology courses can be made meaningful.

Table 12. Perception of Students on the Underlying Dimensions

GENERATED FACTORS	Mean	Sd	Description
Students' Efficient Self-Regulation	3.31	0.58	Very High
Varied Assessment Types	3.30	0.52	Very High
Instructors' Favorable Personal Attributes	3.24	0.45	High
Interactive Online Learning Sessions	2.83	0.69	High
Readily Available Self-Learning Materials	3.36	0.49	Very High
Remarkable Professional Competence	3.12	0.62	High

1.00-1.75 Low 2.51-3.25 High; 1.76-2.50 Moderate 3.26-4.00 Very High

Out of the six generated factors, the one with the highest average with an overall mean of 3.36 (SD=0.49) is the Readily Available Self-Learning Materials. This means that students agree significantly with the following items under this factor, namely: "The instructors are hands-on in providing recorded video demonstrations and lectures performed inside the hospital and school facility (M=3.17)", "I receive other learning materials such as modules and educational videos for self-study (M=3.25)", "The activities and lectures are posted on a virtual classroom platform. (M=3.55)", "References and learning materials (books, websites, articles, PPTs, PDF files, notes, etc.) are provided by the instructor (M=3.48)".

The factors that followed the Provision of Self-Learning Materials with a very high overall mean are the Students' Efficient Self-Regulation (M=3.31) and Varied Assessment Types (M=3.30). Meanwhile, the factors Instructors Favorable Personal Attributes (M=3.24) and Remarkable Professional Competence (M=3.12) have a high overall mean. The factor that garnered the lowest score based on descriptive statistics was Interactive Online Learning Sessions (M=2.83). According to Sugi et al. (2021), traditional medical imaging education teaching methods have not kept up with technological advances that promote successful transition into independent practice. The COVID-19 pandemic has exacerbated this gap, as the need for social distancing and the implementation of hybrid staffing models have reduced critical educational interactions. Online instructional methods have long been recognized as effective tools for learning; however, online learning can be difficult for students due to the lack of nonverbal communication.

Other factors, such as interactions between students and professors, material accessibility, and time management, can all have an impact on the opinions of online education participants (Khalil et al., 2020). Furthermore,

some students have indicated that a lack of interaction is challenging for them, reflecting on their progress and personalities (Almahasees et al., 2021). According to Kumar et al., (2021), it is absurd to imagine learning without interaction since it is critical to the efficacy and effectiveness of today's blended learning systems. Learner-content interaction is primarily responsible for the successful realization of expected learning outcomes.

Additionally, Effective teacher-student interaction is an essential requirement for deep learning in the context of online education (Mu and Wang, 2019); it is the most potent factor in the online learning experience. Lin et al. (2017) revealed that interaction between online learners and teachers has a significant positive impact on both learning fulfillment and learning outcomes. According to Sun et al. (2022), the level of interaction between instructor and students has a positive impact on the learning involvement and mental environment. This demonstrates that the level of instructor-student interaction would affect students' learning effects in online education from a different dimension.

Conclusion and Recommendation

Based on the overall findings of the study, the following conclusions were formulated: In terms of gender profiling, Frequency distribution confirmed that out of 181 respondents, 117 or 64.8% were females, which dominates the number of participants in the study. In terms of year-level profiling, the highest number who participated in the study were the 4th-year students, 60 or 33% of the total respondents. The data presented implies that the Radiologic Technology Student respondents in terms of both sex and year level are distributed diversely.

Out of the extracted statements from the Radiologic Technology students, six (6) factors comprise the model of radiologic technology meaningful learning. The following are (1) Students' Self-Regulation and Efficacy, (2) Varied Assessment Types, (3) Instructors' Relations and Attributes, (4) Interactive Online Learning Sessions, (5) Provision of Self-Learning Materials, and (6) Professional Competence. Thus, with these factors, Radiologic Technology students perceived how meaningful education should be taught in the Radiologic Technology program.

The descriptive result of the six generated factors that characterize meaningful learning of Radiologic Technology students has an overall mean of 3.19; described as a high level. This implies that most of the indicated items that characterize meaningful learning in radiologic technology are agreed upon by the Radiologic Technology students within the context of the Covid-19 pandemic. This indicates that most of the 181 students who participated in the second phase of the study share the same perspective as to how radiologic technology courses can be made meaningful. Furthermore, among the six factors of the learning model, the respondents identified the Provision of Self-Learning Materials as the most notable factor that characterizes meaningful learning in Radiologic Technology. On the other hand, Interactive Online Learning Sessions serve as the least notable factor.

Based on the findings and conclusions of the study, the following recommendations were presented: Commission of Higher Education officials may consider this learning model in their learning continuity plan and curriculum development for the Radiologic Technology Program. The study may serve as a framework

and guide for them to better implement system protocols, provide guidelines and regulate standard rules in the instructional delivery of Radiologic Technology training, and provide a practical learning experience to the Radiologic Technology students of various training institutions.

Based on the results, various factors about the educators' professional ability and teaching character have been mentioned. School administrators may develop continuing professional training programs using in-house resources or outsource training from various professionals or experts in education training to improve and develop the necessary skills that are useful in the new mode of instructional delivery.

The factor that garnered the highest average in the perception of students regarding meaningful learning of Radiologic Technology is the Provision of Self-Learning Materials. Radiologic Technology educators and clinical instructors should consider developing printed and electronic learning materials as supplementals and references for the Radiologic Technology students, provided that these learning materials have undergone a series of planning and quality checks before distribution. This could help in the implementation of students' independent learning goals and may strengthen students' self-regulated learning skills, which are very useful in today's new mode of instructional delivery.

There should be extensive research and development of learning platforms that support Radiologic Technology training in the virtual set-up in a comprehensive manner. This means that Radiologic Technology students' learning must not be limited to the analytical domain and that activities must be accessible and usable to all Radiologic Technology students.

It is suggested that future researchers may consider applying the same study in the context of other medical-related courses taught in Universities and colleges. Additionally, private and public training institutions may replicate the study to establish comparability of results to enhance the suggested learning model.

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