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Emotional Intelligence among Radiation Therapists

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Emotional Intelligence among

Radiation Therapists

A thesis submitted in fulfilment of the requirements for the award of the degree

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By

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Certification

I, Stamatia Trakis, declare that this thesis, submitted in fulfilment of the requirements for the award of Master of Philosophy, in the School of Nursing, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Stamatia Trakis

27th March 2019

Acknowledgements

Dedication

This work is dedicated to my family and friends who have been my inspiration and motivation during this journey. A special feeling of gratitude to Jan and Jim—my next door neighbours—for their continual support and interest in my thesis work and for providing me with encouragement throughout.

Compendium of Publications and Conference Presentations

Publication

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Conference presentations

Trakis S, Parrish D, Fernandez R. Completion of ethics application. Presented at the In-service, St George Hospital, Sydney, Australia, 18 October, 2016.

Trakis S, Parrish D, Fernandez R. Emotional intelligence: An important attribute for radiation therapists. Presented at the Research Showcase St George Hospital, Sydney, Australia, 6 May, 2017.

Trakis S, Parrish D, Fernandez R. Emotional intelligence and conflict management styles among. Presented at the New South Wales Radiation Therapists Research Group, Prince Alfred Hospital, Sydney, Australia, 6 April, 2016.

Trakis S, Parrish D, Fernandez R. Emotional intelligence: Results. Presented at the In-service, St George Hospital, Sydney, Australia, 12 December, 2018.

List of Abbreviations

ECI	Emotional Competency Inventory
EI	emotional intelligence
EQ-i	Emotional Quotient Inventory
EBRT	external beam radiation therapy
Gy	Grays
HDR	high dose rate
ISLHD	Illawarra Shoalhaven Local Health District
JBI	Joanna Briggs Institute
LDR	low dose rate
MSCEIT	Mayer–Salovey–Caruso Emotional Intelligence Test
NSW	New South Wales
RT	radiation therapist
SD	standard deviation
TEIQue	Trait Emotional Intelligence Questionnaire
TEIQue-SF	Trait Emotional Intelligence Questionnaire–Short Form
SESLHD	South Eastern Sydney Local Health District

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Abstract

Introduction

Radiation therapy, also known as radiotherapy or radiation oncology, has become increasingly used for the management of cancer. Administering radiation therapy is a complex procedure and involves the accurate planning, dosimetry and delivery of the prescribed radiation dose to obtain optimal patient outcomes. The prolonged radiation treatment regimes, rapid advancements in technology, changes to the healthcare setting and increased responsibilities relating to patient care held by radiation therapists (RTs) have resulted in increased levels of stress among RTs. Additionally, RTs are required to have empathy and compassion, and to acknowledge the patient's vulnerability when providing care within this stressful environment. There is limited evidence investigating emotional intelligence (EI) among RTs. Therefore, the aim of this thesis was to explore the demographic predictors of emotional intelligence among RTs working in cancer care centres in New South Wales, Australia.

Methods

A cross-sectional self-administered survey was implemented to collect data. The Trait Emotional Intelligence Questionnaire–Short version (TEIQue-SF) was used to measure emotional intelligence. Multiple regression analysis was used to identify if age, years of experience as a RT, sex, highest level of education obtained or level of current employment were predictors of EI in the population sample.

Results

A total of 205 RTs participated in this study. The mean score for global emotional intelligence was 5.16 (SD = 0.6) and the scores for the emotionality, self-control, wellbeing and sociability dimensions were 5.3 (SD = 0.7), 4.9 (SD = 0.9), 5.7 (SD = 0.8) and 4.7 (SD = 0.8), respectively. The predictors of global EI were age and highest level of current employment. Younger age was a significant predictor of the global dimension and higher levels of employment was a significant predictor of the global and sociability dimension. Sex was a significant predictor of the emotionality dimension and higher levels of education was a significant predictor of the emotionality and sociability

dimension. None of the demographic variables were significant predictors of the self-control and wellbeing dimensions.

Conclusions

Predictors of EI included being a young RT, female, having higher levels of employment and higher levels of education. As level of education and level of employment are both amendable demographic factors, strategies to enhance these EI predictors and to reduce the effects of emotional struggle experienced by RTs in their work should be implemented. Further research must be undertaken to identify why older RTs have lower levels of lower EI.

KEY WORDS: radiation therapists, emotional intelligence, predictors, self-administered survey, TEIQue-SF, regression analysis

Chapter 1: Background

1.1 Introduction

Cancer has a considerable effect on the health of the population worldwide and is one of the leading causes of death in the developed world.[1] Globally, approximately 14.1 million new cases of cancer are detected and 8.2 million cancer-related deaths occur each year.[2] Nearly two-thirds of all cancer patients receive radiation therapy,[3] which has the potential to either cure, prevent or provide palliative relief for those suffering the disease. By 2030, the incidence of new cancers globally is expected to rise to 22 million, which will result in the increased use of radiation therapy.[4]

1.2 Radiation Therapy

Since the historic discovery of X-ray by Roentgen in 1895, radiation therapy, also known as radiotherapy or radiation oncology, has become increasingly used for the management of cancer.[5] Radiation therapy uses X-rays, gamma rays, electron beams, or protons, which are high-energy particles or waves that damage the DNA of cancer cells, thus preventing the multiplication of the cancer cells.[5]

Radiation therapy is a highly specialised treatment aimed directly at the cancer cells, enabling them to be destroyed while reducing the effect of radiation on healthy cells within the body.[5] Radiation therapy can be administered externally or internally. External administration includes megavoltage external beam radiation therapy, while internal administration is a source of radiation delivered inside the body.

External Beam Radiation Therapy

External Beam Radiation Therapy (EBRT) is a non-invasive radiation method that delivers targeted radiation beams to a tumour from outside the body to specific parts of the body. For example, if a patient had lung cancer, treatment would be provided only to their chest and not any other part of their body. Management with EBRT can comprise several treatments, called fractions, delivered over a period of one day to six weeks.[7] External beam radiation therapy is delivered using a radiation machine (a linear accelerator) to generate and direct the radiation beams at the cancer site and is generally controlled by radiation therapists (RTs)[3] (see Figure 1).

Patients do not feel any sensation while the radiation is being delivered and their experience is similar to having an X-ray or CT scan.[8] EBRT is used for pain control and is also referred to as palliation treatment or cure, preventing the cancer from returning or slowing its growth.[8]

Figure 1: External Beam Radiation Therapy

Internal Radiation Therapy

Internal radiation therapy involves either temporarily or permanently placing radiation-producing sources directly within the tissue or body cavity.[9] An internal radiation source can either be in a solid or liquid form. When radiation is delivered in a liquid form, it is referred to as a systemic treatment; internal radiation treatment with a solid source is called brachytherapy.[3,6]

Systemic Treatment

This type of systemic radiation therapy is delivered either orally or intravenously; the radioactive isotope travels throughout the patient's body via the bloodstream to the tissues attacking and killing the cancer cells. Radioactive Iodine (I-131) is the most common liquid source used to treat thyroid cancers.[10]

Brachytherapy

This is an internal radiation therapy using a solid source of radiation and can be in the form of seeds, ribbons or capsules that are put in position through a catheter. The amount of radiation used in photon radiation treatment is measured in Grays (Gy). Radiation sources are placed near the cancer and, as with EBRT, it only treats the specific site. There are two main types of brachytherapy: low dose rate (LDR) and high dose rate (HDR).

Low Dose Rate Brachytherapy

In LDR brachytherapy, small radioactive 'seeds' (Palladium-103, Caesium-131 or Iodine-135) are implanted near or in the tumour. These seeds stay in place, releasing small amounts of radiation (125 Gy, 115Gy or 145Gy) over 1–7 days. This technique is currently used for treating prostate cancers.[11]

High Dose Rate Brachytherapy

In HDR brachytherapy, the radioactive sources used are Iridium-192 or Cobalt -60. The radiation dosage delivered by these sources is greater (10.5 Gy, 8.5–9.5 Gy or 6.0–7.5 Gy) and the treatment is delivered within a shorter period (minutes).[12] At the end of each treatment session, the radioactive sources are removed. Treatment with HDR brachytherapy can occur over 1–3 sessions and is used for more high-risk, but localised, cancers in the breast, cervix, prostate, head or neck. HDR brachytherapy is often given in conjunction with EBRT.

Globally, radiation therapy is considered an essential treatment modality for the management of cancer and is used solely or in combination with the other primary treatments, such as surgery and or chemotherapy.[7] For patients with localised tumours, such as early-stage breast or prostate cancer, radiation therapy remains the sole treatment of choice.[7,13–15] Sixty per cent of all new cancer cases are treated with radiation therapy while 8.9% of all cancer patients would have a chemotherapy/radiation therapy treatment during the course of their illness.[7]

1.3 Benefits of Radiation Therapy

Nearly half of all patients with cancer are suitable for radiation therapy and the benefit–risk ratio is favourable for radiation for most cancer cases. Radiation therapy is provided in 34% of cases for curative and 14% for palliative purposes.[16] Benefits of radiation therapy include improvements in overall and cancer-specific survival, reduction in recurrence rate of the cancer and symptom relief.[17–19] Radiation therapy has also been reported as a cost-effective treatment for cancer.[20]

A systematic review involving six randomised control trials in patients with early-stage Hodgkin lymphoma demonstrated a statistically significant improvement in overall survival (HR 0.31; 95% CI 0.19–0.52; $p < .00001$) and progression-free survival (HR 0.42; 95% CI 0.25–0.72; $p = .001$) among those who received adjuvant radiation therapy compared to chemotherapy alone.[21] Another study calculated the estimated benefits of radiation therapy for patients with cancer up to 2025 using previously published Collaboration for Cancer Outcomes, Research and Evaluation data. The results indicated that the five-year survival benefits were estimated to be up to 9.6% for those receiving radiation therapy compared to 4.4% with no radiation therapy use.[16,20] In a large trial comprising 1168 patients, the cancer-specific survival rate among those who received preoperative radiation therapy was 72% compared to 62% among those who did not receive radiation.[22]

A statistically significant reduction in the local recurrence rate of the tumour has been reported among those who received radiation therapy (9%) compared to those who did not (26%). This reduction in local recurrence rate has been observed irrespective of the tumour height.[22] Another study demonstrated that radiation therapy provided a five-year local control benefit in 10.4% of all cancer patients (95% CI 9.3–11.8).[16] Patients with head, neck and cervical cancer received the greatest benefits of radiation therapy for local control of their cancer.[16]

Evidence obtained from studies published between 1995 and 2015 demonstrated that more than two-thirds of patients receiving radiation therapy had symptom palliation. A total of 74% of patients had control of bleeding, 67% had pain control and 68% had relief from obstruction symptoms.[19] In a multicentre trial among patients with proven cancer-

induced bone pain, there were no statistically significant differences in average pain, pain interference or quality of life among those who received radiation therapy alone compared to those who received pain medication plus radiation therapy.[17] A recent systematic review involving four meta-analyses, 20 randomised controlled trials and 32 prospective studies confirmed that, for painful bone metastases, radiation therapy provided good palliation.[18]

Radiation therapy centres are expensive to initially establish; however, the treatment machines can treat a large number of patients each day for up to 10 years, making radiation therapy cost-effective. In Australia, radiation therapy costs the Commonwealth government less than nine cents in every dollar spent on all cancer diagnoses and treatment.[7]

1.4 Complications of Radiation Therapy

Despite the benefits of radiation therapy, this treatment modality is not without complications. Some patients undergoing radiation therapy may not have any side effects while the majority will experience some form of side effects during their course of treatment. The side effects that patients experience while undergoing radiation therapy depend on the part of the body being treated, the area being treated and the duration of treatment. Vomiting, nausea, diarrhoea or urinary difficulties are common side effects in patients receiving radiation therapy in the abdomen or pelvic region.[23,24] Dryness of the mouth, oral infections and difficulty swallowing are common in patients receiving radiation therapy in the head or neck regions.[25,26] The most common side effect that most or all patients will experience is the skin of the area that is being treated becoming dry, red and even breaking down, which is very similar to sunburn.[27] Tiredness is another common side effect that may occur during the course of treatment, particularly towards the completion of treatment.[28,29] Appropriate management of these side effects through close monitoring and the use of medications may assist in resolving these complications.[30]

1.5 Radiation Therapy in the Australian Context

From 2015–2016 in Australia, approximately 60,600 courses of radiation therapy were delivered in both public and private hospitals compared to 56,400 during 2014–2015

and 47,700 during 2013–2014.[31] Of the radiation treatment courses delivered during 2015–2016, 58% were reported as curative (cure), 38% as palliative (pain relief) and 1.1% as prophylactic (preventative). For males, 30,926 radiation therapy courses were delivered; of these, 18,034 radiation therapy courses were for the top five cancers in men: prostate cancer, lung cancer, head and neck cancer, colorectal cancer and lymphoma (see Figure 2).
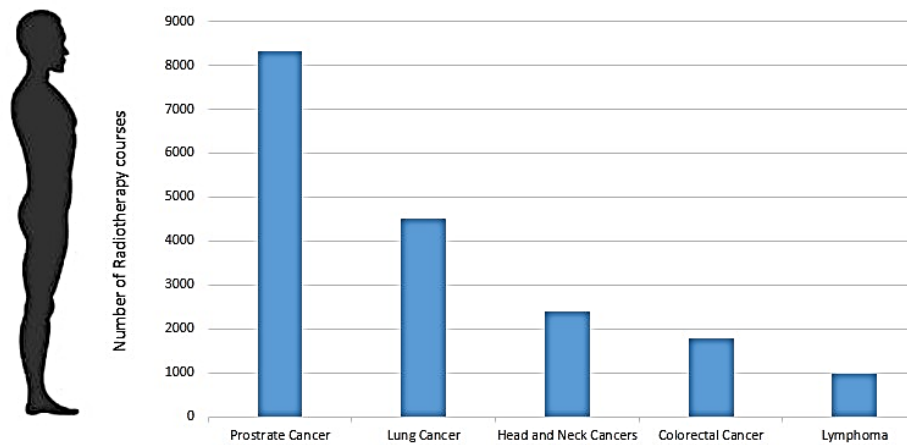
Figure 2: Radiation Therapy Treatments for Top Five Cancers—Males, 2015–2016

For females, 29,619 radiation therapy courses were delivered; of these, 19,728 were for the top five cancers in women: breast cancer, lung cancer, colorectal cancer, uterine cancer and lymphoma (see Figure 3).
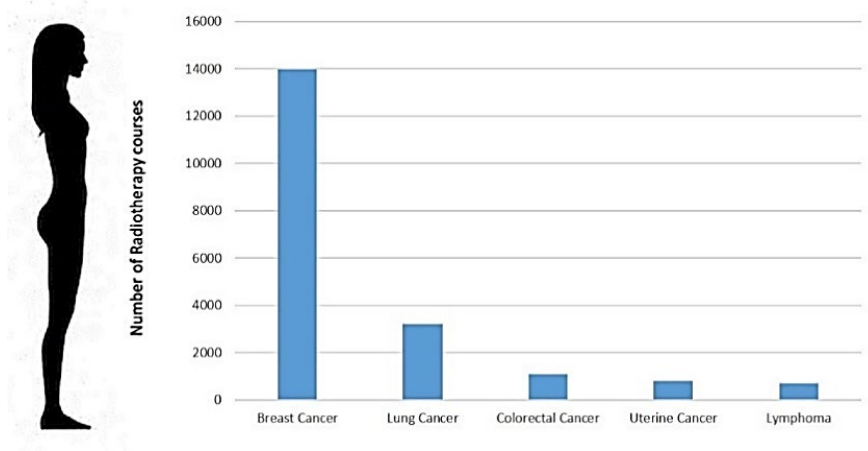
Figure 3: Radiation Therapy Treatments for Top Five Cancers—Females, 2015–2016

1.6 Administration of Radiation Treatment: Role of the Radiation Therapist

Radiation treatment is generally delivered by therapy radiographers who are also known as RTs. For the purpose of this thesis, the term RT will be used.

Administering radiation therapy is a complex procedure and involves the accurate planning, dosimetry and delivery of the prescribed radiation dose to obtain optimal patient outcomes.[3,32] Errors in administration can lead to negative consequences, such as death.[33] Novotny's (1997) study indicated that 22% of the 67 errors in patients receiving external beam therapy were caused due to incorrect calculation of the exposure time or radiation dose. Further, 13% of the errors were caused due to inadequate review of the patients' medical records and 12% were due to treatment provided to the incorrect anatomical site.

Hence, RTs require scientific and technological knowledge to provide the required specialised care to patients.[34,35] Apart from the scientific and technological knowledge, RTs also provide support and guidance to patients to alleviate their fears and anxieties about their diagnosis and treatment. Generally, RTs provide radiation treatment over 4–8 weeks. During this time, patients undergoing radiation treatment develop a bond with their RT who also provides them and their families with emotional comfort. Illness and a prolonged treatment regime can affect both the patients and the RTs. Consequently, it is important for RTs to have empathy, compassion and an ability to recognise patients' vulnerability and to appropriately manage their own emotions in a professional manner.[36]

1.7 Significance of the Study

Radiation therapy is highly technical, hence RTs focus on the technology in order to ensure that an accurate dose of radiotherapy is delivered to the patient and at the correct area of interest. Due to the benefits of radiotherapy, this treatment is being increasingly used as the first line management for cancer. As a result the volume of patients treated by RTs is rapidly increasing. In order to meet the demand, RTs have to deliver the treatment with a certain time frame thus increasing their workload. The nature of the cancer, prolonged treatment regimes, rapid advancements in technology, changes to the healthcare setting and increased responsibilities held by RTs have resulted in the

radiation therapy setting becoming a highly stressful environment.[37] Despite these challenges it is important for the radiation therapists to provide high quality care and develop a relationship with the patient in order to provide support and guidance and elevate their fears and anxieties about the treatment. These technological and time pressures faced by the RTs results in higher stress levels, decreased job satisfaction and increased symptoms of burnout. Radiation therapists are required to have empathy and compassion and to acknowledge the patient's vulnerability when providing care within this stressful environment.[38]

It is imperative that they understand their own feelings, make good decisions and have empathy for others.[39] Hence, RTs are required not only to have general intelligence,[37] but to also have emotional intelligence (EI) to manage themselves in the workplace. [40,41] These EI skills include the ability of RTs to accurately understand and accept themselves, be aware of their own emotions, be able to express themselves, have empathy, social responsibility, develop good interpersonal relationship, be able to tolerance stress and control their impulses and be optimistic. Limited research thus far has examined EI among RTs.

1.8 Aim

The aim of this thesis was to explore the EI scores and demographic predictors of EI among qualified RTs working in cancer care centres in NSW Australia.

1.9 Research Questions

1. What are the EI scores among qualified RTs working in cancer care centres in NSW Australia?
2. What are the demographic predictors of EI among qualified RTs working in cancer care centres in NSW Australia?

1.10 Presentation of the Thesis

The thesis is presented as a traditional research report comprising five chapters:

Chapter 1: BACKGROUND

A description of radiation therapy, its use within Australian context, the role of the radiation therapist and the significance of the study.

Chapter 2: LITERATURE REVIEW

A description and benefits of emotional intelligence and a review of the literature relating to emotional intelligence among radiation therapists.

Chapter 3: METHODOLOGY

The methodology undertaken to investigate emotional intelligence and predictors of emotional intelligence among radiation therapists working in public hospitals in NSW, Australia.

Chapter 4: RESULTS

A description of the results.

Chapter 5: DISCUSSION

A discussion of the results.

Study commenced
April 2015

Information provided to chief radiation therapist
May 2015

Radiation therapist educator informed of the study
May 2015

Radiation therapist (participants) informed of the study
June 2015

Data collected commenced
June 2015

Data collected completed
August 2015

Data entry completed
October 2015

Data analysis completed
Feb 2016

Figure 4: Presentation of the Thesis

1.11 Conclusion

This chapter has provided a description of radiation therapy, its use within the Australian context, the role of the RT and the significance of the study. The next chapter will provide a description and the benefits of EI and a review of the literature relating to EI among RTs.

Chapter 2: Literature Review

2.1 Introduction

In this chapter, a description of emotional EI has been provided and its predominant models and theories have been explored in detail. The attributes and associated assessment instruments for the predominant models of EI have been described. Further, the benefits and the demographic predictors of EI have been reported.

2.2 Emotional Intelligence

In 1990, based on research in areas relating to emotion, psychotherapy, intelligence and cognition, Mayer and Salovey proposed a new form of intelligence: EI.[42] They describe EI as an individual's ability to monitor their own feelings and emotions and those of others and to be able to discriminate among them and use the information to assist with their thoughts and behaviours.[42]

This definition and the conceptualisation of EI has been further developed through research and practice.[43] Emotional Intelligence has been described as a blend of personal and interpersonal competencies that affect one's behaviour, thinking and interactions with others.[44] It has also been referred to as having the capacity to control and express one's emotions and the traits and abilities to handle personal, interpersonal and social relationships judiciously and empathetically.[45–47]

2.3 Models of Emotional Intelligence

A number of models of EI have been developed. The major conceptual EI models include the ability model,[48] competency model,[46] trait model[47] and mixed model.[45] Each model has its own proprietary instrument used to assess and interpret a measure of EI. The four major models of EI, the theorists who developed each and the associated assessment tool for each model are illustrated below (see Figure 5).
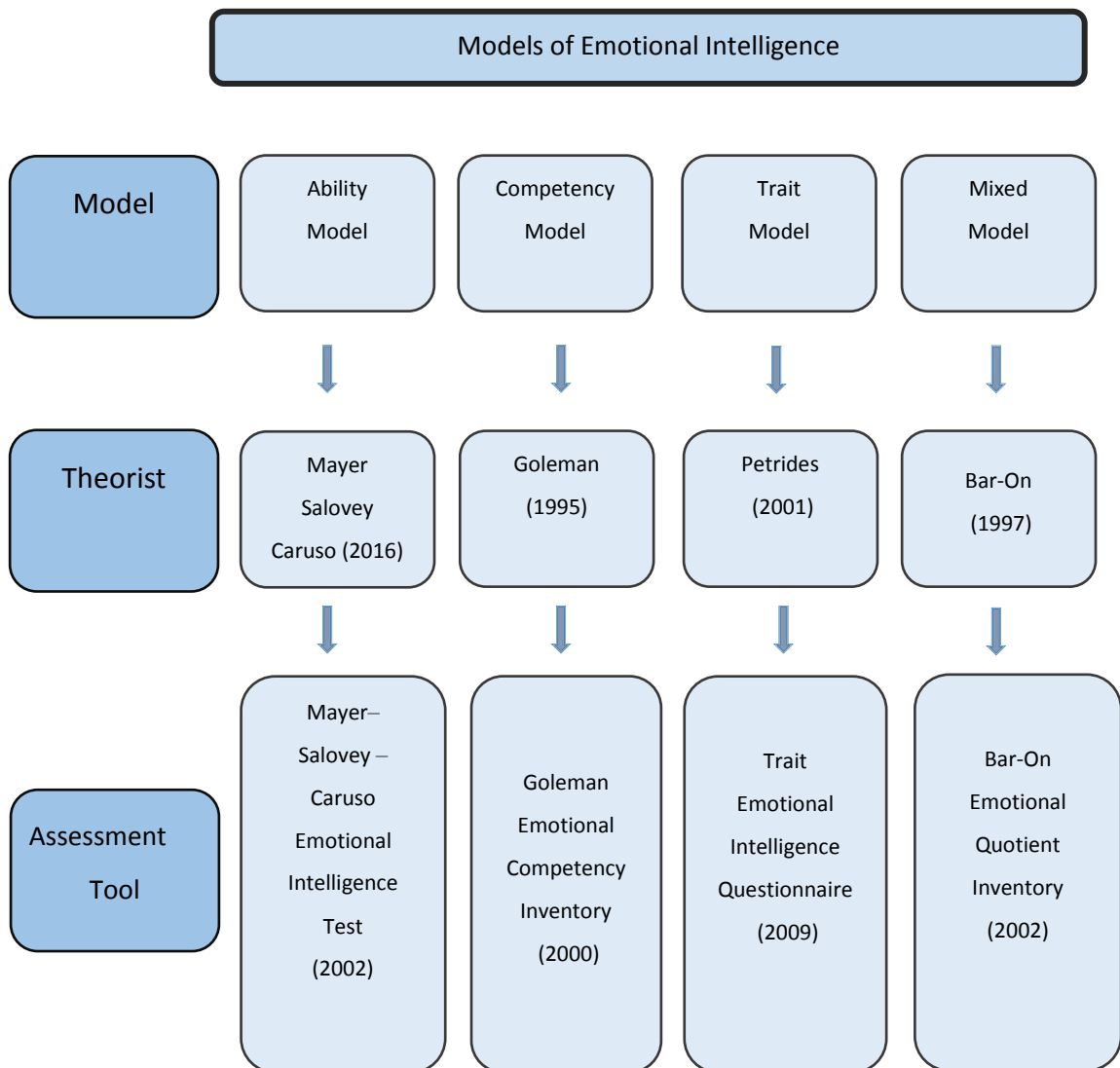
Figure 5: Models of Emotional Intelligence

The Ability Model

The ability model was introduced by Salovey and Mayer in 1990.[42] It is defined as the ability to perceive, understand, manage and use emotions to facilitate thinking.[42] According to the ability model, emotions are used by individuals to assist them to cope with daily life. Salovey and Mayer[42] explain EI as a set of abilities a person possesses that enables them to read and understand the emotions of themselves and others, and to act on this accordingly. They believed that traditional measures of intelligence did not assess a person's ability to perceive, process and manage emotions and emotional information. They suggest that EI in the ability model comprises four components:

perceiving emotion, facilitating thought using emotions, understanding emotions and managing emotions.[42]

Recently, Mayer, Salovey and Caruso[48] developed a set of principles to further guide thinking about the ability model of EI. These principles include:

(1) *EI exists as a mental ability*: emotions are used to accurately facilitate thought. Emotions can be managed within the individual. The emotions of the individual and others' can be understood.[48]

(2) *EI is best measured as an abilit*y: the way one thinks, problem-solves and interprets information.[48]

(3) *Intelligent problem-solving does not correspond to intelligent behaviour*: motives, emotions, social styles, self-awareness and self-control all contribute to consistencies in behaviour.[48]

(4) *A test's content—the problem-solving area involved—must be clearly specified as a precondition for the measurement of human mental abilities (pg. 291)*: involves verbal problem-solving, such as understanding vocabulary and comprehensive sentences.[48]

(5) *Valid tests have defined subject matter that draws out relevant human mental abilities (pg. 292)*: reasoning abilities are used to solve problems and there is an interaction between people's mental abilities and problem-solving.[48]

(6) *EI is a broad intelligence*: general intelligence is at the top of the list and it is divided at the next level down to include the following broader intelligences: fluid reasoning, verbal intelligence, general memory and learning, long-term storage and retrieval, broad cognitive speediness and processing speed.[48]

(7) *EI is a member of the class of broad intelligences focused on hot information processing*: outlines hot and cool intelligence. Hot intelligence involves the reasoning of information that is significant to them while cool intelligence involves impersonal knowledge, such as verbal-propositional intelligence, maths abilities and visual–spatial intelligence.[48]

The types of reasoning within the four components of the original ability model have been upgraded to include the seven principles and this is described below.[48] The new

components are as follows: perceiving emotion, facilitating thought using emotions, understanding emotions and managing emotions.[48]

Perceiving Emotion

This component of the ability model comprises the ability to identify and express emotions accurately in one's thoughts, feelings and physical state.[48] It also relates to being able to use language to express emotions to others, resulting in honest expressions.[48] Further, it includes the ability to identify emotions in other people and to discriminate between honest and dishonest emotional expressions. This includes the ability to discriminate between accurate and inaccurate emotional expression and to understand how emotions are displayed depending on context and culture. It relates to being able to perceive emotional content in the environment and to perceive emotions in other people[48] (see Table 1).

Facilitating Thought Using Emotion

Facilitating emotions into thought processes encompasses the ability to direct attention and prioritise thinking. It is the ability to generate emotions to assist with judgement and memory and as a means of relating to the experiences of another person. This component includes the ability to select problems based on how one's emotional state might facilitate cognition.[48] It also relates to leveraging mood swings to generate different cognitive perspectives (see Table 1).

Understanding Emotions

Understanding emotions included the abilities associated with labelling emotions, identifying their causes and consequences and understanding complex emotions. Understanding emotions embodies the ability to define emotions and recognise the meanings of the different emotions and the relationships between them.

It includes the ability to determine the meanings of emotions conveyed, understand complex feelings and combinations of feelings and understand possible changes between emotions. It includes the ability to recognise transition of emotions; for example, from anger to satisfaction. It also includes the ability to evaluate emotions

within a cultural context and to differentiate between moods and emotions[48] (see Table 1).

Managing Emotions

Regulating and managing emotions incorporates the ability to stay open or calm when facing pleasant and unpleasant feelings and to engage or detach from emotions depending on their capacity to neutralise negative emotions and to escalate positive emotions.[48] It also involves monitoring and managing emotions in oneself and in others, and managing one's own emotions and responses to others' emotions .[48] It also includes the ability to evaluate strategies to maintain, reduce or intensify an emotional response[48] (see Table 1).

Table 1: The Ability Model [48]

Perceiving Emotion	Facilitating Thought Using Emotion	Understanding Emotions	Managing Emotions
Being able to identify deceptive or dishonest emotions	*Being able to select problems based on individual's emotional state*	*Being able to recognise cultural differences when evaluatingf emotions*	*Being able to effectively manage others' emotions*
Being able to discriminate between accurate and inaccurate emotions	*Being able to leverage mood swings to generate different cognitive perspectives*	*Being able to understand how a person might under certain conditions*	*Being able to effectively manage one's own emotions*
Being able to understand how emotions are displayed based on context and culture	*Being able to prioritise thinking*	*Being able to recognise likely transitions among emotions*	*Being able to evaluate strategies to reduce or increase an emotional response*
Being able to express emotions accurately	*Being able to relate to experiences of others*	*Being able to understand complex and mixed emotions*	*Being able to monitor one's emotional reactions*

Perceiving Emotion	Facilitating Thought Using Emotion	Understanding Emotions	Managing Emotions
Being able to perceive environmental emotional content	*Being able to generate emotions to assist with judgement and memory*	*Being able to differentiate between moods and emotions*	*Being able to use helpful emotions and disregard unhelpful emotions*
Being able to identify emotions in other people through their voice, expression, language and behaviour		*Being able to assess situations that are likely to provoke emotions*	*Being able to stay open to pleasant and unpleasant feelings*
Being able to identify one's own emotions		*Being able to determine the cause and effect of emotions*	
		Being able to identify the various emotions	

Assessment of Emotional Intelligence Using the Ability Model

The Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) is the proprietary instrument used to assess and interpret the four components of the ability model of EI. The MSCEIT has been developed from an intelligence-testing tradition formed by emerging scientific understanding of emotions and their functions.[49] The MSCEIT includes 141 items that yield a total EI score, two area scores and four branch scores. The MSCEIT has good construct representation and high reliability with Cronbach's alpha ranging from 0.86 to 0.93.[50,51]

The Competency Model

Another widely used EI model proposed by Goleman[46] is the competency model. According to this model, EI is an assortment of personal and social competence that contributes to managerial performance and leadership.[46] This theory of EI, which was inspired by Mayer and Salovey's early work, categorises EI into self-awareness, self-management, social awareness and social skills.[46] Self-awareness and self-management relate to understanding one's own emotions, how these emotions can influence behaviour and the appropriate management of these emotions. Social awareness and social skills are related to understanding the emotions, associated behaviours and needs of others and appropriately managing and interacting with others.[52] Twenty-seven competencies were developed relating to a person's potential for developing and mastering self-awareness, self-management, social awareness and social skills.[52] According to this model, these competencies can be learned and individuals who possess EI competence can handle conflicting circumstances more effectively.[52] Further refinement of the competency model resulted in the renaming of the categories and reduction of the competencies from 27 to 18.[53]

Self-Awareness

According to Goleman, self-awareness means having an understanding of one's emotions, strengths, limitations, values and motives. Understanding how one feels can enable the individual to accurately assess their own emotional state. To achieve this, the individual requires the following attributes: emotional *s*elf-awareness, accurate self-assessment and self-confidence. Self-awareness is critical for appropriate self-

management and an important factor in individuals' achievement of their goals (see Table 2). [46,53]

Self-Management

This builds on self-awareness and involves knowing how to manage ones emotions. Self-management competencies can assist a person to appropriately manage negative feelings. Individuals cannot effectively manage their employees' emotions without first controlling their own.[46,53] Individuals must strive to positively manage themselves to develop a work environment of trust, integrity and fairness.[46,53] Further, self-management embraces an individual's ability to adapt to challenges and try to improve themselves. The self-management competencies are emotional self-control, transparency, optimism, adaptability, achievement and initiative (see Table 2). [46,53]

Social Awareness

Social awareness is the most easily recognised dimension of EI. Foundational to social awareness is the requirement for empathy. If individuals are aware of their employees' needs, they will be able to assist them to develop professionally and to be more productive. Empathy does not mean that individuals must try to please everyone; rather, it means taking the employees' feelings motivations and needs into consideration when making decisions that will affect or impact them or their work performance.[46,53] The social awareness competencies are empathy, organisational awareness and service orientation (see Table 2). [46,53]

Relationship Management

Relationship management is strongly influenced by the three dimensions of self-awareness, self-management and social awareness, particularly the competency of empathy. Specific interpersonal tools—persuasion, conflict management and collaboration—are also important for relationship management. An individual's ability to build bonds and form networks will influence and progress an organisation in the right direction. Relationship management also seeks to inspire and guide others, communicate clearly, develop others and provide a vision that others can work to achieve.[46,53] The relationship management competencies include developing others,

inspirational leadership, change catalyst, influence, conflict management and teamwork and collaboration [46,53] (see Table 2).

Table 2: The Competency Model[46,53]

Personal Competence		Social Competence	
Self-Awareness	**Self-Management**	**Social Awareness**	**Relationship Management**
Emotional Self-Awareness *Recognising one's emotions and their effects*	**Emotional Self-Control** *Keeping disruptive emotions and impulses under control*	**Empathy** *Understanding others and taking an active interest in their concerns*	**Developing Others** *Sensing others' development needs and bolstering their abilities*
Accurate Self-Assessment *Knowing one's strengths and limitations*	**Transparency** *Honest and integrity*	**Organisational Awareness** *Empathising at the organisational level*	**Inspirational Leadership** *Inspiring and guiding groups and people*
Self-Confidence *A strong sense of one's self-worth and personal capabilities*	**Optimism** *Persistence in pursuing goals despite barriers*	**Service Orientation** *Recognising and meeting customers' needs*	**Change Catalyst** *Initiating or managing change*
	Adaptability *Flexibility with challenges*		**Influence** *Wielding interpersonal influence tactics*
	Achievement *Drive to improve*		

Personal Competence		Social Competence	
Self-Awareness	**Self-Management**	**Social Awareness**	**Relationship Management**
	Initiative *Readiness to act*		**Conflict Management** *Resolving disagreements* **Teamwork and Collaboration** *Creating a shared vision*

Assessment of Emotional Intelligence Using the Competency Model

Based on the competency model, several measurement tools have been developed. These include the Emotional Competency Inventory (ECI), Emotional Intelligence Appraisal and Work Profile Questionnaire.[54] The ECI is a 360-degree tool designed to assess the 18 emotional competencies of individuals within the four constructs of the competency model: self-awareness, social awareness, self-management and relationship management.[55]

These competencies are assessed using self-report and observations made regarding the individual's behaviour by others.[55] Both the individual and the rate use a five-point scale to make determinations about how particular behaviours are characteristic of the individual. Each behaviour is associated with specific levels of a competency. Feedback is provided using a mathematical equation that converts the raters and the self-assessment scores into competency levels.[55]

The ECI has an overall reliability of 0.78. The Cronbach's alpha for the four constructs of the ECI are 0.68 (transparency), 0.87 (emotional self-awareness), 0.47 (conflict management) and 0.76 (inspirational leadership).[55]

The Trait Model

The trait model was developed by Konstantin Vasily Petrides.[56] This model describes EI as an individual's self-perceptions of their emotional abilities, including behavioural personalities and self-perceived abilities[56] (see Table 3).

As with all the other EI models, the features embedded within this model comprise the core values of understanding and regulating one's own emotions and of understanding and regulating one's response to others' emotions. However, unlike the other models, the role of self-perception is seen to effect the recognition and regulation of a person's own emotions, thus relying on individuals' abilities to recognise their own emotions and strengths.[56] This model has five components—wellbeing, sociability, emotionality, self-control and auxiliary facets—and subscales[56] (see Table 3).

Wellbeing

This component includes three factors: trait optimism, trait happiness and self-esteem. Trait optimism is an ability to look on the bright side of things, trait happiness is the ability to be cheerful and self-esteem is the ability to stand up for one's rights[56] (see Table 3).

Sociability

The sociability component also includes three factors: emotional management, assertiveness and social awareness. Emotional management is an ability to influence other people's feelings, assertiveness is the ability to be upfront and willing to stand up for one's rights and social awareness is the ability to have networking skills to complete tasks[56] (see Table 3).

Emotionality

This includes four factors: trait empathy, emotional perception, emotion expression and relationships. Trait empathy is the ability to understand others' perspectives, emotional perception is the ability to understand one's own and others' feelings, emotion expression is the ability to communicate one's feelings to others and relationships means the ability to uphold relationships[56] (see Table 3).

Self-Control

Self-control includes three factors: emotional regulation, impulsiveness and stress management. Emotional regulation is the ability to control one's emotions, impulsiveness is the ability to control one's impulses and stress management is the ability to endure pressures and stress[56] (see Table 3).

Auxiliary Facets

Auxiliary facets includes two factors: self-motivation and adaptability. Self-motivation is the ability to be motivated and to achieve one's goals and adaptability is the ability to adapt in any situation[56] (see Table 3).

Table 3: The Trait Model[56]

Wellbeing	Sociability	Emotionality	Self-Control	Auxiliary Facets
Trait Optimism *Confident and likely to 'look on the bright side' of life*	**Emotional Management** *Capable of influencing other people's feelings*	**Trait Empathy** *Capable of taking someone else's perspective*	**Emotional Regulation** *Capable of controlling their emotions*	**Self-Motivation** *Driven and unlikely to give up in the face of adversity*
Trait Happiness *Cheerful and satisfied with their life*	**Assertiveness** *Forthright, frank and willing to stand up for their rights*	**Emotional Perception** *Clear about their own and other people's feelings*	**Impulsiveness** *Reflective and less likely to give in to their urges*	**Adaptability** *Flexible and willing to adapt to new conditions*
Self-Esteem *Successful and self-confident*	**Social Awareness** *Accomplished networkers with excellent social skills*	**Emotional Expression** *Capable of communicating their feelings to others*	**Stress Management** *Capable of withstanding pressure and regulating stress*	
		Relationships *Capable of having fulfilling personal relationships*		

Assessment of Emotional Intelligence Using the Trait Model

The Trait Emotional Intelligence Questionnaire (TEIQue) is the EI test developed to measure the five components of the trait model.[47] The TEIQue is a self-reported inventory that comes in a full form that covers the sampling domain of trait EI comprehensively or a short form. The full-form inventory comprises 153 items, measuring 15 facets and requires approximately 25 minutes to complete.[57] The short-form inventory comprises 30 short questions designed to measure global trait EI comprising two items addressing each of the 15 facets of the TEIQue.[58] Both the TEIQue full- and short-form inventories have demonstrated good internal consistency and reliability[59] with an overall average internal consistency coefficient of 0.85, which is within the optimal value range of Cronbach's alpha (0.70–0.95).[60–63]

The Mixed Model

The mixed model of EI introduced by Reuven Bar-On describes EI as a mix of interrelated emotional and social competencies, skills and behaviours that affect intelligent behaviour.[45] The mixed model purports that EI is the ability to deal effectively with others and to have a positive influence on emotions.[45] According to Darwin, for survival and adaptation, expressing one's emotions is vital and this theory has influenced the development of the mixed model of EI.[45] In addition to emotional expression, socially intelligent behaviour is also vital for effective adaptation.[45] Therefore, the model defines EI as a cross-section of interrelated social and emotional competencies, skills and behaviours that determine how effectively we understand ourselves and others and cope with daily demands.[45] This model has five components—intrapersonal skills, interpersonal skills, adaptability, stress management and general mood—and sub-components relating to EI competencies, skills and behaviours.[45]

Intrapersonal Skills

This refers to the awareness and understanding of one's emotions and feelings, and comprises five factors: emotional self-awareness, assertiveness, self-regard, self-actualisation and independence. Self-awareness, which is the ability to be aware of and understand one's feelings, is an important factor in the workplace as it can influence workplace effectiveness. Assertiveness is the ability to express one's feelings and

emphasise one's viewpoint without causing negative consequences to others. Self-regard is the ability to accurately perceive, understand and accept oneself. Self-actualisation is the ability to achieve personal goals and realise one's potential. Independence is the ability for one's behaviour and thinking to be autonomous and not emotionally dependent on others [45] (see Table 4).

Interpersonal Skills

Interpersonal skills, which involve an understanding and awareness of others, is the second of the mixed model's EI components.[45] This component comprises three factors: empathy, social responsibility and interpersonal relationships. Empathy is described as one's ability to be able to understand other's feelings.[45] Social responsibility is one's ability to negotiate and is an important factor in any discussion, mediation or intervention process.[45] Interpersonal relationships involves the ability to provide harmony in relationships and to communicate well with others[45] (see Table 4).

Adaptability

This is the third of the mixed model's EI components and is defined as the ability to be flexible and to change one's feelings according to a given situation.[45] This component comprises three factors: flexibility, problem-solving and reality-testing. Flexibility refers to an individual being able to adapt and alter their emotions and thoughts in order to manage themselves in a given situation.[45] Problem-solving is the ability to categorise problems into personal or interpersonal categories followed by the development of appropriate solutions to address the problems.[45] Reality-testing is the ability to objectively validate one's feelings and thinking with external reality[45] (see Table 4).

Stress Management

Stress management is the fourth of the mixed model's EI components. It encompasses strategies to cope with stress and emotions and comprises two factors: stress tolerance and impulse controls. Stress tolerance is the ability to manage stressful situations, strong emotions and adverse events with success.[45] Impulse controls refers to the ability to resist temptation or to delay an urge or impulse and the ability to control the verbal expression of ones thoughts[45] (see Table 4).

General Mood

The fifth component of the mixed model, general mood, refers to one's ability to be optimistic and communicate emotions that are positive.[45] This component comprises two factors: optimism and happiness. Optimism is the ability to remain hopeful and confident when negative feelings arise and happiness is the ability to feel satisfied with life and to have positive emotions ranging from contentment to joy[45] (see Table 4).

Table 4: The Mixed Model[45]

Intrapersonal	Interpersonal	Stress Management	Adaptability	General Mood
Self-Awareness and Self-Expression	Social Awareness And Interpersonal Relationship	Emotional Management and Regulation	Change Management	Self-Motivation
Self-Regard *To accurately perceive, understand and accept oneself*	**Empathy** *To be aware of and understand how others feel*	**Stress Tolerance** *To effectively and constructively manage emotions*	**Reality-Testing** *To objectively validate one's feelings and thinking with external reality*	**Optimism** *To be positive and look at the brighter side of life*
Emotional Self-awareness *To be aware of and understand one's emotions*	**Social Responsibility** *To identify with one's social group and cooperate with others*	**Impulse Control** *To effectively and constructively control emotions*	**Flexibility** *To adapt and adjust one's feelings and thinking to new situations*	**Happiness** *To feel content with oneself, others and life in general*
Assertiveness *To effectively and constructively express one's emotions and oneself*	**Interpersonal Relationship** *To establish mutually satisfying relationships and relate well with others*		**Problem-Solving** *To effectively solve problems of a personal and an interpersonal nature*	
Independence *To be self-reliant*				

Intrapersonal	Interpersonal	Stress Management	Adaptability	General Mood
Self-Awareness and Self-Expression	**Social Awareness And Interpersonal Relationship**	**Emotional Management and Regulation**	**Change Management**	**Self-Motivation**
and free of emotional dependency on others				
Self-Actualisation *To strive to achieve personal goals and actualise one's potential*				

Assessment of Emotional Intelligence Using the Mixed Model

The Emotional Quotient Inventory 2.0 (EQ-i 2.0) is the EI test designed to measure the five components of the mixed model.[45] The inventory comprises 133 items on five composite scales that measure the individual's social and emotional strengths and weaknesses and takes approximately 30 minutes to complete.[45] The five composite scales are intrapersonal, interpersonal, stress management adaptability and general mood. Each item is measured on a five- point response scale ranging from 'very seldom or not true of me' (1) to 'very often true of me or true of me' (5).[45] Higher scores demonstrate effective functioning regarding meeting demands and daily challengers.[45] The EQ-i 2.0 has demonstrated high reliability with internal consistency for the total scale (0.97) and for the subscales (0.77). The test–retest reliability at 2–4 weeks was 0.92 and, at 8 weeks, was 0.81.[64,65]

2.4 Benefits of Emotional Intelligence

Numerous benefits of EI have been reported among people including healthcare professionals.[66] These benefits are due to the individual's ability to identify and interpret emotions in oneself and others, enabling cognitive activities, such as critical thinking and problem-solving. This ability allows them to change their 'moods' to best fit the task at hand.[67] Additionally, individuals can regulate their own behaviour by redirecting disruptive impulses and moods to effectively pursue their goals. Another benefit includes the ability in managing relationships and building networks to achieve favourable results.[52] The benefits of EI also include the ability to be flexible and to adapt to situations, communicate their feelings and to cope with pressure and stress.[68]

Emotional Intelligence has been found to have a positive effect on personal outcomes, including leadership, academic achievement, personal wellbeing, job satisfaction, stress and burnout.[43,69–71] Researchers have also provided evidence that developing EI among healthcare professionals may positively effect patient outcomes.[72–75] Overall, the literature indicates that people with higher EI are better able to achieve goals, maintain strong relationships and perform better in social relationships.[76]

Leadership

Emotional Intelligence related to self-management, social awareness and social skills has been found as most applicable and recognised as a highly relevant and important requirement for leadership.[43] Empirical research has acknowledged the contributions of EI to effective management in healthcare organisations and the importance of developing EI skills in healthcare administrators.[77] Evidence indicates that emotionally intelligent leaders motivate nurses to make high-level clinical decisions, which positively affects patient care. [78–80]

Academic Achievement

Academic success has been reported as associated with EI. A descriptive, correlational study involving 135 nurses from three hospitals in New York counties in the United States identified a positive correlation between nurses' self-compassion and EI.[81] Similarly, in a study with 51 postgraduate nursing students, a significant positive relationship was found between total EI and academic success.[69] However, in a study with 73 undergraduate nursing students, there was no association between academic success and overall EI.[69]

Personal Wellbeing

In a systematic review of 35 studies involving 7898 participants, EI was found to have a positive effect on the individual's personal wellbeing.[70] The results also demonstrated a positive correlation between EI and mental health, psychosomatic health and physical health ($r = .22$). [70]

Job Satisfaction

Increased job satisfaction is another benefit that has been reported among those with high EI. A study conducted on 142 teachers found a positive association between EI and job satisfaction, suggesting that the higher a person's EI, the greater their job satisfaction.[71] A study of higher education leaders found that those utilising EI competencies were more satisfied in their job[82] and ascertained that increased EI had a positive effect on how an individual felt about their role.

Stress and Burnout

Higher EI has also been shown to contribute to the individual's ability to cope with stress, increase their efficiency and increase the pleasures of life that can actually enhance their emotional relationships.[83] A study that involved 202 faculty members from the Isfahan University of Medical Sciences found an inverse correlation between the total EI score and the level of stress relating to their job (r = −0.235, p = .005), indicating that staff with higher EI had lower stress levels. Similarly, a study undertaken among 333 nurses examining the relationships between EI and the stress caused by working in a hospital found a statistically significant relationship between EI and job stress. Participants with a higher EI level were found to have a lower level of stress.[83] Additionally, the study also reported that faculty members with higher levels of self-awareness and self-management had significantly lower job-related stress.[71] In a study in the Netherlands regarding 380 nurses working with people with mental illness and severe behavioural problems, among female nurses, low EI was associated with higher burnout. This study also found that higher EI competencies relating to problem-solving and stress tolerance resulted in lower burnout in male nurses.[84]

Patient Outcomes

In an integrative literature review comprising 39 empirical research articles that focused on EI in nursing, EI was found to be critical to clinical practice. This literature review concluded that emotionally intelligent nursing leaders influenced the quality of patient care and patient outcomes.[85] This study also concluded that the nursing curriculums should include concepts of EI because of the positive effect EI has on students' learning, critical thinking, decision-making and clinical knowledge.[85]

Given the benefits of EI in the workplace, the potential for using it in job recruitment and selection, and to inform career development and progression across a range of professions has also been suggested.[86]

2.5 Association between Emotional Intelligence and Demographic Factors

The influence of demographic factors on EI has been explored in the literature with studies determining that certain demographic factors have an effect on EI. These factors include age, sex and educational levels.[87–89]

Age

Several studies have identified a positive correlation between EI and age, with older people reporting higher EI.[70,87] An American study involving 405 participants aged 22–70 years found that EI increased slightly with age.[90] The authors suggest that EI develops cumulatively as a consequence of life experiences. While these findings are logical, findings in more recent literature suggests that age is not a predictor of EI.[91] This is a premise that will be investigated in this current study.

Gender

There are studies that have reported women to be more socially skilful compared to men.[92] High EI among women has been attributed to biological and social factors. The biological factors include a larger size of the brain area, which processes emotions, in women compared to men.[93] The social factors are related to the innate or learnt behaviours of men and women in which women are taught and encouraged to be more empathetic and men are conditioned to be more constructive.[93] Further, researchers have found that higher levels of EI in women may be due to the influences and nurturing roles between the mother and her child in which male children are likely to obtain less emotional expression from their mothers compared to female children.[94] A study conducted by Harrod and Scheer on 200 youths aged 16–19 years showed significantly higher EI levels among females compare to males.[89] Sex as a predictor of EI will be investigated in this research study.

Educational Levels

Educational levels have been identified as another demographic factor that influences EI. In a study undertaken on 212 professionals working in a mental health setting there was a statistically significant correlation between EI and educational levels, with those

who had higher levels of education demonstrating greater EI.[95] In another study undertaken among 333 nurses, it was also observed that increases in EI were positively associated with increases in educational level. The study findings support the belief that EI can be learned; therefore, having a higher level of education may lead to greater EI.[83] This is a premise that will be investigated in this current study.

Level of Employment

There are increasing claims for EI in the workplace; however, much of the literature is focused on staff at higher employment levels, such as senior managers and executives. This may be due to EI often being associated with leadership and, while leaders can be found at all levels of employment, senior managers are primarily the leaders.

In a study undertaken with 3305 employees across different employment levels, the results indicated that employees demonstrated higher EI as they advanced up the employment ladder.[96] These results have been supported by another longitudinal study undertaken with 126 undergraduate business students in which higher EI was strongly related to higher job levels over a 10-year period.[97] High EI levels (mean EI score = 170.9) assessed using the TEIQue-SF have also been reported in a study undertaken among 148 nurse managers, which is a role at a higher employment level. [98] These results have been replicated (median EI score = 172) in another study undertaken with 60 senior academics in radiation oncology.[99] The mean global EI score assessed using the same TEIQue instrument was 155.98 among 380 senior nurses working in critical care.[100] In contrast, a study undertaken on 30 junior registered nurses commencing critical care nursing found lower EI at this subordinate employment level (mean global EI score assessed = 148.9).[101] Another multi-institutional study undertaken on 325 junior doctors reported an even lower global EI for these residents working at this subsidiary employment level (101.0 ± 8.1).[102] In a cross-sectional study that compared the EI in student and qualified radiographers, there was a significant difference in the EI level among the two groups, with students demonstrating lower EI than their higher employment level colleagues.[41] Similar results have been reported among student nurses and midwives.[103]

This collection of evidence suggests that a higher employment level is a predictor of higher EI. This current study will investigate if level of employment has an impact on the EI of RTs.

2.6 Emotional Intelligence and Radiation Therapists: A Scoping Review

In this section, the literature relating to EI and RT has been presented using previously published methods for undertaking a scoping review.[104] A scoping review involves the gathering of literature on a particular topic in which the aim is to accumulate evidence relating to the review, question this and map the results according to the objectives.[104] This scoping review was undertaken according to the seven stages of the Joanna Briggs Institute (JBI) methodology[105] as follows:

1. state the objective and the review questions
2. describe the inclusion criteria
3. describe the search strategy
4. identify relevant studies
5. assess methodological quality
6. extract data
7. present results.

Objectives of the Review

The objective of the scoping review was to map the evidence relating to EI among qualified RTs.

Review Questions

The questions of the review were:

1. What is the evidence relating to the EI among qualified RTs?
2. What are the predictors of EI for qualified RTs?

Inclusion Criteria

The review considered studies that included qualified RTs. Only studies that measured the EI using validated instruments, such as the TEIQue-SF and those that reported on

the predictors of EI among qualified RTs were included. This review considered studies conducted in the clinical setting and included hospitals or clinics. Observational studies of any design, including prospective and retrospective cohort studies, case control studies and analytical cross-sectional studies that report quantitative data were included. Only studies published in English were included. Since EI is a relatively new concept first coined in 1990, only studies published from 1990 until July 2018 were included.

Methods

Search Strategy

A three-step search strategy that aimed to find both published and unpublished studies was used in this review. An initial limited search of Embase, MEDLINE and CINAHL was undertaken to inform the development of the search strategy. A search strategy was developed for each database as each database has its own indexing terms. The following databases were searched: Ovid MEDLINE, Embase, CINAHL, PsycINFO and Scopus. A full Embase search strategy is presented in Table 5. The search for unpublished studies included WorldCat, ProQuest and Mednar. The reference list of all studies selected for critical appraisal were screened for additional studies that could be included in the review.

Table 5: Embase Search Strategy

1	radiation therapist.mp.
2	radiotherapist.mp.
3	radiologist/ or radiographer.mp. or radiological technologist/
4	radiation oncologist.mp. or radiation oncologist/
5	radiotherapy.mp. or radiotherapy/
6	radiography/ or radiography.mp.
7	radiation oncology.mp. or radiation oncology/
8	cancer radiotherapy.mp. or cancer radiotherapy/
9	radio oncology.mp.
10	emotional intelligence.mp. or emotional intelligence/
11	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9
12	10 and 11

Identifying Relevant Studies

Following the search, all identified citations were collated and uploaded into EndNote and duplicates removed. Titles and abstracts were screened by two independent reviewers for assessment against the inclusion criteria. Studies that met the inclusion criteria were retrieved.

Data Extraction

Data were extracted from papers by two independent reviewers using the draft data extraction tool, adapted from the JBI scoping review data extraction tool.[106] The data extracted included specific details about the population, concept, context and study methods of significance to the review question and review objectives. Authors of papers were contacted to request missing or additional data where required.

Presentation of the Results

The results are presented as a map of the data extracted from the included papers in a tabular form; these align with the objective of the scoping review. The tables show results including distribution of studies by year, countries of origin, research methods and results. A narrative summary accompanies the tabulated and charted results, and describes how the results relate to the review objective and questions.

Results

The literature search identified 30 studies; 12 were duplicates and were removed. Assessment based on the title and abstract resulted in the exclusion of a further six studies. Full text of the remaining 12 studies was obtained and assessed against the inclusion criteria. A further nine studies were excluded as they did not meet the selection criteria. Three studies were included in the final review. Figure 6 presents a flow chart of the search and study selection process.

PRISMA 2009 Flow chart for the

Search and study selection process

Identification

Records identified through database searching (n = 30)

Additional records identified through other sources (n = 0)

Screening

Records after duplicates removed (n = 18)

Records screened (n = 18)

Records excluded based on title and abstract (n = 6)

Eligibility

Full-text articles assessed for eligibility (n = 12)

Trials excluded (reasons):
- Conference abstract (n = 6)
- Undertaken on students (n = 3)

Included

Studies included in quantitative synthesis (n = 3)

Figure 6: Flow Chart

Source Moher et.al [107]

Description of the Studies

Of the three studies included in the review, two assessed the EI among both RTs and diagnostic radiographers and one study[108] reported EI solely on RTs. The included studies were undertaken in Australia,[109] UK[110] and Canada.[108] Sample size within these studies ranged from 199[108] to 1997.[110] All studies were conducted using a cross-sectional design and the TEIQue-SF was used to assess EI. According to the TEIQue-SF, the global, wellbeing, emotionality and sociability dimension scores ranged from one (minimum) to seven (maximum).

Emotional Intelligence Scores

Data for the three studies indicated that the score for global EI ranged from 5.22(±0.717)[108] to 5.28.[110] The score for wellbeing ranged from 5.75[110] to 5.82(±0.86).[109] The score for self-control ranged from 4.85(±0.987)[108] to 5.03 (±0.915)[109] and the score for emotionality ranged from 5.25 (±0.85)[109] to 5.38.[110] Sociability was reported in only two studies[108,109] and the score for sociability ranged from 4.71 (±0.8)[108] to 4.76(0.977).[109] Figure 7 presents the EI scores for the three studies included in the review.
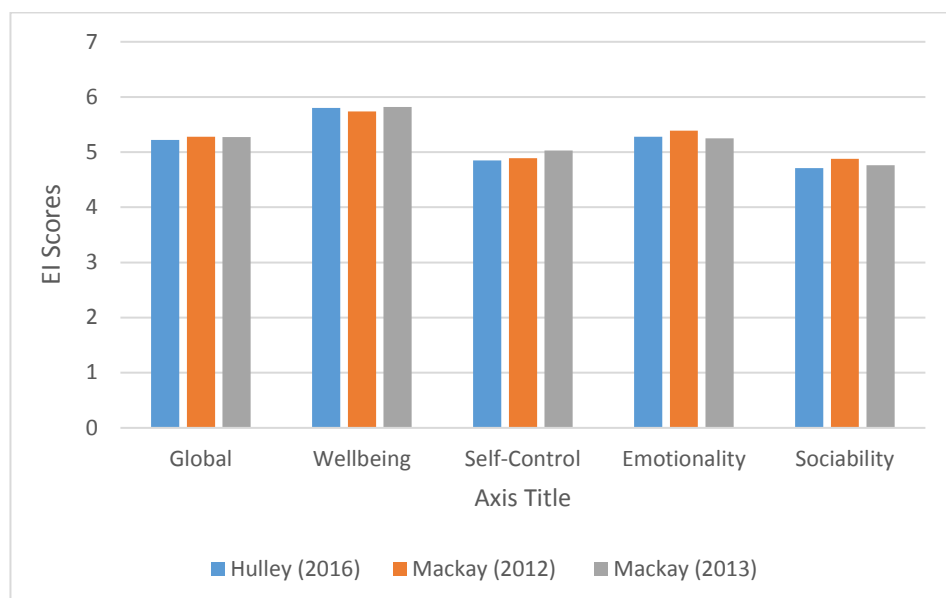
Figure 7: TEIQue-SF Score for the Three Studies

Demographic Predictors of Emotional Intelligence

Association between demographics and EI was reported in two studies[109,110] and included both RTs and diagnostic radiographers. The demographic included age, sex, level of employment, type of work (diagnostic or therapeutic radiographer) and level of managerial responsibility.

Age was identified as a predictor of the global and wellbeing dimensions of EI.[109] Radiographers aged 20–39 years had significantly higher global EI compared to those aged 40–49 years[109] Similarly, younger radiographers (20–29 years) had higher scores for wellbeing (F [5,954] = 3.41, p ≤ .01 [partial eta squared = 0.018]) compared to the older radiographers (40–49 and 50–59 years).[109]

Sex was a statistically significant predictor of wellbeing with females scoring higher compared to males (F [1, 954] = 4.30, p ≤ .05).[109] Level of employment was identified as a predictor of the self-control and sociability dimensions of EI.[110] Radiographers at higher levels of employment had significantly higher scores in the self-control dimension (F [7, 1917] = 2.12, p = .05) and in the sociability dimension (F [7, 1917] = 2.60, p = .011.) compared to those at lower levels of employment.[110] Being a diagnostic radiographer or RT was not a predictor of global EI or the dimensions or wellbeing, self-control, emotionality and sociability. Similarly, level of managerial responsibility was not a predictor of global EI or the wellbeing, self-control, emotionality and sociability dimensions of EI. Table 6 presents a summary of the findings of EI of the studies included in this review.

Table 6: Summary of Findings

Author/Country	Participants	Results	Key findings
Mackay et al. (2013) Australia	954 members of the Australian Institute of Radiographers **Proportion of** **diagnostic and therapy** **radiographers**: **79:29**	**Global EI:** 5.27 (SD = 0.69) **Wellbeing :** 5.82 (SD = 0.86) **Self-Control :** 5.03 (SD = 0.91) **Emotionality:** 5.25 (SD = 0.85) **Sociability :** 4.76 (SD = 0.97)	When compared to the UK radiographers, the Australian radiographers had significantly higher wellbeing scores. No differences were observed in the emotionality, sociability, self-control and global dimensions between the UK and the Australian radiographers. No statistical differences in EI scores were found between diagnostic and therapy radiographers. Similarly, no statistical differences were found between level of managerial responsibilities and EI scores. For global EI, there were statistically significant differences for age group. For the wellbeing factor, there were statistically significant main effects for sex and age group.
Mackay et al. (2012) United Kingdom	1997 Individuals registered to practice radiography **Proportion of** **Diagnostic and therapy** **radiographers** - **77:12**	**Global EI :** 5.27 (SD = 0.69) **Wellbeing:** 5.82 (SD = 0.86) **Self-Control:** 5.03 (SD = 0.91)	No statistical differences in EI scores were found between diagnostic and therapy radiographers. For global EI, self-control and sociability factors there were statistically significant main effects for level of employment. For the wellbeing, emotionality and sociability factor there were statistically significant main effects for type of work.

Author/Country	Participants	Results	Key findings
		Emotionality: 5.25	
		(SD = 0.85)	
		Sociability: 4.76	
		(SD = 0.97)	
Hulley et al. (2016)	199 radiation therapists responded within 13 Ontario cancer care centres	**Global EI:** 5.22 (SD = 0.71) **Wellbeing:** 5.80 (SD = 0.83) **Self-Control:** 4.85 (SD = 0.98) **Emotionality:** 5.28 (SD = 0.83) **Sociability:** 4.71 (SD = 0.91)	Radiation therapists were skilled at communication with emotional patients. The skill level was significantly influenced by personal and organisational factors.
United States			

*This scoping review has summarised the available current evidence.

A systematic search undertaken for this thesis identified 30 publications; however, only three were eligible for inclusion in this review. Most participants in two of the three studies were diagnostic radiographers and only one study was undertaken on RTs. All three studies used a cross-sectional design and the overall reporting of the methods was high. The findings from this scoping review should be interpreted with caution as only three studies were included.

The review found high scores for the global, wellbeing and emotionality dimensions of EI and lower scores for self-control and sociability among the radiographers. Those who were female, younger radiographers with higher levels of employment had higher levels of EI. Younger radiographers (20–29 years) had higher global EI and higher EI relating to the wellbeing component compared to their counterparts (40–59 years). Females had significantly higher scores relating to the wellbeing dimension of EI compared to males. Radiographers in higher levels of employment had significantly higher scores in the self-control and sociability dimension of EI.

What is clear from this scoping review is that there is limited evidence regarding EI among RTs. Hence, this study was undertaken to investigate EI among RTs.

2.8 Conclusion

In this chapter, the various models of EI, their attributes and associated assessment instruments have been synthesised. Further, the benefits and demographic predictors of EI have been reported. This chapter also looked at the literature relating to EI among radiographers. The major limitation of this review is the lack of literature relating to EI among RTs. The next chapter presents the methodology undertaken to investigate EI and predictors of EI among RTs working in cancer care centres in public hospitals in NSW Australia.

Chapter 3: Methodology

3.1 Introduction

This chapter presents the methodology used for this study. It discusses the rationale for choosing the study design to investigate the EI and predictors of EI among RTs working in any of the 15 public cancer care centres in NSW, Australia. This chapter describes the methods used to undertake the study, including the research design, participants, recruitment strategies, data collection, data analysis and ethical considerations.

These methods have been published in the manuscript:

Trakis S, Fernandez R, Parrish D. Demographic predictors of emotional intelligence among radiation therapists. J Med Radiat Sci 2018;65:114–22.

3.2 Research Design

This research study adopted a quantitative, non-experimental approach using a cross-sectional study design.[111] A quantitative approach was deemed appropriate as data collected could be analysed statistically, employing mathematical models to identify relationships between data and to inform findings.[112] A cross-sectional approach was used in this study as it examines data from a population at a specific time point. There are a number of advantages with this research design. First, it enables the researchers to examine relationships between independent variables with a view to better understanding a phenomenon without intervening in any way.[113] Second, it allowed important hypotheses to be derived that could potentially inform the instigation of other experimental research.[113,114]

3.3 Participants

Inclusion Criteria

All RTs irrespective of their level of employment and working in any of the 15 public cancer care centres in NSW, Australia, were eligible to participate.

Definition of a Radiation Therapist

For the purpose of this study, a RT was defined as a healthcare professional who managed cancer patients' treatment and, in conjunction, with the radiation oncologists

were responsible for the design, accurate calculation and delivery of a prescribed radiation dose over a course of treatment to the patient. Currently, in NSW, the employment levels for RTs are Levels 1–6. Each of these is described below:

Level 1: professional development year following graduation as a RT.

Level 2: (Years 1–5): automatic progression on completion of RTs' professional development year.

Level 3: RTs can apply for this level once they have demonstrated a high level of knowledge and proficiency in complex clinical procedures.

Level 4: section managers.

Level 5: assistant chiefs.

Level 6: chief RTs.[115]

Exclusion Criteria

Radiation therapists who were on leave at the time of the data collection were excluded from this study. Further, supervised practitioners (supervised practice is undertaken to ensure medical radiation practitioners meet the requirements of registration and are capable of safe, independent practice) were also excluded.

3.4 Data Collection

Data for this study were collected through a self-administered survey.[116] This included demographic details and EI scores.

Demographic Information

Details collected included gender, age, highest level of education obtained, employment level, employment status (full time or part time), years of experience as a RT and whether participants were undertaking any further study (see Appendix C).

Emotional Intelligence Measure

Theorists have viewed EI as a trait rather than an ability.[56] Trait EI essentially evaluates how an individual perceives their emotional abilities which then affect their behaviours and cognitive abilities.[56] The Trait Model of EI is heavily reliant on personality

characteristics and is assessed within a framework of understanding an individual's personality.[56] Hence studies of trait EI cannot be compared with studies of other models of EI. Therefore for this study the trait model of EI was used as a measurement of EI among RTs. Emotional Intelligence was measured using the validated and reliable TEIQue-SF. The TEIQue-SF which is a 30-item self-report questionnaire comprising four dimensions: wellbeing (6 items), self-control (6 items), emotionality (8 items) and sociability (6 items).[57] The four items that are not aligned to one of the four dimensions contribute to the measure of global EI, which was measured by aggregating the scores for all 30 items. Wellbeing, as used in this instrument, refers to a generalised sense of wellbeing extending from past achievements to future expectations, accompanied by high self-esteem. It includes the factors of self-esteem, trait happiness and trait optimism. The emotionality dimension reflects one's ability to identify and express feelings, and to use these abilities to maintain close relationships with significant others. It includes the following factors: emotion perception, emotion expression, trait empathy and relationships. The sociability dimension encompasses the capacity to assert oneself and to influence others' emotions and decisions. It includes the following factors: social awareness, emotion management and assertiveness. The self-control dimension is related to one's ability to regulate impulses and emotions, and to managing external pressures and stress. It includes the following factors: emotion regulation, stress management and impulsiveness.[117] The additional four items associated with global EI align with the auxiliary facets of self-motivation and adaptability. The TEIQue requires participants to rate their degree of agreement with each item statement on a seven-point Likert-type scale with responses ranging from completely disagree (1) to completely agree (7) (see **Appendix C**).

Prior to implementing a data collection instrument, it is important to understand its psychometric properties, namely validity and reliability.

Validity

This is related to the extent to which an instrument measures what it is intends to measure.[118] It is important that any instrument used for research is valid so that its interpretation can be constant. High correlations between the TEIQue with Shrink's

Emotional Intelligence Scale demonstrated validity in measuring EI and the Big Five personality traits. In terms of incremental validity, the TEIQue-SF also demonstrates that it can predict emotion-focused coping when controlling for a measure of the Big Five personality traits. Further, construct validity is largely consistent with how trait EI should theoretically impact coping and related outcomes in the context of task stress.[119]

Reliability

This is related to the ability of an instrument to measure consistently.[118] It is important that any instrument used for research can be interpreted and administered in a reliable and reproducible manner so that its interpretation can be constant. Cronbach's alpha is the most widely used measure of reliability in medical research when multiple-item measures are required. Cronbach's alpha is easier to use compared with other estimates (e.g., test–retest reliability estimates).[120] Even though there are different acceptable values of alpha, the most common are ranges from 0.70 to 0.95.[60–63]

The TEIQue-SF as used in this study has demonstrated high reliability by way of Cronbach's alpha ranging from 0.65 to 0.85.[57,121]

3.5 Recruitment Strategies

Prior to commencing this research, approval was sought from the chief RTs at each of the 15 cancer care centres in NSW, Australia. This was done by providing a 10-minute presentation about the study via a teleconference at a chief RTs meeting. All chief RTs agreed to participate and nominated a RT educator at their centres as the point of contact. Two weeks later, the RT educators at each of the participating cancer care centres were provided a detailed account of the study rationale, research design, participant recruitment strategies and data collection tools. The RT educators were also provided with a presentation and a copy of the study proposal to provide information to RTs in their centre about the study during a regular in-service session. The RT educators informed the researcher of the number of RTs working at their centre so that an appropriate number of surveys could be prepared for distribution at each cancer care centre. One week after the surveys were distributed, an agreed number of individual research packs, comprising the invitation letter, informed consent sheet, questionnaires and a return envelope addressed to the primary researcher were delivered by mail to

the RT educators for distribution at their centre. To minimise coercion, RTs were informed that participating in the study was voluntary and non-participation would have no effect on their employment. Radiation therapist educators were asked to return by mail all surveys at the end of eight weeks regardless of whether the survey was completed. Consent was assumed by the completion and return of the surveys. In an attempt to increase the response rate, the educators were sent follow-up reminders every two weeks.[122] (see **Appendix B).**

3.6 Data Analysis

The data collected for this study were entered into Survey Monkey and exported into the Statistical Package for the Social Sciences (SPSS) version 21 for data analysis. Data were cleaned and reviewed for any missing values. To ensure data integrity, 10% of the data collected was audited by a person not associated with the project.[123]

Recoding the Trait Emotional Intelligence Questionnaire (TEIQue)

To calculate the TEIQue-SF responses, reverse scoring was undertaken according to author guidelines. This required the reversal of numerical scoring for questions that were framed as a negative question. For example, 'Question 1: Expressing my emotions with words is not a problem for me' would be coded 1 (completely disagree) to 7 (completely agree). Conversely, 'Question 2: I often find it difficult to see things from another person's viewpoint', would be coded 7 (completely disagree) to 1 (completely agree). Questionnaires that use a Likert scale (e.g., completely disagree, partially disagree, disagree, neither disagree nor agree, agree, partially agree and completely agree) to answer questions often contain some items that are reversed coded because the most positive agreement to a statement is not the most desired response. According to the author guidelines in the TEIQue questionnaire the responses to questions 2, 4, 5, 7, 8, 10, 12, 13, 14, 16, 18, 22, 25, 26 and 28 were reverse coded.

In analysing the TEIQue-SF data, a global trait score of EI was calculated by summing the score for all 30 items and dividing by the total number of items which is 30. The scores for well –being, self-control and sociability dimensions were calculated by summing the scores for the respective six items that contributed to each of the dimension and dividing each by six. The scores for the emotionality dimension was calculated by summing the scores for the respective eight items that contributed to this dimension and dividing it by eight.[57] Due to usage restrictions of the TEIQue further details on scoring are available at www.psychometriclab.com.

Categorical data are presented as percentages and continuous data are presented as means and standard deviation (SD). To identify the predictors of EI, all demographic variables were included in a univariate analysis (t-tests, ANOVA) and only variables that were significant were included in a multiple regression analysis.

Prior to conducting the univariate and multiple regression analysis, the demographic variables of age, current level of employment as a RT and highest level of qualification that had more than one category were grouped into two categories and were coded as 0 or 1. This was undertaken due to the low sample sizes in some categories that could result in a Type 2 error.[124,125] Age was combined into two categories: ≤39 and ≥40. These categories for age were established as evidence suggests that the mean age of the Australian Institute of Radiography member population was 38 years.[109] Current employment as a RT was dichotomised at Level 2 or Level 3.1 and higher. Highest level of qualification was dichotomised at bachelor's degree and lower or master's degree and higher. The difference in mean scores between the groups (eg. male and female) is presented as a mean difference with its 95% CI.

The following demographic predictor variables that were significant in the univariate analysis were included in the multiple regression model: (1) age, (2) years of experience (3) gender, (4) highest level of education obtained and (5) level of current employment.

Prior to conducting the multiple linear regression analysis four assumptions about the variables used the analysis were considered. These assumptions included presence of a Linear relationship between EI and predictors, normal distribution of residuals, no multicollinearity and homoscedasticity Violations to these assumptions can result in the

over or under estimation of the significance of the effects.[124] The beta (β) values and the 95% confidence intervals (CIs) were calculated in the multiple regression analyses to identify the predictors of EI; the confidence interval for a given sample mean indicates the range of values within which the true population value can be expected to be found and the probability that this will occur.[126] Statistical significance was set at $p < .05$.

3.7 Ethical Considerations

Ethics approval to conduct the study was obtained from each local hospital and the University of Wollongong Human Research Ethics Committee. Ethical consideration must always be considered when undertaking any research project.[113] While human participants were involved in this study, little or no risk to them was encountered (see **Appendix A**).

Human Research Ethics Committee Approval

In accordance with the Australian Code of Responsible Conduct of Research (National Health and Medical Research Council 2007), all researchers must respect research participants and must comply with the ethical principles of integrity, respect for persons, justice and beneficence. This research complied with codes of ethics obtained from both the University of Wollongong (UOW), Illawarra Shoalhaven Local Health District (ISLHD) Human Research Ethics Committee and the South Eastern Sydney Local Health District (SESLHD) Human Research Ethics Committee.

Consent

In accordance with the Australian Code of Responsible Conduct of Research (National Health and Medical Research Council 2007), all participants invited to participate in this study received a letter of invitation stating that their participation in the study was voluntary and that if they chose not to take part, it would not affect their employment or relationship with UOW, ISLHD or SESLHD. Participants were also informed that they could withdraw from the study at any time without giving a reason; but that it would not be possible to withdraw data they provided once it had been received by the primary investigator due to the inability to identify participant information. Consent to participate in this study was assumed if participants submitted a completed questionnaire. In accordance with the Australian Code of Responsible Conduct of

Research (National Health and Medical Research Council 2007), all sealed envelopes received from the participating centres were handled by a second investigator. Data will be kept for five years at the St George Hospital Research department. After this time, paper copies will be shredded and electronic files deleted.

Confidentiality

Participating centres were coded to preserve participant anonymity. There was no identifying information about the hospital's name on the questionnaire. All questionnaires were removed from the envelope by the department secretary and the envelope was destroyed. Therefore, once the questionnaire was removed from the envelope, there was no way of identifying from which centres the questionnaires were received.

Analysis by hospital was not undertaken; therefore, there was no need to identify each participant's hospital. This method of data management ensured that the primary investigator did not access the surveys of her peers working in the same hospital.

Beneficence, Justice and Respect

In accordance with the Australian Code of Responsible Conduct of Research (National Health and Medical Research Council 2007), the findings from this study were provided/reported to RTs in cancer care centres. It was anticipated that study participants will benefit by becoming aware of the importance of EI. This information has the potential to assist and enhance performance outcomes of RTs and, more broadly, organisational success.

3.8 Conclusion

This chapter provided a description of the research design, data collection, participants, recruitment strategies ethical considerations and data analysis of this study. The next chapter will provide a description of the results.

Chapter 4: Results

4.1 Introduction

This chapter presents the results of the data analysis undertaken in this research study. The EI data collected from the participating RTs were tested for normality. Separate standard multiple regression analyses have subsequently been performed to enable the identification of predictors of EI among the sample population of RTs.

These results have been published in the manuscript:

Trakis S, Fernandez R, Parrish D. Demographic predictors of emotional intelligence among radiation therapists. J Med Radiat Sci 2018;65:114–22.

4.2 Response Rate

During the survey period, there were 300 RTs working in the 15 cancer care centres in NSW, Australia. Completed questionnaires were received from 205 RTs yielding an overall response rate of 68%.

4.3 Sample Description

Study respondents were predominantly female (76.5%), aged between 20 and 39 years (70.7%) and currently employed as a RT at Level 2 (57.1%). The years of experience as a RT ranged from 6 months to 40 years with the mean being 12 years (SD = 9.2). Most (82.4%) RTs had a bachelor's degree and/or lower. Eighteen (8.8%) of the RTs were undertaking a postgraduate or higher degree course at the time of the study. Approximately three-quarters (74.6%) of RTs were working in a full-time position at the time of the survey. The demographic characteristics of respondents are presented in Table 7.

Table 7: Demographic Characteristics of Participants (n = 205)

Characteristic	Frequency(%)
Gender (Missing data n = 3 [1.5%])	
Female	157(76.5)
Male	45(22.0)
Age Group	
20–29	72(35.1)
30–39	73(35.6)
40–49	38(18.5)
50–59	21(10.2)
60–69	1(0.5)
Level of Current Employment (Missing data n = 1 [0.5%])	
Level 2	117(57.1)
Level 3	26(12.7)
Level 4	53(25.9)
Level 5	6(2.9)
Level 6	2(1.0)
Highest Level of Qualifications Obtained (Missing data n= 2 [1.0%])	
Bachelor's degree and lower	169(82.4)
Postgraduate qualifications	34(16.6)

Characteristic	Frequency(%)
Certificate	2(1.0)
Associate diploma	15(7.3)
Degree of Applied Science	152(74.1)
Master's degree	22(10.7)
PhD	4(2.0)
Other	8(3.9)
Currently Undertaking Postgraduate or Higher Degree Courses	
Yes	18(8.8)
No	187(91.2)
Current Employment Status (Missing data n = 2 [1.0%])	
Full time	153(74.6)
Part time	50(24.2)
	Mean(SD)
Years of Experience as a Radiation Therapist (Missing data n = 2)	12(9.2)

4.4 Emotional Intelligence - Distribution of the data

The first step was to assess the normality of the distribution of the data. Distributions of all responses to EI measures were tested for assumptions of normality using histograms. No extreme outliers were noted. The z-score for kurtosis and for skewness was within the normal parameters.[127] Kurtosis, which is similar to skewness, is a statistical measure used to describe the distribution of data. It is a measure of the tails of a frequency distribution when compared with normal distribution of data. Kurtosis measures the tailedness of the probability distribution as opposed to the peakedness in the centre.[127]
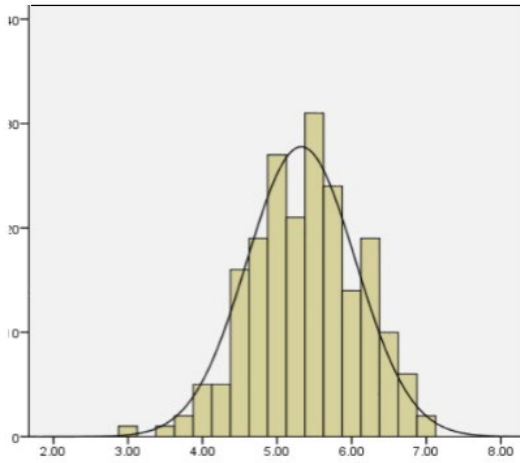
Figure 8: Distribution of Emotionality Scores
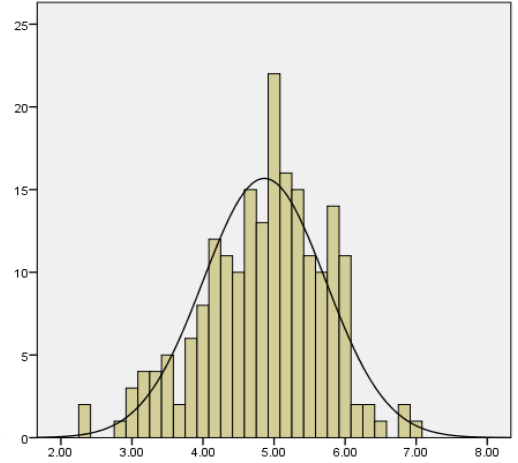
Figure 9: Distribution of Self-Control Dimension Scores
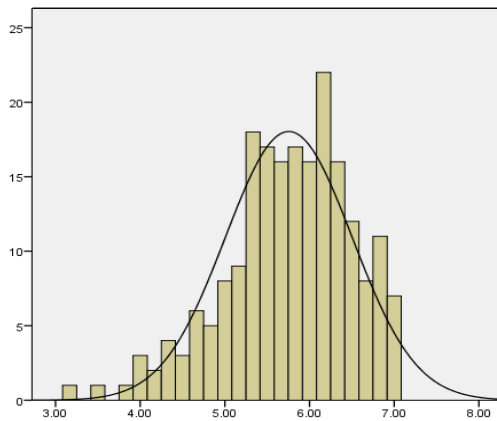
Figure 10: Distribution of Self-Control Dimension Scores
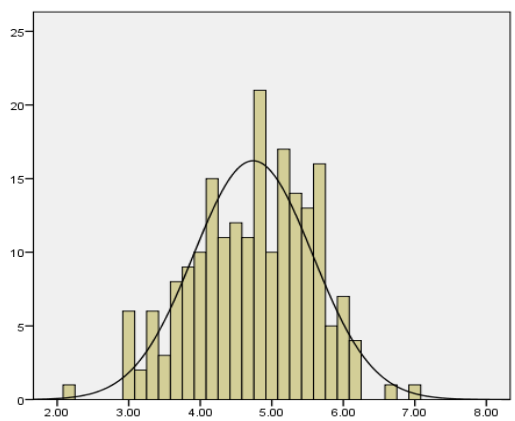
Figure 11: Distribution of Self-Control Dimension Scores
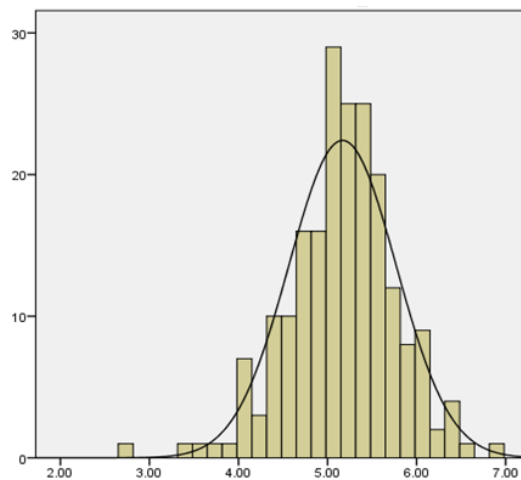
Figure 12: Distribution of Global Emotional Intelligence Dimension Scores

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Table 8: Z-Scores for Kurtosis and for Skewness

Measure	Emotionality Dimension	Self-Control Dimension	Wellbeing Dimension	Sociability Dimension	Global EI Dimension
Valid	203	203	203	203	203
Missing	2	2	2	2	2
Skewness	−.194	−.387	−.629	−.252	−.397
Std. Error of Skewness	.171	.171	.171	.171	.171
Kurtosis	−.094	.089	.353	−.253	1.229
Std. Error of Kurtosis	.340	.340	.340	.340	.340

4.5 Emotional Intelligence Scores

The mean global EI for participants was 5.16 (SD = 0.6) (range = 2.7–6.9). The mean scores for the EI dimensions were 5.3 (SD = 0.7) (range = 3.0–7.0) for the emotionality dimension, the self-control dimension was 4.9 (SD = 0.8) (range = 2.3–7.0), the wellbeing dimension was 5.7 (SD = 0.8) (range = 3.17–7.0) and the sociability dimension was 4.7 (SD = 0.8) (range = 2.17–7.0).
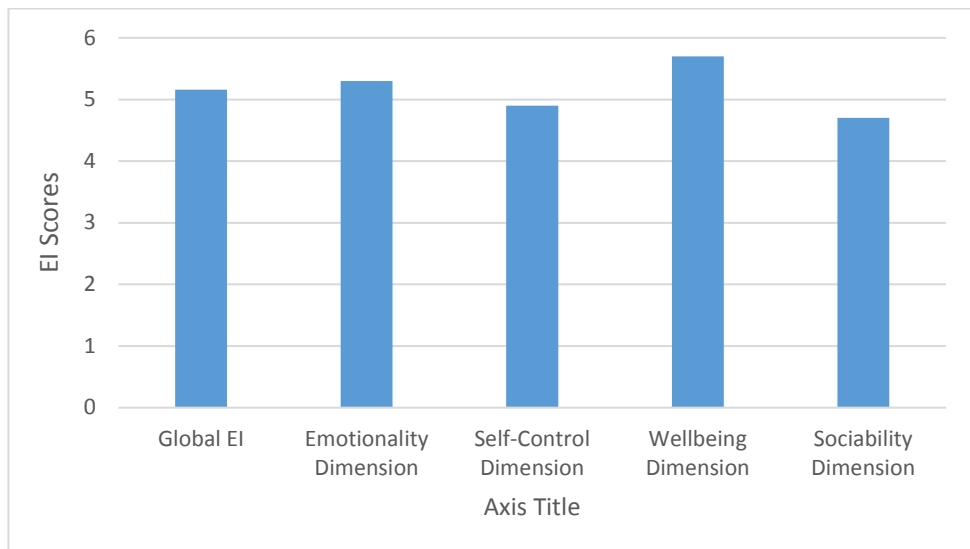
Figure 13: Emotional Intelligence Mean Scores

Global Emotional Intelligence

Female RTs had higher global scores compared to their male counterparts (mean difference = −0.16, (95% CI = −0.52, −0.03)). Radiation therapists aged 20–39 years had higher means scores compared to those aged 40–69 years (mean difference = 0.16, (95% CI= −0.02, 0.34)). Those with a higher level of employment (Levels 3.1–6) had higher global scores compared to those with a lower level of current employment (mean difference = −0.05, (95% CI = −0.22, 0.16)). Similarly, RTs with postgraduate qualifications had higher global EI scores compared to those with a bachelor's degree and lower (mean difference = −0.14, (95% CI= −0.36, 0.07)) (see Table 9). There was no correlation between the years of experience as a RT and global EI (r (203) =-.45, p =.529).

Table 9: Global Emotional Intelligence Scores According to Demographics

Variable	Global Mean(SD)	Mean Difference (95% CI)
Gender		
Male	5.04 (SD = 0.60)	−0.16 (−0.52, −0.03)
Female	5.20 (SD = 0.60)	
Age		
20–39	5.21 (SD = 0.59)	0.16 (−0.02, 0.34)
40–69	5.05 (SD = 0.63)	
Current Employment		
Level 2	5.14 (SD = 0.64)	−0.05 (−0.22, 0.16)
Levels 3.1–6	5.19 (SD = 0.54)	
Level of Education		
Bachelors and lower	5.13 (SD = 0.60)	−0.14 (−0.36, 0.07)
Postgraduate	5.28 (SD = 0.57)	

Table 10: Correlation Between Years of Experience and Emotional Intelligence

Measure	Years of Experience as a Radiation Therapist	Emotionality	Self-Control	Wellbeing	Sociability	Global
Years of Experience as a Radiation Therapist	1					
Emotionality	−.036	1				
Self-Control	−.012	.349[**]	1			
Wellbeing	−.004	.534[**]	.480[**]	1		
Sociability	−.015	.406[**]	.431[**]	.531[**]	1	
Global	−.045	.751[**]	.736[**]	.809[**]	.738[**]	1

** Correlation is significant at the .01 level (two tailed)

Emotionality Dimension

Female RTs had significantly higher emotionality scores compared to their male counterparts (mean difference = −0.27, (95% CI = −0.52, −0.03)). Radiation therapists aged 20–39 years had higher means scores compared to those aged 40–69 years (mean difference = 0.11, (95% CI = −0.11, 0.33)). Those with a higher level of employment (Levels 3.1–6) had higher emotionality scores compared to those with a lower level of current employment (mean difference = −0.02, (95% CI = −0.23, 0.17)). Radiation therapists with postgraduate qualifications had significantly higher emotionality scores compared to those with a bachelor's degree and lower (mean difference = −0.31, (95% CI = −0.56, −0.03)) (see Table 11). There was no correlation between the years of experience as a RT and the emotionality dimension (r (203) =−.036, p =.615).

Table 11: Emotionality Dimension Scores Associated with Demographic Variables

Variable	Emotionality Mean(SD)	Mean difference (95% CI)
Gender		
Male	5.10 (SD = 0.72)	−0.27 (−0.52, −0.03)
Female	5.38 (SD = 0.72)	
Age		
20–39	5.36 (SD = 0.72)	0.11 (−0.11, 0.33)
40–69	5.24 (SD = 0.73)	
Current Employment		
Level 2	5.31 (SD = 0.76)	−0.02 (−0.23, 0.17)
Levels 3.1–6	5.34 (SD = 0.67)	
Level of Education		
Bachelors and lower	5.26 (SD = 0.71)	−0.31 (−0.56, −0.03)
Postgraduate	5.57 (SD = 0.77)	

Self-control Dimension

Male RTs had higher self-control scores compared to their female counterparts (mean difference = 0.03, (95% CI = −0.25, 0.33)). Radiation therapists aged 20–39 years had higher mean scores compared to those aged 40–69 years (mean difference = 0.15, (95% CI = −0.10, 0.42)). Those with a higher level of employment (Levels 3.1–6) had higher self-control scores compared to those with a lower level of current employment (mean difference = −0.13, (95% CI = −0.37, 0.11)). Radiation therapists with postgraduate qualifications had lower scores in the self-control dimension compared to those with a bachelor's degree and lower (mean difference = −0.13, (95% CI = −0.37, 0.11)) (see Table 12). There was no correlation between the years of experience as a RT and the self-control dimension (r (203) = −.012, p =.863).

Table 12: Self-Control Dimension Scores Associated with Demographic Variables

Variable	Self-Control Mean(SD)	Mean Difference (95% CI)
Gender		
Male	4.88 (SD = 0.76)	0.03 (−0.25, 0.33)
Female	4.85 (SD = 0.89)	
Age		
20–39	4.91 (SD = 0.86)	0.15 (−0.10, 0.42)
40–69	4.75 (SD = 0.86)	
Current Employment		
Level 2	4.80 (SD = 0.90)	−0.13 (−0.37, 0.11)
Levels 3.1–6	4.93(SD = 0.80)	
Level of Education		
Bachelors and lower	4.87 (SD = 0.86)	0.08 (−0.23, 0.40)
Postgraduate	4.78 (SD = 0.84)	

Wellbeing Dimension

Female RTs had higher wellbeing scores compared to their male counterparts (mean difference = −0.19, (95% CI = −0.44, 0.06)). Radiation therapists aged 20–39 years had higher means scores compared to those aged 40–69 years (mean difference = 0.09, (95% CI= −0.13, 0.32)). Those with a lower level of employment (Level 2) had higher wellbeing

scores compared to those with a higher level of current employment (Levels 3.1–6) (mean difference = 0.09, (95% CI = −0.12, 0.30)). Radiation therapists with postgraduate qualifications had higher scores in the wellbeing dimension compared to those with a bachelor's degree and lower (mean difference = −0.09, (95% CI = −0.36, 0.18)) (see Table 13). There was no correlation between the years of experience as a RT and the wellbeing dimension (r (203) =−.004, p =.954)

Table 13: Wellbeing Dimension Scores Associated with Demographic Variables

Variable	Wellbeing Mean(SD)	Mean Difference (95% CI)
Gender		
Male	5.60 (SD = 0.85)	−0.19 (−0.44, 0.06)
Female	5.79 (SD = 0.71)	
Age		
20–39	5.78 (SD = 0.72)	0.09 (−0.13, 0.32)
40–69	5.69 (SD = 0.81)	
Current Employment		
Level 2	5.79 (SD = 0.76)	0.09 (−0.12, 0.30)
Levels 3.1–6	5.69 (SD = 0.73)	
Level of Education		
Bachelors and lower	5.73 (SD = 0.75)	−0.09 (−0.36, 0.18)
Postgraduate	5.82 (SD = 0.74)	

Sociability Dimension

Female RTs had higher sociability scores compared to their male counterparts (mean difference = −0.06, (95% CI = −0.36, 0.04)). Radiation therapists aged 20–39 years had higher means scores compared to those aged 40–69 years (mean difference = 0.15, (95% CI = −0.09, 0.40)). Those with a higher level of employment (Levels 3.1–6) had higher sociability scores compared to those with a lower level of current employment (mean difference = −0.23, (95% CI = −0.46, 0.00)). Radiation therapists with postgraduate qualifications had significantly higher scores in the sociability dimension compared to those with a bachelor's degree and lower (mean difference = −0.35, (95% CI = −0.66, −

0.05)) (see Table 14). There was no correlation between the years of experience as a RT and the sociability dimension (r (203) =−.015, p =.832)

Table 14: Sociability Dimension Scores Associated with Demographic Variables

Variable	Sociability Mean(SD)	Mean Difference (95% CI)
Gender		
Male	4.68 (SD = 0.85)	−0.06 (−0.36, 0.04)
Female	4.74 (SD = 0.83)	
Age		
20–39	4.78 (SD = 0.82)	0.15 (−0.09, 0.40)
40–69	4.62 (SD = 0.85)	
Current Employment		
Level 2	4.63 (SD = 0.86)	−0.23 (−0.46, 0.00)
Levels 3.1–6	4.86 (SD = 0.77)	
Level of Education		
Bachelors and lower	4.67 (SD = 0.84)	−0.35 (−0.66, −0.05)
Postgraduate	5.03 (SD = 0.73)	

4.6 Demographic Predictors of Emotional Intelligence

Separate standard multiple regression analyses were performed for the following dependant variables: global EI, emotionality, self-control, wellbeing and sociability. The demographic characteristics included as predictor variables were age, years of experience, gender, highest level of education obtained and level of current employment.

Prior to conducting the multiple linear regression analysis four assumptions about the variables used the analysis were considered.[124] _Assumption 1_ - Linear relationship between EI and predictors. Visual inspection of the Scatter plots showed a straight trend line with a positive slope indicating a positive relationship between EI and the predictors. _Assumption 2_ - Residuals are normally distributed. In this study the histogram was checked and the distribution satisfied the normality assumption. _Assumption 3_ - No multicollinearity. This assumption was tested using the Variance Inflation Factor

(VIF).The VIF values were less than ten indicating that there was no problem with multicollinearity. _Assumption 4_ - Homoscedasticity. Homoscedasticity assumes that the variance of error terms are similar across the values of the independent variables.[124] In this study a scatter plot of residuals versus predicted values showed no cone shaped pattern indicating that the points are equally distributed across all values of the independent variables.

Demographic Predictors of Global Emotional Intelligence

The multiple regression model to predict global EI among RTs was significant and accounted for 6.1% of the variance, R^2_{Adj} = 0.037, F (5,189) = 2.475, p = .034. The only significant predictor of global EI was age with RTs aged 20–39 years having higher global EI (β = −0.341; 95% CI −0.65, −0.03; p = .031) (see Table 15).

Table 15: Demographic Predictors of Global Emotional Intelligence

Model		Unstandardised Coefficients	Sig. _p_	95% Confidence Interval for β	
		β		Lower Bound	Upper Bound
Global EI	Constant	4.99	000	4.78	5.21
	Age	−0.341	.031	−0.650	−0.032
	Level of current employment	.136	.205	−0.075	.346
	Gender	.176	.091	−0.029	.381
	Years of experience	.003	.701	−0.013	.020
	Highest level of education	.143	.213	−0.083	.368

Demographic Predictors of the Four Emotional Intelligence Dimensions

Emotionality Dimension

The multiple regression model to predict the emotional dimension was significant and accounted for 6.8% of the variance, R^2_{Adj} = 0.044, F (5,189) = 2.77, p = .019. Female gender (β = 0.273; 95% CI 0.027, 0.519; p = .030) and having postgraduate qualifications (β = 0.311; 95% CI 0.040, 0.581; p = .025) were predictors of the emotionality dimension of EI (see Table 16).

Table 16: Demographic Predictors of Emotionality Dimension

Model		Unstandardised Coefficients	Sig. *p*	95% Confidence Interval for β	
		β		Lower Bound	Upper Bound
Emotionality	Constant	5.090	000	4.838	5.341
	Age	−0.215	.255	−0.586	.156
	Level of current employment	.126	.325	−0.126	.379
	Gender*	.273	.030	.027	.519
	Years of experience	−0.003	.779	−0.023	.017
	Highest level of education	.311	.025	.040	.581

*Indicates higher scores for females

Sociability Dimension

The multiple regression model to predict the sociability dimension was significant and accounted for 7.9% of the variance, R^2_{Adj} = 0.054, F (5,189) = 3.223, p = .008. Having postgraduate qualifications (β = 0.374; 95% CI 0.069, 0.679; p = .017) and a higher level of current employment (β = 0.329; 95% CI 0.044, 0.615; p = .024) were predictors of the sociability dimension (see Table 17).

Table 17: Demographic Predictors of Sociability Dimension

Model		Unstandardised Coefficients	Sig. *p*	95% Confidence Interval for β	
		β		Lower Bound	Upper Bound
Sociability	Constant	4.566	000	4.283	4.849
	Age	−0.417	.051	−0.835	.001
	Level of current employment	.329	.024	.044	.615
	Gender*	.065	.647	−0.213	.342
	Years of experience	−0.003	.822	−0.020	.025
	Highest level of education	.374	.017	.069	.679

*Indicates higher scores for females

Self-control and Wellbeing Dimensions

The multiple regression model to predict the self-control and wellbeing dimensions were not significant. None of the demographic variables were significant predictors of the self-control and wellbeing dimensions (see Table 18).

Table 18: Demographic Predictors of Self-control and Wellbeing Dimensions

Model		Unstandardised Coefficients	Sig. p	95% Confidence Interval for β	
		β		Lower Bound	Upper Bound
Self-Control	Constant	4.83	.000	4.529	5.138
	Age	−0.439	.055	−0.889	.010
	Level of current employment	.225	.148	−0.081	.532
	Gender	−0.022	.885	−0.320	.276
	Years of experience	.007	.576	−0.017	.031
	Highest level of education	−0.111	.506	−0.439	.217
Wellbeing	Constant	5.575	.000	5.309	5.841
	Age	−0.245	.219	−0.638	.147
	Level of current employment	−0.123	.365	−0.391	.145
	Gender	.191	.150	−0.070	.451
	Years of experience	.011	.327	−0.011	.032
	Highest level of education	.099	.495	−0.187	.386

4.7 Conclusion

This chapter presents the results of the data analysis undertaken in this study. A total of 205 RTs participated. Age and level of current employment were identified as predictors of global EI. Gender and level of education were significant predictors of the emotionality dimension. Levels of employment along with level of education were both significant predictors of the sociability dimensions of EI. The next chapter will discuss and conclude these results.

Chapter 5: Discussion and Conclusion

5.1 Introduction

In this section, a discussion of the results in light of other published literature is presented. Further, implications for practice and implications for further research are presented.

This discussion has been published in the following manuscript:

Trakis S, Fernandez R, Parrish D. Demographic predictors of emotional intelligence among radiation therapists. J Med Radiat Sci 2018;65:114–22.

Contemporary healthcare services are more productive and successful when their health professionals have EI.[77] Radiation therapists constantly interact with many different patients and colleagues in various situations daily. The technical elements of the RT role are relative straightforward to fulfil; however, the emotional aspects, such as dealing with patients' feelings, can be more challenging and demanding. Radiation therapists who have EI tend to address these challenges and demands more capably. Additionally, EI can enhance work environment, supervisory abilities, self-awareness and relationships. Further, EI assists RTs to understand and attempt to provide the needed emotional care to patients, contributing to an improvement in the overall patient-centred care and resulting in positive patient experiences. A comprehensive literature search identified the paucity of research reporting on the level of EI and predictors among qualified RTs. Therefore, the aim of this thesis was to identify the level of EI and the demographic predictors of EI among RTs working in a clinical setting.

5.2 Emotional Intelligence

The results from this study demonstrated that the global EI and the wellbeing, self-control, emotionality and sociability dimensions of RTs were higher than that reported in the literature among first-year student radiographers.[41] These results were also higher than normative data obtained from a cross-sectional study undertaken in a general public cohort of 109 participants. [41] However, the results from the current study were lower than the results obtained from a cross-sectional study undertaken on qualified radiographers.[41] In contrast, the emotionality dimension was higher than that

of qualified radiographers.[41] This may be because RTs in this study have greater contact with patients compared to radiographers and may have developed the ability to control their emotions.

5.3 Predictors of Emotional Intelligence

Being a young RT, female, having higher levels of employment and having higher levels of education were predictors of EI. Table 19 summarises the demographic predictors of EI based on the current study's findings.

Table 19: Summary of the Predictors of Emotional Intelligence

Variable	Emotional	Self-Control	Wellbeing	Sociability	Global
Gender					
Female	√				
Male					
Age					
20–39					√
40–69					
Current Employment					
Level 2					
Levels 3.1–6				√	
Level of Education					
Bachelor's and lower					
Postgraduate	√			√	

The study results indicated that younger RTs had higher global EI. It has been reported that the older a person is, the more likely she/he is to have a positive outlook, less neuroticism and better emotional control.[128] Further, they become more aware of the fragility and complexities of life, which enables them to better handle their emotions.[128] However, the study findings did not corroborate this result; rather, it found the opposite: that the younger RTs had higher EI. One inference for this result could be that RTs are exposed on a regular basis to traumatic and distressing situations in which the patient and their families are grappling with grief regarding a potentially terminal

disease.[129] Dealing with cancer patients takes an emotional toll that is exacerbated over time; this could be a possible explanation for why the EI of older RTs was not as high as that of younger RTs. Thus, instead of becoming more emotionally intelligent as they age, the period when RTs have the greatest EI would be when they are younger and have had little exposure to the stressful environment.

It is notable that, in conjunction with younger RTs having higher EI, years of experience was not found to be a predictor of EI. This result is also in contrast to studies that have found a positive correlation between years of experience and EI.[130] A possible explanation for this dissonance could be that radiation therapy departments are constantly evolving due to an increase of new techniques and technologies. Associated with this evolution is the need for practitioners to keep abreast of learning and development that is involved with all these changes. This evolution adds to the constant pressures faced by RTs who also deal with high patient loads and maintaining focus on providing a service in line with increasing work demands. The prevalence of these demands and conditions negates the benefits and advantages of years of experience, including increased EI, which explains why years of experience was not a predictor of EI in this study. It could also be postulated that the EI scores as assessed using the Trait EI model are not expected to change over the life span.

Being female was identified as a predictor of the emotional dimension of EI, which is a result consistent with the findings of other published EI studies.[92,131] Emotionality relates to being able to identify and express emotions and to maintain intimate relationships with others. Thus, the study finding that being female is a predictor of the emotionality dimension of EI may not relate to being a RTs. Rather, the explanation for this finding could simply be that females possess learnt behaviours from particular nurturing that make them innately more attune with their feelings and capable of sustaining relationships.

Previous literature has acknowledged that an increase in the level of education improves EI.[95] This study did not replicate these findings, as higher levels of education was not a predictor of global EI. This result may be explained by most RTs only obtaining a level of education needed for their professional role. Once they are in the field, many RTs will not seek further education unless it is required to develop technical competence. Thus,

the finding that higher levels of education are not a predictor of global EI is logical because the skills associated with global EI are not related to technical competence. Further, studies that demonstrated an association between EI and education levels were undertaken in general populations in which there could have been a variation in education levels across individuals, which might have influenced the results. This study was undertaken in RTs whose range of education level was constrained; hence, the association between education and EI may have not manifested.

However, higher levels of education were found to be a predictor of higher emotionality. The emotionality dimension reflects the ability to identify and express feelings, and to use these faculties to maintain close relationships with significant others. It includes the facets of emotion perception, emotion expression, trait empathy and relationships. Participants could have acquired these skills when undertaking higher education programs, such as management and leadership, as most of these programs offer subjects, courses or workshops relating to EI. Obtaining these skills has a direct effect on the RTs' ability to engage with others and express their feelings.

The sociability dimension, which relates to the capacity to assert oneself and to respond appropriately to others' emotions and decisions, includes the facets of social awareness, emotion management and assertiveness. This study found that the sociability dimension was greater among those with both a high level of employment and a high level of education. Explanations for this could be due to confidence and experience, both of which are assumed to be gained as a consequence of higher levels of employment and education, being able to enhance one's sociability. Further, the RT environment of teamwork and close affiliations within the multidisciplinary team require the skills of sociability, so these will logically increase due to their regular and ongoing employment in more senior roles.

In this study, no demographic variables were significant predictors of the self-control and wellbeing dimensions of EI. A possible reason for this could be that radiation therapy environments are highly technological environments dealing with high patient loads and, thus, managing external pressures and stress is more synonymous with self-management compared to any of the demographic predictors tested in this study.

Similarly, wellbeing is not a major focus of RTs' environments that are more concerned with providing a service rather than ensuring the happiness and optimism of RTs.

5.4 Strengths of the Study

The major strength of this study was that it included a broad cohort of RTs who worked in cancer care centres across NSW, Australia. Further, the study was conducted in a rigorous manner using validated instruments. A high response rate of 68% of the population sample is also a strength and makes the findings both meaningful and generalisable. The higher response rate was obtained as the researchers used evidence-based strategies to increase response rate to surveys. These evidence-based strategies included involvement of the key stake holders, including the chief RTs and the RT educators at the project's commencement.

5.5 Limitations of the Study

Despite the evidence, some limitations inherent in undertaking such a study must be acknowledged. First, this study used a self-selected sample that may have been highly motivated. Second, the study participants were recruited from the public health service in one state of Australia and, hence, the results cannot be generalised to other countries.

5.6 Implications for Practice

As level of education and level of employment are both amendable demographic factors, strategies to address these factors to reduce the effects of emotional struggle experienced by RTs in their work should be considered and subsequently implemented. These strategies may include enrolling in EI courses to learn EI skills, allowing staff to rotate through different clinical roles as well as the continuation of professional development to enhance coping and communication skills. In addition, participation in meditation and mindfulness practices may assist in increasing self-awareness and reducing stress. Recording of feelings at various times, expressing emotions and paying attention to these emotions can also assist in developing EI.

5.7 Implications for Further Research

Further large international studies are required to assess the EI of RTs. An unprecedented finding of this research was that older RTs have lower levels of EI. This

finding contradicts other research that has explored EI among other professionals and in other contexts, including health. Emotional Intelligence is a complex variable; therefore, further research must be undertaken looking at reasons why younger RTs have higher levels of global EI. Further, it would be interesting to replicate this study with other professionals undertaking emotionally demanding work, such as police, doctors and lawyers.

5.8 Conclusion

This thesis has provided evidence relating to the level of EI and the demographic predictors of EI among RTs working in a clinical setting. Predictors of EI included being a young RT, female, having higher levels of employment and higher levels of education. As level of education and level of employment are both amendable demographic factors, strategies to enhance these EI predictors and to reduce the effects of emotional struggle experienced by RTs in their work should be implemented. A significant recommendation is that further research be undertaken to explore the reasons why younger RTs have higher EI.

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Appendix A: Ethics Approval

26 November 2015

Ms Stami Trakis
Senior Radiation Therapist
St George Cancer Care Centre
St George Hospital
KOGARAH NSW 2217

Dear Ms Trakis

HREC ref no: 15/049 (LNR/15/POWH/180)
Project title: Emotional Intelligence (EI) and Conflict Management styles among Radiation
Therapists (RT's)

Thank you for submitting the above Low/Negligible Risk (LNR) Application for review by the Human Research Ethics Committee (HREC). Based on the information you have provided and in accordance with the NHMRC guidelines [National Statement 2007 – Section 5 Institutional Responsibilities and "*When does quality assurance in health care require independent ethical review?*" (2003)], this project has been assessed as low risk and is therefore exempt from full HREC review.

The project was first considered by the LNR Committee on 5 May.

I am pleased to advise that ethical approval has been granted for this project to be conducted at the following site(s):

- Cancer Care Centre at St George Hospital

The following documentation has been approved:

- Low/negligible risk application, submission code AU/6/002E1158 dated 7 April 2015
- Proposal, version 3, dated August 2015
    - Letter of Invitation
    - Demographics Questionnaire
    - Trait Emotional Intelligence Questionnaire
    - Thomas - Kilmann Conflict Mode Questionnaire

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Appendix B: Letter to the Radiation Therapist Chiefs and to Educators

Emotional Intelligence and Conflict Management styles among Radiation Therapists

Background

Over the past century, changes to the health care system, increased use of technology and amplified responsibilities have resulted in health care settings becoming highly stressful environment for health care professionals to work in (Reeves 2005). Working in such stressful environments and dealing with colleagues, clients, patients and families requires not only general intelligence but also emotional intelligence (EI) (Reeves 2005).It is extremely important, in such work environments, that stress and conflict are effectively handled. Health professionals need to recognize their own emotions and discover how to exercise them to generate well-meaning decisions that bring about positive outcomes (Goleman 1998).

In the past, intelligence was synonymous with success. A person's Intelligence Quotient (IQ), was used as a predictor of work performance and career success (Goleman 1998). However, while a high IQ may help a person gain entry into a profession it cannot guarantee his or her subsequent success. Intelligence Quotient is an important construct, but it is also necessary to expand the definition of intelligence to include other factors that lead to personal effectiveness and adaptation (Sternberg, Lautrey & Lubart 2003). Emotional Intelligence (EI) is reported to be a more significant factor in career performance than IQ with success dependent on an individual's ability to employ several intelligences and control their own and other's emotions (Goleman 1998).

In work contexts EI enhances ones'- awareness, judgment- creating, direction, honest and truthful interaction, confidence, collaboration, creativeness as well as improvement in work performance (Koman & Wolff 2008). Radiation Therapists (RTs) are constantly under a great deal of pressure with regard to the delivery of treatment, duty of care and management of their own emotions. Extensive literature has been published on EI and conflict management styles among leaders, nurses and students. However, little research has been undertaken in EI and conflict management styles among Radiation Therapists. This gap in the literature has prompted this study which will seek to identify EI competencies and conflict management styles that are perceived to be least prevalent in RTs, thus outlining the educational and interventions that can be recommended towards the development for future.

Research aims and objectives/ questions

Research Aims

The aim of this research is to investigate the emotional intelligence competencies and conflict management styles among a group of radiation therapists.

Specific Objectives of the study

The objective of this study will be to undertake a survey to investigate

(1) Demographic predictors of EI and conflict management styles

(2) The relationship between EI and conflict management styles

Research Question

• What are the demographic predictors of EI?,

• What is the relationship between EI and conflict management styles?

Methods

Research design

This research study will be a quantitative, non-experimental, systemic controlled design (Jirojwong, Johnson & Welch 2011). One questionnaire comprising of demographic questions and validated instruments to assess EI competencies and conflict management styles will be used in this study. The demographics data being collected includes (self-rating) details include, gender, age, educational status, employment status, years of experience as a radiation therapist and any if they were undertaking any further study at present.

Setting

This study will involve radiation therapists who work in any of the following Cancer Care Centre's within NSW:

Illawarra Cancer Care Centre (ICCC), St Vincent Hospital (SVH), North Coast Centre Institute – Coffs Harbour (NCCI- CH), Port Macquarie (NCCI- PM), North Coast Centre Institute – Lismore (NCCI- Lis), Nepean Cancer Care Centre (NCCC),Crown Prince Mary Cancer Centre (CPMCC), Prince of Wales Hospital (POWH),St George Cancer Care Centre (SGCCC), Calvary Mater Newcastle Hospital (CMN), Royal North Shore Hospital (RNSH),Liverpool Cancer Therapy Centre (LCTC), Royal Prince Alfred Hospital (RPAH),Macarthur Cancer Therapy Centre (MCTC), Central West Cancer Services (CWCS).

Selection Criteria

The selection criteria for this study will involve radiation therapists who work in Cancer Care Centres within NSW. Radiation therapists on leave and those who are on internship (interns) will be excluded from the study sample. Outlining clearly the population targeted will minimise any potential bias (Evans 2003).

It is anticipated that invitations to participate in this research study will be sent to a total population of approximately 500 Radiation Therapists.

Recruitment strategies

Prior to commencement of the study one of the investigators will contact by email the Chief Radiation Therapists of the participating hospitals advising them of the survey. This email will be the letter of invitation outlining the requirements of participants and indicating that participation in completing the survey is entirely voluntary. The primary investigator within a few weeks will organise a teleconference with the educators as these are the staff members responsible for the coordination of continuing professional development and education of clinical staff, at each of the participating centres. A detailed account of the study, design, recruitment and questionnaires will be presented. At this point numbers of staff at each participating centres will be advised. One week later, an agreed number of individual participant packs consisting of the invitation letter, participants' consent information sheet and consent forms as well as the questionnaires will be delivered by mail to the educators to be distributed to consenting participants within their centres. Educators will be requested to return by mail to the primary investigator, all surveys at the end of three weeks. A reminder will be sent out on the second week as a strategy to increase response rate. Consent will be indicated by the completion of the surveys.

Data Collection

Data for this study will be collected through a self-administered survey (Burns et al. 2008) that uses the following validated instruments.

Demographic

Details of gender, age, educational status of the radiation therapist, employment status, years of experience and any further study at present will be collected.

Emotional Intelligence

Emotional Intelligence will be assessed using the Trait Emotional Intelligence Questionnaire (TEIQue).TEIQue is a personality assessment that evaluates a person's Emotional Intelligence (EI) potential.

This questionnaire (short version) consists of 30 questions.Participants choose from a Likert scale 1-7 (completely disagree to completely agree) scoring method, their preferred response option.

Conflict Management

Conflict management will be measured using the Thomas –Kilmann Mode Instrument (TKI). Thomas (1992) reclassified the modes of handling conflict into two dimensions: cooperation- referring to the degree to which one tries to please the interests of another person and assertiveness -referring to the extent to which one tries to satisfy his or her own concerns. TKI has been used successfully for more

than 30 years to assist individuals to make choices using various conflict styles that best serves a situation and positively affects others.

This questionnaire comprises sixty statements, which are divided into 30 paired items. Participants select the one choice from each pair of statements that best describes the manner in which they would act in a conflict situation.

Data Analysis

(1)The results of this study will be entered and analysed in SPSS V17.

(2)Frequencies, for Means and Standard deviation (SD) will be calculated in Excel for all demographic characteristics and EI and conflict management styles outcomes.

(3)Linear Regression analysis will be used to measure Demographic predictors of EI

Significance of this Study

Emotional intelligence has been shown to be a significant factor in career performance and organisational success. This project will aim to identify the optimal level of EI and conflict styles among radiation therapists. Participants from this study will also benefit by becoming aware of their own emotional and conflict management skills. As well as these findings, educational and other interventions for future RT professional development as well as strategies for enhancing the potential performance and organisational success of RTs will be recommended.

Contacts

Please contact me at any time if any further information is required

Stami Trakis - Stami.Trakis@sesiahs.health.nsw.gov.au (9113 3845)

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Appendix C: Survey Questionnaire

> *Instructions: Please tell us about yourself by answering the following questions. For each question please indicate your response by ticking ONE box or writing in the space provided.*

1. What is your gender?   ☐$_1$ Female   ☐$_2$ Male

2. What is your age?

☐$_1$ <20   ☐$_2$ 20-29   ☐$_3$ 30-39   ☐$_4$ 40-49

☐$_5$ 50-59   ☐$_6$ 60-69   ☐$_7$ ≥70

3. What is the highest level of education you have obtained?

☐$_1$ Certificate   ☐$_2$ Associate Diploma   ☐$_3$ Degree OF Applied Science

☐$_4$ Master's Degree   ☐$_5$ PhD   ☐$_6$ Other

4. How would describe your current employment status?

☐$_1$ Full Time   ☐$_2$ Part Time

5. How many years of experience do you have as a Radiation Therapist?

_____

6. What is the level of your current employment as a Radiation Therapist?

☐$_1$ Level 2   ☐$_3$ Level 3.2   ☐$_5$ Level 4.2 ☐$_7$ Level 6

☐$_2$ Level 3.1   ☐$_4$ Level 4.1   ☐$_6$ Level 5

7. Are you currently undertaking any post graduate or higher degree course?

☐$_1$ Yes   ☐$_0$ No

If yes please state the course _____

Trait Emotional Intelligence Questionnaire (TEIQue)

Instructions: Please answer each statement below by putting a circle around the number that best reflects your degree of agreement or disagreement with that statement. Do not think too long about the exact meaning of the statements. Work quickly and try to answer as accurately as possible. There are no right or wrong answers. There are seven possible responses to each statement ranging from 'Completely Disagree' (number 1) to 'Completely Agree' (number 7).

1 . . . . 2 . . . . 3 . . . . 4 . . . . 5 . . . . 6 7

Completely
Disagree

Completely
Agree

1. Expressing my emotions with words is not a problem for me.	1	2	3	4	5	6	7
2. I often find it difficult to see things from another person's viewpoint.	1	2	3	4	5	6	7
3. On the whole, I'm a highly motivated person.	1	2	3	4	5	6	7
4. I usually find it difficult to regulate my emotions.	1	2	3	4	5	6	7
5. I generally don't find life enjoyable.	1	2	3	4	5	6	7
6. I can deal effectively with people.	1	2	3	4	5	6	7
7. I tend to change my mind frequently.	1	2	3	4	5	6	7
8. Many times, I can't figure out what emotion I'm feeling.	1	2	3	4	5	6	7
9. I feel that I have a number of good qualities.	1	2	3	4	5	6	7
10. I often find it difficult to stand up for my rights.	1	2	3	4	5	6	7
11. I'm usually able to influence the way other people feel.	1	2	3	4	5	6	7
12. On the whole, I have a gloomy perspective on most things.	1	2	3	4	5	6	7
13. Those close to me often complain that I don't treat them right.	1	2	3	4	5	6	7
14. I often find it difficult to adjust my life according to the circumstances.	1	2	3	4	5	6	7

15. On the whole, I'm able to deal with stress.	1	2	3	4	5	6	7
16. I often find it difficult to show my affection to those close to me.	1	2	3	4	5	6	7
17. I'm normally able to 'get into someone's shoes' and experience their emotions.	1	2	3	4	5	6	7
18. I normally find it difficult to keep myself motivated.	1	2	3	4	5	6	7
19. I'm usually able to find ways to control my emotions when I want to.	1	2	3	4	5	6	7
20. On the whole, I'm pleased with my life.	1	2	3	4	5	6	7
21. I would describe myself as a good negotiator.	1	2	3	4	5	6	7
22. I tend to get involved in things I later wish I could get out of.	1	2	3	4	5	6	7
23. I often pause and think about my feelings.	1	2	3	4	5	6	7
24. I believe I'm full of personal strengths.	1	2	3	4	5	6	7
25. I tend to 'back down' even if I know I'm right.	1	2	3	4	5	6	7
26. I don't seem to have any power at all over other people's feelings.	1	2	3	4	5	6	7
27. I generally believe that things will work out fine in my life.	1	2	3	4	5	6	7
28. I find it difficult to bond well even with those close to me.	1	2	3	4	5	6	7
29. Generally, I'm able to adapt to new environments.	1	2	3	4	5	6	7
30. Others admire me for being relaxed.	1	2	3	4	5	6	7

Appendix D: Publication

Journal of Medical Radiation Sciences

Appendix D: Publication

ORIGINAL ARTICLE

Demographic predictors of emotional intelligence among radiation therapists

Trakis Stami, BAppSc (MRS),[1] Fernandez Ritin, RN, PhD, [2] & Parrish Dominique, DipEd, BEd, MEd, PhD[3]

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Abstract

Introduction: Contemporary health care services are more productive and successful when their health professionals have emotional intelligence (EI). The objective of this study was to explore the demographic predictors of EI among radiation therapists working in cancer care centres in NSW, Australia. Methods: Data were collected using a cross-sectional self-administered survey. Emotional intelligence was measured using the Trait Emotional Intelligence Questionnaire-Short version (TEIQue − SF). Multiple regression analysis was used to identify if age, years of experience, gender, highest level of education obtained or level of current employment were predictors of EI. Results: A total of 205 radiation therapists participated in this study. The mean scores for Global EI, emotionality, self-control, wellbeing and sociability dimensions were 5.16 (SD = 0.6), 5.3 (SD = 0.7), 4.9 (SD = 0.9), 5.7 (SD = 0.8) and 4.7 (SD = 0.8) respectively. Age and level of current employment were identified as predictors of global EI. Gender and level of education were significant predictors of the EI emotionality dimension. Levels of employment along with level of education were both significant predictors of the sociability dimension of EI. Conclusions: Being a young radiation therapist, female, and having higher levels of employment and higher levels of education were predictors of EI. Given that level of education and level of employment are both amendable demographic factors, strategies to address these factors to reduce the effects of emotional struggle experienced by radiation therapists in their work need to be implemented.

Introduction

Emotional intelligence (EI) has been defined as a blend of personal and interpersonal competencies that affect one's behaviour, thinking and interactions with others.[1] Salovey and Mayer[2] first coined emotional intelligence defining it as "the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions" (p. 189). This definition and the conceptualisation of emotional intelligence has been further developed through research and practice.[3] While there are a number of alternate models of emotional intelligence such as the Bar-On,[4] and Salovey and Mayer[2] models, the Goleman[5] model is widely used.

The Goleman model of EI organises emotional intelligence into four dimensions; self-awareness and self-management and social awareness and social skills.[5] These four dimensions of EI each comprise a suite of personal or interpersonal competencies that are essential for health care professionals in order to provide optimal patient care as well as work synergistically as part of a multidisciplinary team.[6] Theorists have viewed EI as a trait rather than a cognitive ability.[7–9] According to them trait EI is related to people's personality and is formed by their emotional self-perceptions and emotional traits. Unlike ability, trait EI involves behavioural characteristics and self-perceived capabilities and is measured through self-report.[7–9] Therefore, for this study it was decided that

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trait EI would be used as a measurement of EI among radiation therapists (RT).

Benefits of EI

Various benefits of EI relating to performance, stress, job satisfaction, burnout and patient care have been reported among health care professionals. Evidence from the literature suggests that people with higher EI are better able to achieve goals, maintain strong relationships and have greater performance in social relations.[10] Emotional intelligence related to self-management, social awareness and social skills has been found to be highly relevant and important requirement for leadership.[3]

An inverse correlation was reported between EI and stress among nurses working in private and public hospitals,[11] with those nurses who had higher EI being less stressed. A study in the Netherlands, of nurses working with people with mental illness and severe behavioural problems found that low EI was associated with higher burnout in female nurses. In an observational study, undertaken on 110 medical doctors higher self-rated EI has been significantly associated with less burnout ($P < 0.001$) and higher job satisfaction ($P < 0.001$).[12] An integrative literature review of 39 empirical research articles that focused on EI in nursing found positive impact of EI on leaders thus influencing employee retention, quality of patient care and patient outcomes. This investigation concluded that EI should be explicitly taught within nursing education.[13] A descriptive, correlational study involving 135 nurses from three hospitals in counties of New York, USA identified a

positive correlation between nurses' self-compassion and EI.[14]

The association between EI and demographic factors

The influence of demographic factors on the EI of individuals has been explored in studies and literature. A number of studies have identified a positive correlation between EI and age with older people reporting higher emotional intelligence.[15,16] An American study involving 405 participants aged between 22 and 70, found that EI increased slightly with age.[17] In this study linear regression analysis was conducted in which age was the independent variable and EI was the dependent variable. The authors suggest that emotional intelligence develops cumulatively as a consequence of life experiences. While these findings are logical, findings in more recent literature suggests that age is not a predictor of EI.[18] This is a premise that will be investigated in this research study.

There are studies that have reported women to be more socially skilful compared to men.[8] An Australian study exploring the work stress and EI of mental health nurses found that female nurses with less experience in mental health had lower EI. This was not the case however in the male participants.[19] High EI among women has been attributed to biological and social factors. The biological factors include the larger size of the brain area, which processes emotions, in women compared to men.[20] The social factors are related to the innate or learnt behaviours of men and women, where women are taught and encouraged to be more empathetic and men are conditioned to be more constructive.[20] Furthermore, researchers have found that higher levels of emotional intelligence in women may be due to the influences and nurturing roles between the mother and her child in which the male children are likely to obtain less emotional expression from their mothers than female children.[21]

Educational level has been identified as another demographic factor that influences EI. In a study undertaken on 212 professionals working in a mental health setting there was a statistically significant correlation between EI and educational levels, with those

who had higher levels of education demonstrating greater EI.[22]

Studies of EI and RTs

A comprehensive search of the literature identified five publications investigating EI among radiographers of which three were undertaken among radiography students.[23–25] The remaining two studies investigated EI among qualified diagnostic and therapy radiographers (RT).[26,27] In the study by Mackay[26] the mean global EI score for radiographers was 5.27 (SD = 0.691) and in the second study the mean global EI scores ranged from 5.14 to 5.60.[27] The study by Mackay 2013 also indicated that there was no statistically significant difference in EI levels between diagnostic and therapy radiographers. This result could be related to the unequal sample size of the two groups where the number of therapy radiographers comprised of only up to 18% of the total sample.

In Australia, there is a significant difference in the role of diagnostic and therapy radiographers in oncology. The main role of the diagnostic radiographer is to deliver high-quality medical imaging to enable medical specialists in making accurate informed diagnosis of the patient's illness. On the other hand RTs are responsible for the "design, accurate calculation and delivery of a prescribed radiation dose over a course of treatment to the patient."[28] In addition to having scientific and technological knowledge, the role of the RTs also involves

counselling patients to allay their fears and anxieties about their diagnosis and treatment.[28]

In many instances RTs provide radiation therapy for patients over a period of 4–8 weeks. Hence, patients undergoing radiation treatment develop a rapport with their RT who also provides them and their families with emotional comfort. Illness and prolonged treatment regime can have an impact not only on the patient but also on the RT. Therefore, RTs are required to have empathy and compassion and acknowledge patients' vulnerability, while at the same time being capable of managing their own emotions in a professional manner.

While there is extensive literature published on EI among people in executive positions, across a range of professions and among students, there is a paucity of data relating to the emotional intelligence among qualified RTs. Therefore, the aim of this study was to investigate the EI levels and the demographic predictors of EI among qualified RTs.

Methods

Research design

This study adopted a quantitative, non-experimental, cross-sectional research design.

Sample

All RTs who met the criteria for professional entry to radiation therapy as per the Medical Radiation Practice Board of Australia (MRPBA) guidelines[29] and irrespective of their level of employment and working in any of the 15 public cancer care centre's in NSW were eligible to participate in this study.

Currently in NSW RTs are employed between levels 1–6, where level 1 is classified as professional development year and level 6 classified as chief RTs.[29] Radiation therapists who were on leave were excluded from this study. In addition, those who were undertaking their professional development year or a supervised practice programme were also excluded.

Data collection instrument

Data for this study were collected through a self-administered survey. The data collected included demographic information, as well as measures of EI traits. The demographic details collected included, gender, age, educational level, level of employment and years of experience as a RT. Emotional intelligence was measured using the Trait Emotional Intelligence Questionnaire-Short Form (TEIQue-SF). The TEIQue-SF is a 30-item

self-report measure that comprises four dimensions namely Wellbeing (6 items), Self-control (6 items), Emotionality (8 items) and Sociability (6 items).[30] The remaining four items contributed only to the measure of Global EI, which was measured by aggregating the scores for all 30 items. Wellbeing as used in this instrument refers to a generalised sense of wellbeing extending from past achievements to future expectations, accompanied by high self-esteem, and includes the facets of self-esteem, trait happiness and trait optimism. The Emotionality dimension reflects the ability to identify and express feelings, and to use these faculties to maintain close relationships with significant others, and it includes the facets of emotion perception, emotion expression, trait empathy and relationships. The Sociability dimension, regarding the capacity to assert oneself as well as to influence others' emotions and decisions, includes the facets of social awareness, emotion management and assertiveness. The Self-Control dimension, concerning the ability to regulate one's impulses and emotions, as well as managing external pressures and stress, includes the facets of emotion regulation, stress management and impulsiveness.[31]

The TEIQue-SF has been shown to have high reliability and validity with Cronbach's alpha ranging from 0.65 to 0.85.[30,32–34] This tool requires participants to rate their degree of agreement with each item on a seven-point Likert-type scale with responses ranging from completely disagree (1) to completely agree (7).

Data collection method

Prior to commencement of this research, approval was sought from the chief RT at each of the 15 cancer care centres in NSW. This was done by providing a 10 minute presentation about the study via a teleconference at the chief RT meeting. All chief RTs agreed to participate and nominated the RT educators at their centres as the point of contact. Two weeks later the RT educators at each of the participating cancer care centres were provided a detailed account of the study rationale, design, participant recruitment and data collection tools. The RT educators were also provided with a presentation as well as a copy of the study proposal to provide information to RTs in their centre, about the study, during a regular in-service session. Educators informed the researcher of the number of RTs working at their centre so that an appropriate number of surveys could be prepared for each therapist. One week later an agreed number of individual research packs, consisting of the invitation letter, informed consent sheet, questionnaires and a return envelope addressed to the primary researcher, were delivered by mail to the educators for distribution at their centre. In

order to minimise coercion RTs were informed that participating in the study was voluntary and non-participation would have no effect on their employment. Educators were requested to return by mail, all surveys, regardless of whether they were completed or not, at the end of 8 weeks. Consent was assumed by the completion and return of the surveys. In an attempt to increase the response rate, the educators were sent follow up reminders every 2 weeks. Ethics approval to conduct the study across NSW was obtained from the South Eastern Sydney Local Health District Human Research Ethics Committee (HREC ref no: 15/049 LNR/15/POWH/180) and the University of Wollongong Human Research Ethics Committee (2017/449).

Data analysis

The data collected for this study were entered into survey monkey and exported into the Statistical Package for the Social Sciences V21 (SPSS) for data analysis. Data were cleaned and reviewed for any missing values. Missing data were replaced according to author guidelines.[35] To maintain integrity of the data set, 10% of the data were audited by a person not associated with the project.

Categorical data were presented as percentages and continuous data wererepresented as means and standard deviation (SD). TEIQue items were reversed according to guidelines.[30] A Global Trait EI score was calculated by averaging the scores for all 30 items. Similarly, scores for

Table 1. Demographic characteristics of the participants (n = 205).

Frequency (%)	
Gender*	
Female	157(71.7)
Male	45(20.5)
What age group do you belong to?	
20–29	72(32.9)
30–39	73(33.3)
40–49	38(17.4)
50–59	21(9.6)
60–69	1(0.5)
What is the level of your current employment as a RT?*	
Level 2	117(53.4)
Level 3.1	15(6.8)
Level 3.2	11(5.0)
Level 4.1	34(15.5)
Level 4.2	19(8.7)
Level 5	6(2.7)
Level 6	2(0.9)
Are you currently undertaking any postgraduate or higher degree courses?	
Yes	18 (8.2)

*Missing data.

the 4 dimensions were calculated by averaging all of the items associated with the dimensions.[30] All demographic variables were included in a standard multiple linear regression analysis to determine the predictors of overall EI and the predictors of each EI dimension. Prior to conducting the analysis, the demographical variables of age, current employment as a RT and highest level of qualification that had more than one category were transformed into categorical variables with only two categories and coded as 0 and 1 to undertake the regression analysis. Age was combined into two categories: ≤39 and ≥40. Current employment as a RT was dichotomised at level 2 or level 3.1 and greater. Highest level of qualification was dichotomised at bachelor's degree and lower or master's degree and higher. The chief Beta (B) values and the 95% confidence intervals were calculated in the multiple regression analyses. Statistical significance was set at P less than 0.05.

Results

Sample description

During the period of the survey in July 2015, there were 300 RTs working in the 15 cancer care centres in NSW. Completed questionnaires were received from 205 RTs yielding an overall response rate of 68%. Respondents in this study were predominantly female between 20 and 39 years of age (33% 20–29% and 33% 30–39%) and currently employed as an RT at level 2 (53%). The years of experience as a RT following the professional development year ranged from 6 months to 40 years with the mean being 12 years (SD = 9.2). The demographic characteristics of respondents are presented in Table 1.

Emotional intelligence

The mean global EI for participants was 5.16 (SD = 0.6) (range 2.7–6.9). The mean scores for the EI dimensions were 5.3 (SD = 0.7) (range 3.0–7.0) for the emotionality dimension, the self-control dimension was 4.8 (SD = 0.8) (range 2.3–7.0), the wellbeing dimension was 5.7 (SD = 0.8) (range 3.17–7.0) and the sociability dimension was 4.7 (SD = 0.8) (range 2.17–7.0).

Emotional dimension

Radiation therapists aged between 20 and 39 years had higher means scores compared to those aged between 40 and 69 years (mean difference = 0.11, 95% CI = 0.11, 0.33). Those with a higher level of employment (level 3.1–level 6) had higher emotional scores compared to

those with a lower level of current employment (mean difference = 0.02, 95% CI = 0.23, 0.17). Female RTs had significantly higher emotional scores compared to their male counterparts (mean difference = 0.27, 95% CI = 0.52, 0.03) (Table 2).

Self-control dimension

Radiation therapists aged between 20 and 39 years had higher means scores compared to those aged between 40 and 69 years (mean difference = 0.15, 95% CI = 0.10, 0.42). Those with a higher level of employment (level 3.1–level 6) had higher self-control scores compared to those with a lower level of current employment (mean difference = 0.13, 95% CI = 0.37, 0.11). Male RTs had higher self-control scores compared to their female counterparts (mean difference = 0.03, 95% CI = 0.25, 0.33) (Table 2).

Well-being dimension

Radiation therapists aged between 20 and 39 years had higher means scores compared to those aged between 40 and 69 years (mean difference = 0.09, 95% CI = 0.13, 0.32). Those with a lower level of employment (Level 2) had higher well-being scores compared to those with a higher level of current employment (level 3.1–level 6) (mean difference = 0.09, 95% CI = 0.12, 0.30). Female RTs had higher well-being scores compared to their male counterparts (mean difference = 0.19, 95% CI = 0.44, 0.06) (Table 2).

Sociability dimension

Radiation therapists aged between 20 and 39 years had higher means scores compared to those aged between 40 and 69 years (mean difference = 0.15, 95% CI = 0.09,

0.40). Those with a higher level of employment (level 3.1–level 6) had higher sociability scores compared to those with a lower level of current employment (mean difference = 0.23, 95% CI = 0.46, 0.00). Female RTs had higher sociability scores compared to their male counterparts (mean difference = 0.06, 95% CI = 0.36, 0.04) (Table 2).

Global EI

Radiation therapists aged between 20 and 39 years had higher means scores compared to those aged between 40 and 69 years (mean difference = 0.16, 95% CI = 0.02, 0.34). Those with a higher level of employment (level 3.1–level 6) had higher global scores compared to those with a lower level of current employment (mean difference = 0.05, CI = 0.22, 0.16). Female RTs had higher global scores compared to their male counterparts (mean difference = 0.16, 95% CI = 0.52, 0.03) (Table 2).

Predictors of EI

Separate standard multiple regression analyses were performed for the following dependant variables: global emotional intelligence, emotionality, self-control, wellbeing and sociability. The demographic characteristics included as predictor variables were age, years of experience, gender, highest level of education obtained and level of current employment.

Predictors of global EI

The multiple regression model to predict global emotional intelligence among RTs was significant and accounted for 6.1% of the variance, $R^2_{Adj} = 0.037$ F $(5,189) = 2.475$, P = 0.034. The only significant predictor

Table 2. EI scores.

Variable	Emotional	Self-control	Well-being	Sociability	Global
Gender					
Male	5.10 (SD = 0.72)	4.88 (SD = 0.76)	5.60 (SD = 0.85)	4.68 (SD = 0.85)	5.04 (SD = 0.60)
Female	5.38 (SD = 0.72)	4.85 (SD = 0.89)	5.79 (SD = 0.71)	4.74 (SD = 0.83)	5.20 (SD = 0.60)
Age					
20–39	5.36 (SD = 0.72)	4.91 (SD = 0.86)	5.78 (SD = 0.72)	4.78 (SD = 0.82)	5.21 (SD = 0.59)
40–69	5.24 (SD = 0.73)	4.75 (SD = 0.86)	5.69 (SD = 0.81)	4.62 (SD = 0.85)	5.05 (SD = 0.63)
Current employment					
Level 2	5.31 (SD = 0.76)	4.80 (SD = 0.90)	5.79 (SD = 0.76)	4.63 (SD = 0.86)	5.14 (SD = 0.64)
Level 3.1–6	5.34 (SD = 0.67)	4.93 (SD = 0.80)	5.69 (SD = 0.73)	4.86 (SD = 0.77)	5.19 (SD = 0.54)
Level of Education					
Bachelors and lower	5.26 (SD = 0.71)	4.87 (SD = 0.86)	5.73 (SD = 0.75)	4.67 (SD = 0.84)	5.13 (SD = 0.60)
Postgraduate	5.57 (SD = 0.77)	4.78 (SD = 0.84)	5.82 (SD = 0.74)	5.03 (SD = 0.73)	5.28 (SD = 0.57)

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of global EI was age with RT's aged between 20 and 39 years having higher global EI (B = 0.341; 95% CI 0.65, 0.03; P = 0.031) (Table 3).

Predictors of the four EI dimensions

The multiple regression model to predict emotionality was significant and accounted for 6.8% of the variance, R^2_{Adj} = 0.044 F (5,189) = 2.77, P = 0.019. Female gender (B = 0.273; 95% CI 0.027, 0.519; P = 0.030) and having postgraduate qualifications (B = 0.311; 95% CI 0.040, 0.581; P = 0.025) was associated with higher emotionality dimension of EI.

The multiple regression model to predict sociability was significant and accounted for 7.9% of the variance, R^2_{Adj} = 0.054 F (5,189) = 3.223, P = 0.008. Having postgraduate qualifications (B = 0.374; 95% CI 0.069, 0.679; P = 0.017) and high level of current employment (B = 0.329; 95% CI 0.044, 0.615; P = 0.024) were significant and independently associated with the sociability dimension (Table 3). None of the demographic variables were significant predictors of the self-control and well-being dimensions.

Discussion

The results from this study demonstrates that the Global EI as well as the wellbeing, self-control, emotionality and sociability dimensions of RTs is higher than that reported in the literature among first year student radiographers[24] and the normative data,[27] but was lower than qualified radiographers.[24] In contrast the emotionality dimension was higher than that of radiographers.[24] This could be due to the fact that RT has a greater contact with the patients compared to radiographers and hence have developed the ability to control their emotions.

The results of this study indicated that younger RTs had higher global EI. It has been reported that the older a person becomes the more likely they are to have a positive outlook, less neuroticism and better emotional control.[36] In addition, they become more aware of the fragility and complexities of life, which enables them to better handle their emotions.[36] However, the findings from this study did not conclude this result, in fact it found the complete opposite; that the younger RTs had higher emotional intelligence. One inference for this result could be that RTs are exposed on a regular basis to traumatic and distressing situations, where their patient and families are grappling with the grief of a potentially terminal disease. Exposure to these traumatic and distressing situations could have contributed to the development of EI among younger RTs.[37] Thus, instead of becoming more emotionally intelligent as they get

Table 3. Predictors of EI.

Model	Unstandardised coefficients B	Sig.	95% Confidence interval for B Lower bound	Upper bound
Global EI				
Constant	4.99	0.000	4.78	5.21
Age	0.341	0.031	0.650	0.032
Level of current employment	0.136	0.205	0.075	0.346
Gender	0.176	0.091	0.029	0.381
Years of experience	0.003	0.701	0.013	0.020
Highest level of education	0.143	0.213	0.083	0.368
Emotional				
Constant	5.090	0.000	4.838	5.341
Age	0.215	0.255	0.586	0.156
Level of current employment	0.126	0.325	0.126	0.379
Gender*	0.273	0.030	0.027	0.519
Years of experience	0.003	0.779	0.023	0.017
Highest level of education	0.311	0.025	0.040	0.581
Sociability				
Constant	4.566	0.000	4.283	4.849
Age	0.417	0.051	0.835	0.001
Level of current employment	0.329	0.024	0.044	0.615
Gender*	0.065	0.647	0.213	0.342
Years of experience	0.003	0.822	0.020	0.025
Highest level of education	0.374	0.017	0.069	0.679
Self-Control				
Constant	4.83	0.000	4.529	5.138
Age	0.439	0.055	0.889	0.010
Level of current employment	0.225	0.148	0.081	0.532
Gender*	0.022	0.885	0.320	0.276
Years of experience	0.007	0.576	0.017	0.031
Highest level of education	0.111	0.506	0.439	0.217
Well-being				
Constant	5.57	0.000	5.31	5.84
Age	0.245	0.219	0.638	0.147
Level of current employment	0.123	0.365	0.391	0.145
Gender	0.191	0.150	0.070	0.451
Years of experience	0.011	0.327	0.011	0.032
Highest level of education	0.099	0.495	0.187	0.386

*Negative coefficients indicate higher scores for females.

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older, the time that RTs have the greatest EI would be when they are younger which is synonymous with the findings in this study.

What is interesting in this study is that although younger RTs had higher EI, years of experience were not found to be a predictor of EI. This result is in contrast to studies that have found a positive correlation between years of experience and EI.[38] A possible explanation for this dissonance could be that radiotherapy departments are constantly evolving, due to an increase in new techniques and technologies. Associated with this evolution is the need for practitioners to keep abreast of learning and development that is involved with all these changes. This evolution adds to the constant pressures faced by RTs who also deal with high patient loads and maintaining focus on providing a service that keeps up with increasing work demands. The prevalence of these demands and conditions negates the benefits and advantages of years of experience including increased EI, which explains the result of years of experience not being a predictor of EI in this study.

Being female was identified as a predictor of the emotional dimension of EI, which is a result consistent with the findings of other published EI studies.[8,39] Emotionality relates to being able to identify and express emotions as well as maintain intimate relationships with others. The finding in this study, that being female is a predictor of the emotionality dimension of EI may not be related to being an RT. Rather, the explanation for this finding could simply be associated with the fact that females possess learnt behaviours, resultant from nurturing, which make them innately more attune with their feelings and capable in sustaining relationships.

Previous literature has acknowledged that an increase in the level of education improves EI.[22] This study did not replicate these findings, with higher levels of education not being a predictor of Global EI. This result may be explained by the fact that the majority of RTs only gain the level of education needed for their professional role. Once they are in the field, many RTs will not seek further education unless it is required to develop technical competence. Thus the finding, that higher levels of education are not a predictor of Global EI is logical because the skills associated with Global EI are not related to technical competence. In addition, studies that demonstrated an association between EI and education levels were undertaken in general population where there could have been a variation in education levels across individuals which might have influenced the results. This study was undertaken in RTs where the range of education level was constrained hence the association between education and EI may have not manifested.

However, higher levels of education were found to be a predictor of higher emotionality which is a subscale of the TEIQue. The Emotionality dimension reflects the ability to identify and express feelings, and to use these faculties to maintain close relationships with significant others, and it includes the facets of emotion perception, emotion expression, trait empathy, and relationships. Participants could have acquired these skills when undertaking higher education programmes such as management and leadership as most of these programmes offer subjects, courses or workshops relating to emotional intelligence. Obtaining these skills has a direct impact on the RTs' ability to engage with others and express their feelings.

The Sociability dimension, regarding the capacity to assert oneself as well as to influence others' emotions and decisions, includes the facets of social awareness, emotion management, and assertiveness. This study found that the EI sociability dimension was greater among those with both a high level of employment and a high level of education. Explanations for this result could be due to the fact that confidence and experience, both of which it is reasonable to assume are gained as a consequence of higher levels of employment and education, are going to enhance ones' sociability. Furthermore, the RT's environment of teamwork and close affiliations within the multidisciplinary team require the skills of sociability, so these will logically be increased as a result of their regular and ongoing employment in more senior roles.

In this study none of the demographic variables were significant predictors of the self-control and well-being dimensions of EI. A possible reason for these results could be that radiotherapy environments are highly technological environments dealing with high patient loads and thus managing external pressures and stress is more synonymous with self-management than any of the demographic predictors tested in this study. Similarly, wellbeing is not a major focus of RT environments that are more concerned about providing a service rather than ensuring the happiness and optimism of RTs.

The major strength of this study was that it included a broad cohort of RTs who worked in cancer care centres across NSW. In addition, the study was conducted in a rigorous manner using validated instruments. A high response rate of 68% of the population sample is also strength of the study and makes the findings both meaningful and generalisable. Despite the evidence, some limitations inherent in undertaking in such a study need to be acknowledged. First, this study used a self-selected sample whom may have been highly motivated. Another limitation of the study was that the R-squared values were quite low for each model which suggests that each

model only explained a small amount of variation in EI. Other measured factors could likely explain the inter-individual variation in EI. Emotional Intelligence is a complex variable hence further research needs to be undertaken looking at reasons why older RT have lower levels of global EI. In addition, it would be interesting to replicate this study in other professions that are emotionally demanding such as police, doctors and lawyers.

Conclusion

Radiation therapy is an emotionally demanding profession and focuses mainly on practical skills. This study has contributed new and valuable insights about EI among RTs. Global EI was significantly associated with younger age. Level of employment was also a significant predictor of global EI as well as the sociability factor of EI. Level of education was a significant predictor of the sociability and emotional dimension of EI. The results should, however, be treated with caution, because EI is a highly complex phenomenon that is influenced by numerous social and cultural factors and not merely demographic characteristics. Furthermore large scale trials are warranted to establish a causal relationship between education level, employment level and EI.

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Conflict of Interest

The authors declare no conflict of interest.

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