Exploring the relationship between the Health-related Quality of Life and coping strategies utilizing the FACT-B and the Brief COPE Scale among female breast cancer patients in the Western Cape, South Africa

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DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third-party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

The main research objective of this study was to explore the relationship between coping strategies and the health-related quality of life (HRQOL) in a South African breast cancer sample. This study comprised of a secondary data analysis of 201 women (27-83 years) receiving breast cancer treatment at the breast clinic at Tygerberg Hospital, Western Cape. Participants were asked to complete a battery of instruments, including a demographic questionnaire, the Brief-COPE (a measure of coping) and the FACT-B (a measure of HRQOL). An exploratory factor analysis (EFA) was undertaken on both measures to explore the factor structure of the measures in the current sample of breast cancer patients. Cronbach's alpha (α) was calculated for the subscales of the Brief-COPE and the FACT-B to determine the reliability of the new factor structure produced. A multiple regression analysis was performed to explore the relationship between coping strategies and the domains of HRQOL. The result of the EFA on the Brief-COPE indicated a three-factor structure with the dimensions labelled as Avoidant-coping (four items), Problem-focused coping (three items), and Emotion-focused coping (two items). The EFA on the FACT-B produced a four-factor structure with the dimensions labelled as Functional well-being (five items), Emotional well-being (five items), Physical well-being (four items), and Social well-being (four items). The subscales of the Brief-COPE were found to have adequate reliability as the Cronbach's α values of Avoidant-coping, Problem-focused coping and Emotion-focused coping were .73, .78, and .73, respectively. The total FACT-B score had poor reliability (α=.48), but the Functional well-being, Emotional well-being, Physical well-being, and Social well-being subscales produced good reliability scores of .84, .80, .79, and .77, respectively. The results of the study indicated a significant relationship between coping strategies and HRQOL in the breast cancer sample. Specifically, a significant negative relationship was found between the use of avoidant coping strategies and functional- and social well-being. In contrast, a significant positive association was found between the use of avoidant coping strategies and emotional- and physical well-being. A significant positive association was also found between the use of emotion-focused coping strategies and social well-being. The findings of the study provided factor validated and reliable versions of the Brief-COPE and the FACT-B for use among South African breast cancer patients. The study provided the first insights into the relationship between coping strategies and HRQOL in South African breast cancer patients. The findings also indicate the type of coping strategies that had a positive and negative influence on the HRQOL of South African breast cancer patients.

Key words**:** Breast cancer, coping strategies, health-related quality of life, exploratory factor analysis, South Africa, low-and-middle-income countries

OPSOMMING

Die hoof navorsingsdoelwit van die studie was om die verhouding tussen hanteringstrategieë en gesondheidsverwante lewensgehalte (GVLG) in ‘n steekproef van Suid-Afrikaanse borskanker pasiënte te ondersoek. Die studie onderneem ‘n sekondêre data analise op 201 vroue (27-83 jaar) wat borskanker behandeling ontvang het by die borskliniek van Tygerberg Hospitaal, Wes-Kaap. Deelnemers was versoek om ‘n versameling van vraelyste te voltooi, insluitend ‘n demografiese vraelys, die “Brief-COPE” (‘n hanteringstrategieë meetinstrument) en die “FACT-B” (‘n GVLG meetinstrument). ‘n Ondersoekende faktoranalise (OFA) is onderneem op albei meetinstrumente om die faktorstruktuur te verken in die steekproef van borskanker pasiënte. Cronbach se alfa (α) is bereken vir die dimensies van die “Brief-COPE en die “FACT-B” om die toetsbetroubaarheid van die nuwe faktorstruktuur van die twee meetinstrumente te bepaal. ‘n Veelvuldige regressie analise is gedoen om die verhouding tussen hanteringstrategieë en die dimensies van GVLG te verken. Die OFA van die “Brief-COPE” het ‘n drie-dimensie faktorstruktuur opgelewer, met die dimensies benoem as: Vermydings-hantering (vier items), Probleem-gefokusde hantering (drie items), en Emosie-gefokusde hantering (twee items). Die OFA van die “FACT-B” het ‘n vier-dimensie faktorstruktuur opgelewer met die dimensies benoem as: Funksionele gehaltheid (vyf items), Emosionele gehaltheid (vyf items), Fisiese gehaltheid (vier items), en Sosiale gehaltheid (vier items). Die dimensies van die “Brief-COPE” het voldoende interne konsekwentheid getoon met die Cronbach’s alfa waardes van Vermydings-hantering, Probleem-gefokusde hantering en Emosie-gefokusde hantering bereken as .73, .78, en .73, onderskeidelik. Die totale “FACT-B” het swak interne konsekwentheid (α=.48), maar die dimensies van Funksionele gehaltheid, Emosionele gehaltheid, Fisiese gehaltheid, en Sosiale gehaltheid dimensies het goeie interne konsekwentheid met α waardes van .84, .80, .79, en .77, onderskeidelik. Die resultate van die studie dui op ‘n betekenisvol verhouding tussen hanteringstrategieë en GVLG in die steekproef van borskanker pasiënte. ‘n Betekenisvolle negatiewe verhouding is gevind tussen die gebruik van vermydings-hanteringstrategieë en funksionele en sosial gehaltheid. In kontras met die resultaat, is daar ‘n betekenisvolle positiewe verhouding gevind tussen die gebruik van vermydings-hanteringstrategieë en emosionele- en fisiese gehaltheid. ‘n Betekenisvolle positiewe verwantskap is ook gevind tussen die gebruik van emosie-gefokusde hanteringstrategieë en sosiale gehaltheid. Die resultate van die studie verskaf faktor-geldige en toetsbetroubare weergawes van die “Brief-COPE en die “FACT-B” vir gebruik onder Suid-Afrikaanse borskanker pasiënte. Die studie verskaf die eerste insigte tot die verhouding tussen hanteringstrategieë en GVLG in Suid-Afrikaanse borskanker pasiënte. Die bevindinge van die studie dui ook aan watter tipe hanteringstrategieë ‘n positiewe en negatiewe invloed het op die GVLG van Suid-Afrikaanse borskanker pasiënte.

Sleutelwoorde: Borskanker, hanteringstrategieë, gesondheidsverwante lewensgehalte, “ondersoekende faktor analise, Suid-Afrika, laer-en-middel- inkomste lande”

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LIST OF ACRONYMS

BCS	Breast cancer-specific concerns
CANSA	Cancer Association of South Africa
COPE	Coping Orientation to Problem Experienced
EORTC QLQ-BR23	European Organisation for Research and Treatment of Cancer quality of life core breast cancer
EORTC QOL-C30	European Organisation for Research and Treatment of Cancer quality of life core cancer questionnaire
EFA	Exploratory Factor Analysis
EWB	Emotional well-being
FACIT	Functional Assessment of Chronic Illness Therapy
FACT-B	Functional Assessment of Cancer Therapy- Breast specific scale
FACT-ES	Functional Assessment of Cancer Therapy- Endocrine Symptom subscale
FANLTC	Functional Assessment of Non-Life Threatening Conditions
FS	Fighting spirit
FWB	Functional well-being
HHAP	Helpless-hopeless and anxious preoccupation
HFDIS	Hot Flash Related Daily Interference Scale
HRQOL	Health-related Quality of Life
LMIC	Low- and middle-income countries
PWB	Physical well-being
SF-36	Short-Form 36
SPSS	Statistical Package for the Social Sciences

SWB	Social/family well-being
QOL	Quality of life
WHOQOL-BREF	World Health Organization Quality of Life Short-Form

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Chapter 1

Introduction

1.1 Introduction and background

Cancer is a severe and life-altering disease, which can impact various aspects of an individual's health (Crawshaw, 2013; Izycki et al., 2016; Tomlinson et al., 2015). It is projected that by 2050, 70% of the annual 24 million cancer diagnoses will be made in lower- and middle-income countries (LMIC) (Kingham et al., 2013). Moreover, 62.1% of all cancer mortalities occur in LMIC, calling special attention to the management of the disease in these countries (Ferlay et al., 2015). In terms of cancer types, lung cancer has the highest mortality rate, followed by breast cancer (Bray et al., 2018). Breast cancer occurs mostly in women, however it can also occur in men (Fentiman, 2018). Breast cancer was found to have the highest incidence rate of all cancer types amongst Southern African women (Bray et al., 2018; Jemal et al., 2012).

In South Africa, the lack of a national cancer registry makes it difficult to determine the exact incidence rate of breast cancer (Edge et al., 2014). However, the latest Cancer Association of South Africa (CANSA) report states that in 2017 a total of 9,624 histological breast cancer cases were diagnosed, making breast cancer the leading cancer diagnosis amongst South African females (CANSA, 2021). According to Herd et al. (2015), South African women have a one in 32-life time risk of developing breast cancer. Several factors influence the incidence rate of breast cancer in South Africa, including urbanization and economic development, an increase in harmful lifestyle habits and the adoption of more Westernized practices along with increased longevity (Lukong et al., 2017).

Supporting the findings of Lukong et al. (2017), Sambo et al. (2012) ascribed the high incidence rate of breast cancer in Sub-Saharan Africa to the following challenges faced in the management of the disease: (1) an absence of cancer prevention strategies, policies and programs; (2) insufficient and incomprehensive data to formulate cancer and cancer-related death registries; (3) the heavy financial and psychosocial cost of cancer treatment; (4) inadequate information on the diseases along with a shortage of healthcare personnel and a shortage of local and sustainable research efforts; (5) the high cost of immunization campaigns against infections that cause cancer (i.e., human papillomavirus); (6) the unavailability and unaffordability of treatment resources and lastly, (7) an absence of collaborative efforts with stakeholders and donors to prevent and combat the disease.

Due to resource constraints, the South African healthcare system lacks effective screening programs, contributing to the poor prognosis and advanced staging that many patients receive at diagnosis (Edge et al., 2014; Lukong et al., 2017). Research has also shown that South African women are unaware of early detection tests (Pillay, 2002). Specifically, breast self-examination was found to be very scantly used by South African women (Maree et al., 2013; Pengpid & Peltzer, 2014). The lack of early detection has also been associated with the advanced staging that most South African breast cancer patients present at first consultation (Tesfamariam et al., 2013). The staging that patients present in turn influences the effect of treatment on the disease as well as how patients experience and cope with the disease (Gallagher-Squires et al., 2020; Lai et al., 2019; Mabula et al., 2012).

Although conventional treatment methods are available in certain regions in South Africa, treatment is further compounded by the presence of communicable diseases, like HIV and tuberculosis (Ayeni et al., 2020; Edge et al., 2014). Despite the challenges that South African breast cancer patients face (Joffe et al., 2018; Tesfamariam et al., 2013), the South African healthcare system has become more equipped and advanced in its management of breast cancer (Mayosi et al., 2012). This has contributed to an increase in breast cancer survival rates (McCormack et al., 2013).

Due to increased survival rates, research exploring the relationship between coping strategies and HRQOL in breast cancer patients has increased (Y. U. Cho et al., 2020). Research has shown that coping strategies are associated with better or worse HRQOL (Kvillemo & Bränström, 2014; Lashbrook et al., 2018). However, no study has explored this relationship among South African breast cancer patients. Several measures are used in measuring coping among breast cancer patients, including the Ways of Coping Questionnaire (Aldwin et al., 1980) and the Brief-COPE (Perry et al., 2007). The Brief-COPE has been administered to breast cancer patients in South Africa (Kagee et al., 2018; Roomaney et al., 2020). However, the factor validity and reliability of the measure in South African breast cancer samples is yet to be determined. In terms of HRQOL measures used in breast cancer samples, the Functional Assessment of Cancer Therapy-Breast specific scale (FACT-B) (Kobeissi et al., 2014) and the European Organisation for Research and Treatment of Cancer quality of life core breast cancer (EORTC QLQ-BR23) (Donohoe et al., 2011) are two of the most frequently used measures (Maratia et al., 2016; Mehrabi et al., 2016). The FACT-B was identified as the most reliable measure of HRQOL across several breast cancer populations (Maratia et al., 2016). Despite this, the factor validity and reliability of the measure are yet to be explored among a South African breast cancer sample.

It is of vital importance to investigate the relationship between coping and HRQOL in South Africa, as South Africans with breast cancer may face unique challenges related to the disease due to contextual, political, and socioeconomic influences. Based on the dearth of research on the relationship between coping and HRQOL of breast cancer patients in South Africa, this study firstly explored the factor structure of the Brief-COPE and the FACT-B as well as the internal consistency of the measures. Following this, the study investigated the relationship between coping strategies and the HRQOL of breast cancer patients receiving treatment at a tertiary hospital in the Western Cape, South Africa. Before more background on coping and HRQOL is presented, certain key concepts are defined below.

1.2 Definition of key terms

1.2.1 Breast cancer. A breast is a unique specialized gland that consists of tissue elements, ducts and 15-20 lobules (Nawaz et al., 2011). As hormonal changes take place, breast tissue elements and cells can act responsively or unresponsively to the changes. Changes can be non-malignant (not dangerous), atypical or cancerous of nature (Nawaz et al., 2011). Changes in breast appearance can present as a hard, irregular lump that could be tender but not painful; unusual nipple discharge (e.g. blood-stained excretion); changes in the appearance of the nipples, change in the skin of the breast/s (e.g. redness, swelling, itchiness, and/or thickening), and lumps or swelling (Nawaz et al., 2011).

1.2.2 Coping. This refers to cognitive and behavioural strategies that are continually adapted to tolerate, overcome, master, or minimize external/internal stressors. Several other definitions and theories of coping are offered (Dewe, 1987; Latack, 1986), but the theory of Lazarus and Folkman (1984) is most frequently used to define coping amongst chronic illnesses (Sanaeinasab et al., 2017). This theory is process-orientated, meaning that coping is seen as a behaviour that frequently occurs and is influenced by environmental and personal factors (Lazarus & Folkman, 1984).

1.2.3 Health-related quality of life. Quality of life is a broad term referring to the overall well-being of patients, including dimensions of financial status, partner and family support as well as access to healthcare and social services (Boatemaa Benson et al., 2020; Tsai & Lu, 2019). On the other hand, health-related quality of life (HRQOL) refers to an individual's overall health as defined by physical-, emotional-, social- and functional aspects both during and after treatment (Gordon & Siminoff, 2010; Han et al., 2003). Additionally, HRQOL also includes a focus on the impact of the disease and treatment on the health and well-being of the individual (Gordon & Siminoff, 2010; Han et al., 2003).

1.3 Needs and perceptions of breast cancer patients

Breast cancer patients face specific challenges with regards to their well-being and the fulfilment of needs (Cai et al., 2021; Liamputtong & Suwankhong, 2016; Schmid-Büchi, 2010). These needs include biological and treatment-related needs, emotional and psychological needs, informational and support needs, and psychosocial needs (Cai et al., 2021; Liamputtong & Suwankhong, 2016; Schmid-Büchi, 2010). For the breast cancer patient to cope with the effects of the disease and the psychological challenges, these needs need to be met (Cai et al., 2021; Pidlyskyj et al., 2014). The beliefs and perceptions of the patient affect how breast cancer patients experience the disease (Gyedu et al., 2017; Henriksen et al., 2015; Mermer et al., 2016). The perceptions that patients hold of themselves are influenced by emotions of vulnerability (Tu et al., 2020), a loss of femininity (Salem & Daher-Nashif, 2020) and the socio-economic and socio-cultural background (Donnelly et al., 2013; Gyedu et al., 2017). Breast cancer treatments often result in bodily changes (Boatemaa Benson et al., 2020; Foerster et al., 2019), which leads to alterations in the body image and self-concept of the patients. The perceptions that breast cancer patients hold are important as their beliefs, knowledge and expectations influence how they experience and cope with the disease (Donnelly et al., 2013; Mishra & Saranath, 2019; Shah et al., 2017).

1.4 Subjective experiences of breast cancer patients

Receiving a breast cancer diagnosis and undergoing treatment sees the patient encounter a range of experiences. These experiences include both psychological (Ban et al., 2021; Haji-Seyed-Sadeghi et al., 2020; Y. Li et al., 2019) and physical impacts (Lai et al., 2019; Vadaparampil et al., 2017). Many patients experience different forms of psychological distress (fear, anxiety, shock) and changes in self-esteem, body image and self-perception. Furthermore, the physical impact of the disease also impacts the well-being of the patient (Lai et al., 2019; Vadaparampil et al., 2017). The interaction of psychological experiences and physical experiences are inextricably interconnected and impact patients in different ways (Fisher et al., 2021; Haddou Rahou et al., 2016). Both the subjective experiences of receiving a breast cancer diagnosis and undergoing treatment are important determinants in how patients make sense of and cope with the disease (Gallagher-Squires et al., 2020; Lai et al., 2019).

1.5 Coping with breast cancer

Coping refers to strategies used to tolerate, overcome, or minimize stressful factors (Lazarus & Folkman, 1984). Breast cancer patients use coping strategies to deal with the physical challenges, psychological challenges, social challenges, and functional challenges of the disease (Al-Naggar et al., 2016; Bergerot et al., 2019; Fatiregun et al., 2017). These challenges include receiving the initial diagnosis, dealing with side-effects of treatment, managing fear, depression and anxiety, and dealing with financial implications of the disease (Al-Naggar et al., 2016; Badger et al., 2007; Bergerot et al., 2019; Berterö & Wilmoth, 2007; Fatiregun et al., 2017; Haddou Rahou et al., 2016; Moreira & Canavarro, 2013; Santin et al., 2015; Yan et al., 2016). Taking into account the low age-at-incidence rate and advanced staging that African women receive at diagnosis, coupled with resource constraints (Lukong et al., 2017; Torre et al., 2016), breast cancer patients in South Africa may have an increased reliance on coping strategies to deal with the disease.

Several reviews on coping measures used in breast cancer samples (Kvillemo & Bränström, 2014; Lashbrook et al., 2018; Mehrabi et al., 2016) have identified the most frequently used coping measures as the Ways of Coping Questionnaire (Folkman et al., 1986), the Mental Adjustment of Cancer (MAC) (Watson et al., 1988), the Mini-Mental

Adjustment of Cancer (Hulbert-Williams et al., 2012), the COPE (Kraemer et al., 2011), and the Brief-COPE (Carver, 1997). Furthermore, the Brief-COPE emerged as the most popular measure of coping across all the reviewed studies (Kvillemo & Bränström, 2014; Lashbrook et al., 2018; Mehrabi et al., 2016). Moreover, the measure has shown good reliability across a variety of samples across the world (Boatemaa Benson et al., 2020; Elsheshtawy et al., 2014; Solberg et al., 2021). To determine the extent to which the Brief-COPE measure what it is intended to, the factor validity was explored amongst breast cancer samples in the USA, United Kingdom and Canada, producing a different factor structure in each of the samples (Bellizzi & Blank, 2006; Brain et al., 2008; Fillion et al., 2002; Fletcher et al., 2006; A. W. T. Wang et al., 2018). As the Brief-COPE has been developed for use in developed countries, it is unclear how the scale might be perceived in a different socioeconomic- and cultural context (Panagiotou et al., 2014). However, to date, no study has explored the factor validity of the Brief-COPE amongst a breast cancer sample in a LMIC, like South Africa.

1.6 Health-related quality of life

HRQOL refers to psychological, social, emotional, functional and physical aspects related to the individual's overall health (Gordon & Siminoff, 2010; Han et al., 2003). The assessment of HRQOL is not only used to examine treatment effectiveness but also utilised to guide the patient's future treatment plans (Maratia et al., 2016; Neuner et al., 2014). Compared to the general population, women with breast cancer have significantly worse HRQOL (Y. U. Cho et al., 2020). The HRQOL of breast cancer patients is influenced by both individual- and systemic factors unique to the context of the patient (Maratia et al., 2016). Individual factors influencing the HRQOL of breast cancer patients include demographic characteristics, cancer-related factors, and the general health of the patient (Vadaparampil et al., 2017). On the other hand, systemic factors refer to the health care system, the socioeconomic context as well as the cultural factors that influence the breast cancer patient (Abu-Helalah et al., 2014; Yan et al., 2016).

The HRQOL of breast cancer patients is measured by both generic and disease-specific measures. Generic measures are used to measure the HRQOL of a variety of chronic illnesses (Ware et al., 2016) and include scales like Short-Form 36 (SF-36) (Leung et al., 2014), the World Health Organization Quality of Life Short-Form (WHOQOL-BREF) (Van Esch et al., 2011) and the Functional Assessment of Non-Life Threatening Conditions (Giurgi-Oncu et al., 2021). However, generic measures are less sensitive to disease-specific aspects affecting HRQOL (Ware et al., 2016) and for this reason, disease-specific measures are used. The Functional Assessment of Cancer Therapy-Breast specific scale (FACT-B) (Kobeissi et al., 2014) and the European Organisation for Research and Treatment of Cancer quality of life core breast cancer (EORTC QLQ-BR23) (Donohoe et al., 2011) were identified as the two most frequently used breast cancer-specific HRQOL measures (Lemieux et al., 2011; Maratia et al., 2016; Mokhatri-Hesari & Montazeri, 2020).

Additionally, the FACT-B was found to have the best global performance of HRQOL measures (Maratia et al., 2016). This has seen the reliability of the subscales and the overall measure being confirmed in different cultural and socioeconomic settings (Pandey et al., 2002; Patoo et al., 2015; Shen et al., 2020). Despite its wide use, only two studies have explored the factor validity of the FACT-B, one in Iran (Patoo et al., 2015) and one in Saudi Arabia (Algamdi & Hanneman, 2019). This underlines the need for the factor structure of the measure to be explored amongst breast cancer samples in different countries. Furthermore, obtaining reliable versions of the Brief-COPE and the FACT-B will allow for the exploration of the relationship between coping and HRQOL of breast cancer patients.

1.7 The relationship between coping and HRQOL

Due to increased survival rates, research exploring the relationship between coping strategies and HRQOL in breast cancer patients has increased (Y. U. Cho et al., 2020). In most cases, adaptive coping strategies are associated with higher HRQOL scores (Filazoglu & Griva, 2008; Kvillemo & Bränström, 2014; Yan et al., 2016). However, breast cancer patients may rely on a combination of strategies at different phases of the disease, with varying effects on the different domains of HRQOL (Fasano et al., 2020). The coping strategies used and their relationship with the HRQOL of the breast cancer patient has been found to vary across different settings (Mehrabi et al., 2016). In South Africa, several socioeconomic- and cultural factors might influence the relationship between coping and HRQOL (Gallagher-Squires et al., 2020). However, no study has investigated this relationship amongst breast cancer patients in South Africa. This is underlined by Sutherland (2018) calling for the exploration of the relationship between coping and HRQOL amongst breast cancer patients in LMIC.

1.8 Rationale

As breast cancer incidence is on the rise (Bray et al., 2018; Jemal et al., 2012), it has led to an increase in HRQOL research among this interest group (Calderon et al., 2019; Z. Liu et al., 2020). Specifically, in South Africa, breast cancer has the highest incidence rate of cancer types among women (Jemal et al., 2012). Considering the country's unique socioeconomic and diverse cultural landscape, breast cancer patients employ coping strategies determined by their circumstances to deal with symptoms and side-effects of treatment. As these coping strategies are associated with the HRQOL that patients report (Neuner et al., 2014; Préau et al., 2013), it is important to know which coping strategies patients employ and to gain insight into the relationship between these coping strategies and HRQOL. To explore this relationship, accurate measures of coping and HRQOL are required

(Campbell et al., 2012; Kvillemo & Bränström, 2014). This will provide valuable insight into how clinical practices and psychological interventions should be modified in the future to address the needs of the patients (Maratia et al., 2016; Neuner et al., 2014). Furthermore, it will provide useful information for future research on coping and HRQOL in South African breast cancer patients.

In an earlier study, data were collected on the coping strategies (using the Brief-COPE) and the HRQOL (using the FACT-B) of a breast cancer patient sample receiving treatment at a clinic in a public tertiary hospital in Western Cape, South Africa (Kagee et al., 2018; Roomaney et al., 2020). However, the data on the patients' coping and HRQOL was yet to be analysed. To investigate the research gaps highlighted above, the data from the Brief-COPE and the FACT-B was used in the current study. Firstly, the factor validity of the Brief-COPE and the FACT-B was assessed through an exploratory factor analysis. Thereafter, the internal consistency reliability of both measures was investigated. Following this, the validated measures were used to explore the relationship between coping and HRQOL among female breast cancer patients in the Western Cape, South Africa.

1.9 Research Aims

The study aimed to explore the relationship between coping and HRQOL. The objectives were as follows:

Aim 1: To explore the factor structure of the Brief-COPE and the FACT-B measures among women seeking treatment for breast cancer at a tertiary hospital in the Western Cape, South Africa.

Aim 2: To determine the internal consistency reliability of the subscales of the Brief-COPE and the FACT-B among women seeking treatment for breast cancer at a tertiary hospital in the Western Cape, South Africa.

Aim 3: To investigate the relationship between coping and HRQOL among women seeking treatment for breast cancer at a tertiary hospital in the Western Cape, South Africa.

1.10 Impact of the study

Being able to accurately monitor coping and HRQOL is paramount to managing breast cancer. For this reason, the factor analysis delivered the first factor validated versions of the Brief-COPE and the FACT-B for use amongst female breast cancer patients in South Africa. Furthermore, by also determining the reliability of the measures, future research on breast cancer patients in South Africa will be able to utilize validated and reliable measurements of coping and HRQOL. Healthcare providers will be provided with accurate information on which coping strategies breast cancer patients rely on. This information is valuable in informing treatment management and possible interventions aimed at equipping breast cancer patients with coping mechanisms to deal with the breast cancer diagnosis and treatment. Furthermore, the new validated measures will allow for the exploration of the relationship between coping strategies and HRQOL among other breast cancer samples in South Africa as well as other LMIC. All of the research aims of the study were novel and contributed to a growing body of research on coping and the HRQOL in breast cancer patients in LMIC.

1.11 Organisation of dissertation

Chapter 1 consists of the introduction of the thesis. This covers the definitions of important concepts that are used in the study as well as the problem identification. The aims of the study are defined, followed by a summary of the impact of the study. Lastly, the organization and overview of the thesis are provided.

Chapter 2 contains the literature review and starts by describing breast cancer in LMIC and specifically South Africa. Additionally, factors contributing to the disease are explored whereafter the classification, screening and treatment of the disease are discussed. The coping strategies used by breast cancer patients as well as the utilization of the Brief-COPE are also explored. This is followed by a review of the HRQOL of BC patients and the measurement thereof through the FACT-B. Lastly, the chapter outlines the theoretical frameworks employed to explore the relationship between HRQOL and coping.

Chapter 3 presents the methods used in this study. The chapter contains the research design, a description of data collection and analysis and ethical considerations.

Chapter 4 reports on the results of the statistical analysis. This will entail a general description of the main findings of the procedures, results of the validation of the measures and finally the correlation between coping and HRQOL.

Chapter 5 presents the key findings of the analysis. This will comprise of a discussion of the three study objectives and an integration of the findings with the theoretical frameworks of Lazarus and Folkman (1984) Stress and Coping Model and the Biopsychosocial Model.

Chapter 6 offers a summary of the main findings of the study. The strengths and limitations of the study are presented, whereafter possible reasons for the findings of the study will be presented. Recommendations for future research and clinical practice will be presented in this chapter. Lastly, a conclusion of the study's findings is presented.

Chapter 2

Literature review

2.1 Introduction

Worldwide, breast cancer is the most frequently diagnosed malignancy among women (Yan et al., 2016). In the first section of this chapter, I present prominent research findings, international and local (where possible) on the aetiology of the disease, screening and diagnostic services, treatment methods and the context of the disease in South Africa and Africa. Following this, I explore the needs of breast cancer patients, factors influencing their perceptions of the disease, how patients experience the breast cancer diagnosis and subsequent treatment as well as how these experiences influence their coping with breast cancer. The second section presents a conceptualization of coping and explores coping with cancer and specifically coping with breast cancer. This includes factors influencing coping with breast cancer and the specific coping strategies used by breast cancer patients. Following this, I detail how coping is measured, which includes a detailed discussion on the Brief-COPE and the measure's psychometric properties.

The third section presents a definition of HRQOL and a review of HRQOL in the context of breast cancer. Following this, generic and disease-specific measures of HRQOL are discussed, whereafter a description of the FACT-B and the measure's psychometric properties are presented. The fourth section elaborates on the relationship between coping and HRQOL. This includes a description of the relationship between coping strategies and HRQOL in breast cancer patients. Lastly, the final section introduces the theoretical framework that underpins coping (the Stress and Coping Model) as well as the framework underpinning HRQOL (the Biopsychosocial Model). This includes a description of the models and critiques against them.

Section 1: Background

2.2 Aetiology of breast cancer

Although the exact cause of breast cancer may vary, research has demonstrated that breast cancer could be caused by a multifaceted interaction of lifestyle habits and genetic factors. Both of these factors have been associated with the high incidence rate of breast cancer recorded in Africa (Brinton et al., 2014; Kantelhardt et al., 2015; Lukong et al., 2017). The adoption of harmful 'Western' lifestyle habits (i.e., smoking, drinking, obesity, physical inactivity and reproductive behaviours) has been associated with the low age-standardized incidence rate of breast cancer amongst African patients (Brinton et al., 2014; Kantelhardt et al., 2015).

2.3 Screening and diagnostic services

Screening programmes have been proven to effectively reduce breast cancer mortality by promoting the early detection and treatment of the disease (Lukong et al., 2017). However, the majority of African countries are yet to initiate country-wide breast cancer screening programmes (Lukong et al., 2017). Despite breast cancer being recognised as a public health issue in South Africa, screening services are still lacking (Edge et al., 2014; Moodley et al., 2016, 2018; Salem & Daher-Nashif, 2020). This is highlighted by the absence of a national mammography screening programme (Edge et al., 2014; Moodley et al., 2018). Screening usually consists of either a breast self-examination, clinical breast examination, mammography or ultrasonography (Panieri, 2012).

2.3.1 Breast self-examination. This procedure entails self-palpitation of the breasts to detect any abnormal growths (Kayode et al., 2005). Breast self-examination is frequently recommended by physicians in LMIC as it is painless, easy to practice and cost-free (Koon et al., 2013; Suh et al., 2012). Although the advantages of this method have been established, there is still a reluctance to conduct self-examinations (Pengpid & Peltzer, 2014; Suh et al., 2012). Reasons for this are a fear instigated by the perceptions of breast cancer being a deadly disease, a reluctance to practice self-examination due to cultural beliefs, and the individual's lack of knowledge of breast cancer (Oladimeji et al., 2015; Pengpid & Peltzer, 2014; Suh et al., 2012).

2.3.2 Clinical Breast Examination. A clinical breast examination is a procedure where a health professional uses palpitations and a visual assessment to examine the patient's breasts (Albeshan et al., 2020). According to the World Health Organization (2018), this method is recommended as a viable approach for breast cancer detection in low resource countries. This method is frequently used in areas where financial constraints prevent mammograms and ultrasonography from being used as diagnostic tools (Gutnik et al., 2016).

2.3.3 Mammography. This sees the use of specialized medical imaging that employs a low-dose x-ray system to examine the breasts (Lauby-Secretan et al., 2015). Recent advances in the field have seen the emergence of digital mammography, computer-aided detection systems, and breast tomosynthesis (Radiologyinfo.org, 2019). Mammography is the most used screening method and has proven to be effective in the early detection of the disease (Heywang-Köbrunner et al., 2011). Interestingly, in South Africa where screening services are more available compared to other LMIC, a 2008 nationwide survey found that only 15.5% of women, aged 50 years or older, had ever undergone a mammography (Peltzer & Phaswana-Mafuya, 2014).

2.3.4 Ultrasonography. Many African countries rely on ultrasonography as it is a more cost-effective screening method than mammography (Lukong et al., 2017). This technique uses echoes of ultrasound pulsations to identify areas with different densities in the breasts (Lauby-Secretan et al., 2015). Ultrasonography is especially useful in detecting breast cancer in cases where women have obtained a negative result from a mammogram or for young women whose breast density is too high for a mammogram (Kantelhardt et al., 2015). The cost-effectiveness of the method has seen its adoption as a preferred screening method in several African countries including, South Africa, Uganda, Egypt and Nigeria (Agodirin et al., 2012; Denewer et al., 2010; Dickerson et al., 2017; Galukande & Kiguli-Malwadde, 2010).

2.4 Treatment methods

For an early-stage diagnosis, surgery and radiation therapy are the most effective treatment methods (Jemal et al., 2012). However, depending on the subtype and staging of the breast cancer (Lukong et al., 2017), the prescribed treatment possibilities also include targeted therapy, radiotherapy, chemotherapy or a combination of the treatment methods (Price et al., 2012). All the treatment methods (if available) may come at a high cost to patients in LMIC, preventing patients from initiating the required treatment at an early stage (Lukong et al., 2017; Price et al., 2012). Treatment methods include targeted therapies (Lukong et al., 2017), surgery (Soriano et al., 2019), radiotherapy (Sharma et al., 2020), chemotherapy (Vanderpuye et al., 2017), and traditional medicine and complementary treatments (Li et al., 2013; Salem & Daher-Nashif, 2020). The treatment methods mentioned are described in further detail in Appendix A.

2.5 Breast cancer in the context of Africa and South Africa

In African countries, lung-, breast- and prostate cancer are the most commonly diagnosed cancer types (Jemal et al., 2012; Torre et al., 2016). A review of data from the GLOBOCAN 2012 series indicated that breast cancer accounted for 25% of all cancer diagnoses and 20% of all recorded cancer deaths in 26 African countries, including South Africa (African Cancer Registry Network, 2017; Ferlay et al., 2015). Moreover, the incidence rate of breast cancer in Africa is on the rise with an increase from 92,600 new cases in 2008 to 133,900 new cases in 2012 (Ferlay et al., 2015; Soerjomataram et al., 2012). As the majority of LMIC do not have cancer registries, the incidence rate in African countries is suspected to be even higher than recorded (Kantelhardt et al., 2015).

The precise figure of breast cancer incidence in South Africa is unknown but appears to be increasing due to rising life expectancies and urbanization (Edge et al., 2014; Lukong et al., 2017). The uncertainty surrounding the precise incidence rate is due to a lack of a national cancer data registry, which means that available data on the disease is gleaned from oncology units in larger healthcare centres (Edge et al., 2014; Kantelhardt et al., 2015). Despite Edge and colleagues (2014) reporting that breast cancer and complications related to the disease are one of the leading causes of cancer deaths in South Africa, breast cancer does not receive the necessary attention or apportion of resources. This is further compounded by the socio-economic circumstances of the country (Ayeni et al., 2020). These refer to factors such as employment, income, financial difficulties, education and health status (Ayeni et al., 2020; Brinton et al., 2014).

Patients utilizing the healthcare system in South Africa face several challenges in receiving a diagnosis and the required treatment, such as a lack of access to treatment facilities, low socioeconomic status, a lack of transport, a lack of knowledge on diseases, unemployment, and financial constraints (Edge et al., 2014; Sutherland, 2018). These difficulties compound the challenges faced by breast cancer patients in accessing the required breast health services. The Action Study Group (2017) found in their longitudinal study on 5,249 cancer patients from eight LMIC in Southeast Asia that patients with advanced-stage cancer and low socioeconomic status were most at risk for poor clinical outcomes. Due to socioeconomic circumstances, many South African breast cancer patients receive treatment from state hospitals (Joffe et al., 2018). Several studies have found that a significant number of these patients then present with clinically advanced breast cancer at diagnosis (Cubasch et al., 2013; Edge et al., 2014; Porter et al., 2013). Joffe and colleagues (2018) investigated barriers to early presentation among 499 South African breast cancer patients and found that patients who were more likely to receive an advanced staging if they took longer than three months from the recognition of breast cancer symptoms to visit a healthcare facility. Furthermore, their study also reported that those with advanced diagnoses were more likely patients with little breast cancer awareness and knowledge and had less than a high school qualification (Joffe et al., 2018). As South Africa, like many LMIC, does not have a national mammography screening campaign, women typically self-present to primary healthcare facilities, whereafter they are referred to secondary or tertiary level healthcare facilities (Moodley et al., 2016, 2018). The lack of early diagnostic programmes contributes to the advanced staging that South African breast cancer patients receive (Ayeni et al., 2020; Joffe et al., 2018; Moodley et al., 2016, 2018). Based on the studies discussed above, it is evident that many South African breast cancer patients face difficulties in accessing healthcare services. Furthermore, a lack of adequate screening interventions and engagement by members of the public contributes to the great number of patients presenting with advanced breast cancer.

The staging received at diagnosis determines the treatment that patients can receive as well the quality of life they might experience (da Costa Vieira et al., 2017; Dano et al., 2019). Multimorbidity has also been associated with delays in breast cancer presentation while also affecting treatment decisions and outcomes (Ayeni et al., 2020; Edge et al., 2014). For example, among 1,200 breast cancer patients at a tertiary hospital in Soweto, 20% were HIV-positive and more than 50% presented with advanced (stage 3 or 4) breast cancer (Cubasch et al., 2013; Porter et al., 2013). This is important to note because comorbidity has implications for treatment.

Section 2: The breast cancer patient

2.6 Needs of breast cancer patients

Research on breast cancer patients has shown that this group have specific psychological needs, social needs, practical needs, physical needs, and informational needs (Cai et al., 2021; Ellegaard et al., 2017; Ginter & Braun, 2019; Naik et al., 2020; Pidlyskyj et al., 2014). For the patient to have positive psychological experiences while receiving a breast cancer diagnosis, undergoing treatment, and coping with the effects of the disease, patients need to fulfil the above-mentioned needs (Cai et al., 2021; Pidlyskyj et al., 2014). According to Schmid-Büchi (2010), a need is an internalized compulsion that drives goal achievement behaviour to achieve well-being. Receiving a breast cancer diagnosis and undergoing subsequent treatment poses a specific challenge to the fulfilment of needs, well-being, and the goal achievement behaviour of the patient (Cai et al., 2021; Liamputtong & Suwankhong, 2016; Schmid-Büchi, 2010). Several individual factors and cultural factors such as age, cancer stage, the intensity of psychological distress, social support, coping strategies and socioeconomic circumstances influence the breast cancer patient’s psychosocial needs and responses (Iwatani et al., 2013; The Action Study Group, 2017).

2.6.1 Biological and treatment-related needs. These needs refer to physical aspects related to breast cancer, namely scarring, disfigurement, cognitive impairment, fatigue, pain, challenging physical treatment and possible complications, other chronic illnesses and comorbidities (Aaronson et al., 2014; Ayeni et al., 2020; Browall et al., 2016; Ganz, 2015; Pidlyskyj et al., 2014), as well as functional disabilities, menopausal complications, and sleep disturbances (Lai et al., 2019; Logan et al., 2019; Zhao et al., 2013). In a study by Lam et al. (2018), on patient satisfaction in a sample of 213 Chinese patients with advanced breast cancer, unmet treatment-related needs were associated with poorer levels of patient satisfaction. The findings of Lam et al. (2018) have been confirmed by previous studies on treatment-related needs in breast cancer samples (Brown et al., 2009; Lam et al., 2014). However, it must be noted that the advanced staging of patients in the study by Lam and colleagues (2018) could influence the satisfaction that patients report.

2.6.2 Emotional and psychological needs. Several emotional and psychological issues and needs, such as femininity, loss of sense of desirability, sexuality and body image issues could be directly attributed to specific physical problems (Al Shaikh, 2018; El-Adham & Elsherif, 2018; Hammoudeh et al., 2017)**.** Breast cancer patients reporting on body image dissatisfaction frequently mention issues with their appearances, scarring, disfigurement, being self-conscious in social settings and having low self-esteem (El-Adham & Elsherif, 2018; Fatiregun et al., 2017; Hsiao et al., 2019). In the quantitative study of Hsiao and colleagues (2019), on 83 Chinese breast cancer patients, the QOL following surgery was investigated and no changes with regards to body image were reported at the baseline, two-, five, eight- and 12-months post-surgery assessment points. Many other psychological challenges and needs arise from dealing with breast cancer, which include, role limitations, a loss of sense of autonomy, fear, psychological distress and anxiety (Fasano et al., 2020; Kagee et al., 2018; Lai et al., 2019; Salisu et al., 2021). Additionally, patients also reported experiencing feelings of anger and/or guilt, distress as well as symptoms of adjustment disorder, depression and post-traumatic stress disorder (Daniel et al., 2021; Fasano et al., 2020; Kagee et al., 2018; Tang et al., 2020). In the quantitative study of Kagee et al. (2018) on 201 South African breast cancer patients, 34.3% scored above 44 on the Hopkins Symptom Checklist, while 36.3% scored in the elevated range on the Center for Epidemiological Studies Depression scale, indicating that more than one-third of patients experience clinical distress and symptoms of depression. Therefore, both the cancer diagnosis and subsequent side-effects of treatment leaves patients with emotional and psychological needs that could affect their HRQOL, if they remain unmet.

2.6.3 Informational and support needs. Informational and support needs of breast cancer patients refer to the need for information on treatment and possible side-effects, possible additional and self-help interventions, as well as remission and information related to patient mortality (Cai et al., 2021; Hubbeling et al., 2018; Murchison et al., 2020). In the qualitative study of Hubbeling and colleagues (2018) that investigated the psychosocial needs of 25 Mexican breast cancer patients, patients reported that unmet informational needs contributed to symptoms of anxiety and suicidal ideations. Patients frequently reported the importance of the way the information is presented to them by the healthcare personnel (Cai et al., 2021). Difficulties in communication between the patient and healthcare personnel have been found to result in increased anxiety, feelings of insecurity and a decrease in social- and emotional well-being (Nader et al., 2016; Schmid-Büchi et al., 2008). Furthermore, a lack of information and support has been associated with greater post-operative depression (Angela-Sammarco & Konecny, 2010), worse psychological well-being (Vivar & McQueen, 2005) and an overall worse QOL (Angela-Sammarco & Konecny, 2010; Kroenke et al., 2013). Importantly, Cai et al. (2021) noted that most studies on the informational- and support needs of breast cancer patients have been conducted on Caucasian samples. This highlights the need for studies on breast cancer patients with different ethnicities.

2.6.4 Psychosocial needs. The psychosocial needs of breast cancer patients refer to social support and reliance on the patient’s partner, family, friends and healthcare team (Salakari et al., 2017; Salisu et al., 2021; Yan et al., 2016). Furthermore, access to affordable multidisciplinary treatment for the patient and their family, financial difficulties, a lack of medical aid, unemployment, a lack of transport and a general lack of social support are all social needs and issues that breast cancer patients reported (Ginter & Braun, 2019; Palmer et al., 2016; Sibhat et al., 2019; Vanderpuye et al., 2017). These psychosocial needs could have a significant physical and psychological impact on how the patient experiences the disease if they remain unmet (Palmer et al., 2016; Sibhat et al., 2019). Moreover, if these needs remain unmet, the HRQOL of the breast cancer patients is negatively affected (Brédart et al., 2013; Brennan et al., 2016; Palmer et al., 2016). It is important to note that the diagnosis and treatment of breast cancer affect the entire social support network of the patient (Hammersen et al., 2021; Hertogh, 2021; Wells et al., 2021). In the quantitative study by Hammersen and colleagues (2021), on 561 German breast cancer patients, 59.3% stated that they needed a family-centred psychosocial support program, while 33.3% stated that their children also required psychosocial support. However, the study is limited as family members were not assessed themselves, with data only gathered from the breast cancer patients. This gap in research can be addressed by future studies on South African breast cancer patients and their families.

2.7 Factors influencing patients' perceptions of breast cancer

The breast cancer patient's perceptions, beliefs and understanding regarding the diagnosis and treatment of the disease may determine how the patient experiences the disease (Gyedu et al., 2017; Henriksen et al., 2015; Mermer et al., 2016). It is important to understand how women perceive breast cancer as the patient's beliefs, expectations and knowledge (or lack thereof) may influence how they cope with breast cancer (Donnelly et al., 2013; Mishra & Saranath, 2019; Shah et al., 2017). Patients' perception of themselves might be influenced by feelings of a loss of femininity due to bodily changes (Salem & Daher-Nashif, 2020), feelings of vulnerability (Tu et al., 2020) as well as experiencing a sense of a loss of sexual attractiveness (Lamore et al., 2020). Moreover, the perspectives that patients hold with regards to breast cancer have to be interpreted in the context of their specific socio-economic and socio-cultural background (Donnelly et al., 2013; Gyedu et al., 2017).

A quantitative study by Donnelly et al. (2013) on beliefs and attitudes of 1,063 Arabic women toward breast cancer and screening services found that the individuals' values, attitudes, and social stigma influenced their beliefs with regards to the aetiology of the disease. These beliefs included family history, unhealthy lifestyle choices, not breastfeeding and fatalism (Donnelly et al., 2013). Other studies on the perception of the general population towards breast cancer identified religion (Elewonibi & BeLue, 2019), a lack of harmony with ancestral/superhuman forces (Tetteh & Faulkner, 2016) and a lack of knowledge (Chaka et al., 2018; Sari et al., 2019) as factors that influence the perceptions that individuals hold towards breast cancer.

Investigating the perception of cancer patients towards the disease, a qualitative study by Assaf and colleagues (2017) on 20 breast cancer patients from the United Arab Emirates, found that patients perceived breast cancer as a deadly disease that should not be discussed. Furthermore, patients felt that they would forever be stigmatized, leading to self-isolation, reliance on prayer as solace and a cultural reluctance in disclosing their health status to others (Assaf et al., 2017). Interestingly, only women with permission from their husbands were included in the study, biasing findings towards women with a greater sense of social freedom.

Khan and colleagues (2015) included 42 articles in their review on the association of cultural perceptions and knowledge on delays in diagnosis and treatment of breast cancer among Malaysian women and found that several studies reported that breast cancer brought about a disruption to the woman's role in the family, leading them to refuse breast cancer treatment (Khan et al., 2015). In line with these findings, a qualitative study by Citrin et al. (2012), investigated the beliefs and perceptions of 60 American breast cancer patients. Thirty patients rejected conventional treatment based on negative perceptions towards their treating physicians, beliefs of chemotherapy being 'poison' and perceiving treatment guidelines as a 'one-size fits all' approach (Citrin et al., 2012). Interestingly, patients who initially accepted and later rejected conventional treatment ascribed their decision to the communication style and information presented by the treating physician (Citrin et al., 2012). Moreover, a quantitative study by Norsa'adah et al. (2011), on 328 Malaysian breast cancer patients, found that patients perceived surgery as a threat to their appearance and ability to perform their cultural role leading to a delay in treatment and reliance on alternative therapies. Both delays in presentation and treatment as well as refusing treatment were significantly associated with poorer emotional functioning and physical functioning as well as poorer global health status (Pinheiro et al., 2017).

Hawley et al. (2017), also found that breast cancer patients reported a skewed perception of breast cancer recurring or spreading. In their quantitative study on 2,578 breast cancer patients from Los Angeles and Georgia (United States), 30.4% of women numerically and 14.7% descriptively overestimated the risk of breast cancer recurring. This overestimation of cancer severity was attributed to a family history of breast cancer, anxiety, and a higher level of education among patients. The finding of anxiety influencing perceptions of breast cancer was confirmed by studies in breast cancer patients in Malaysia (Khan et al., 2015), Saudi Arabia (Alrashidi et al., 2017) and Pakistan (Agha & Rind, 2021).

Furthermore, in the qualitative study of Agha and Rind (2021), on the beliefs and perceptions of 42 breast cancer patients in rural Pakistan, it was found that patients held perceptions of breast cancer being contagious. This perception, that the disease could be transmitted through touch or proximity, led to some women being abandoned by their husbands (Agha & Rind, 2021). However, this perception is not unique to breast cancer patients in Pakistan, as a belief that the disease is contagious was recorded among breast cancer samples and other members of their community in Qatar (Donnelly et al., 2013), United Arab Emirates (Assaf et al., 2017), Bahrain (Jassim & Whitford, 2014), Australia (Kwok & White, 2014), Mexico (Hubbeling et al., 2018) and China (Hu et al., 2021; Tsai & Lu, 2019). Moreover, faith in fatalism and the idea that breast cancer is an incurable disease emerged as factors influencing the perception of breast cancer patients (Agha & Rind, 2021).

It is evident in the above-mentioned research that religious and social practices, as well as mythology and stigmas associated with the disease, occur across cultures and religions (Elewonibi & BeLue, 2019; Gyedu et al., 2017; McKenzie et al., 2018; Tetteh & Faulkner, 2016). Mythology-based beliefs such as breast cancer being contagious and that having the disease is a form of punishment or karma, enhanced stigmatization and prohibited patients from seeking a diagnosis or receiving the required treatment (Assaf et al., 2017; Dewan et al., 2020; Yeung et al., 2019).

Worldwide, expansive research has been conducted on women's perception of breast cancer, but only a small amount of South African studies are available. Despite the findings reported being thorough and explicit, it only provides a generalized overview of the psychological, social, and emotional challenges that breast cancer patients face. It has to be noted that specific individual differences in experiencing a breast cancer diagnosis is more difficult to relay and was not mentioned in detail. Considering South Africa's diverse socio-cultural and socioeconomic background, more research on this topic is warranted. Furthermore, none of the studies reviewed has investigated how these perceptions influence the coping strategies that South African breast cancer patients employ to deal with the disease. Despite the gaps in the literature, the above-mentioned studies indicate the significant impact of the perception of the patient and how they experience the breast cancer diagnosis and treatment.

2.8 Subjective experiences of breast cancer patients

Based on the literature above, the psychosocial needs of breast cancer patients and their perceptions of the disease, both impact greatly on women's experiences of receiving a breast cancer diagnosis and undergoing treatment. There are a few important processes that describe the intensity with which patients experience the breast cancer diagnosis. These processes include existential plight, liminality and transformative experience (Fallah et al., 2012; Kernan & Lepore, 2009; Liamputtong & Suwankhong, 2016; Martino et al., 2019; Smit et al., 2019). In the context of this study, gaining a deeper understanding of how patients experience the breast cancer diagnosis would enhance the understanding of how patients cope with the disease.

2.8.1 Processes underpinning the experiences of breast cancer patients. According to Kernan and Lepore (2009), breast cancer patients undergo a process embodied by a critical period of intense emotional burdens, anxiety about one's health and continuing thoughts about one's mortality. Existential plight, as defined by Weisman and Worden (1977), refers to the increase of thoughts concerning one's existence and potential death following a cancer diagnosis. For this reason, receiving a breast cancer diagnosis can be a stressful experience and transformative experience (Y. U. Cho et al., 2020), viewed as a significant moment in which the life of the patient is irrevocably altered (Liamputtong & Suwankhong, 2016; Zhang et al., 2017). The transformative nature of receiving a breast cancer diagnosis is defined by the concept of liminality (Smit et al., 2019; Trusson et al., 2016).

Avdi and Koutri (2016) noted that individuals enter a transitional period (liminal zone) from the moment of their breast cancer diagnosis. This period encapsulates the ambiguity that a patient experiences as they transition between health and illness. This increased awareness of their mortality causes breast cancer patients, their partners as well as their family and friends to re-evaluate their beliefs, motives, needs, behaviour and coping strategies (Y. U. Cho et al., 2020; Emanuel et al., 2017; Tu et al., 2020). According to Thombre and Rogers (2009), a transformative experience comprises an event/experience that starts a process of self-communication, causing the individual to revaluate their priorities and to refocus their self-identity. The transformative experience of receiving a breast cancer diagnosis comprises a collection of existential events which influences physical and cognitive functioning, often causing disruptions and disintegration of the patient's meaning structures

(Carel, 2016; Martino, Gargiulo, et al., 2019; Ng et al., 2017) and health-related quality of life (Lai et al., 2019).

2.8.2 Receiving the breast cancer diagnosis and initiating treatment. Both qualitative and quantitative studies reported that a breast cancer diagnosis has a negative psychological impact on the patient and their family (Ban et al., 2021; Haji-Seyed-Sadeghi et al., 2020; Y. Li et al., 2019). These psychological experiences of breast cancer may include feelings of fear, anxiety, sorrow, unpredictability, grief, shock, indignation and anguish regarding sexual functioning and body image (Ban et al., 2021; Boatemaa Benson et al., 2020; Gallagher-Squires et al., 2020; Hashemi et al., 2019; Liamputtong & Suwankhong, 2016; Overton & Cottone, 2016).

Along with the subjective experiences of the patient following a breast cancer diagnosis, the subjective experiences of undergoing treatment is also important in determining how patients make sense of and cope with breast cancer (Gallagher-Squires et al., 2020; Lai et al., 2019). Following a breast cancer diagnosis, initiating treatment is routinely the next step (Boatemaa Benson et al., 2020). Despite advances in breast cancer treatment (del-Rosal-Jurado et al., 2020), treatment duration and complexity have increased (Azim et al., 2015; Sumpio et al., 2017). Treatment complexities may include a combination of different treatment methods and procedures, waiting lists, many medical appointments, visiting multiple specialists, and treatment decision-making fatigue (Emanuel et al., 2017; Kvillemo & Bränström, 2014; Lamore et al., 2020; Lukong et al., 2017). For this reason, dealing with breast cancer brings about an intense need for informational and emotional support (Lambert et al., 2020; Lamore et al., 2020; Nader et al., 2016). As also mentioned above, breast cancer brings about a transformative experience impacting physical aspects, and psychological aspects of the patient's life (Carel, 2016; Martino, Gargiulo, et al., 2019; Ng et al., 2017). These aspects concerning breast cancer diagnosis will be discussed below.

For the purpose of this discussion, the term ‘treatment’ includes all the methods discussed in section 2.6.

2.8.3 Physical aspects of breast cancer. The physical consequences of treatment consist of both long-term effects and post-treatment side effects (Lai et al., 2019; Vadaparampil et al., 2017). Results from a systematic review on the HRQOL of breast cancer patients in the Eastern Mediterranean region reported the following physical symptoms (caused by the disease and treatment): fatigue, diarrhoea, pain, insomnia, appetite loss, dyspnea (shortness of breath), hair loss, constipation as well as nausea and vomiting (Hashemi et al., 2019). Additional complications that breast cancer patients report include hot flushes and night sweats (Fenlon et al., 2020), headaches, breast symptoms (pain, oversensitivity, swelling, and skin problems) (Koo et al., 2017) as well as arm symptoms (swelling, shoulder pain and struggling to perform a lateral arm raise) (El Fakir et al., 2014), bladder and bowel changes (Stahlschmidt et al., 2020), medicinal side effects (Fatiregun et al., 2017), sleep disturbances (Lai et al., 2019), and diminished sexual enjoyment and functioning (Fatiregun et al., 2017; Naja et al., 2015). Several of the physical challenges reported were confirmed by other studies on breast cancer samples (Fisher et al., 2021; McFarland et al., 2018; Moodley et al., 2016; M. A. Price et al., 2013; Ramadas et al., 2015).

The findings of Love (2015), from her clinical practice, are comparable to the findings mentioned above, while also reporting additional physical problems such as cellulitis, scarring, cardiac disease and secondary cancers, weight gain and bone loss. Interestingly, a quantitative study by Moro-Valdezate et al. (2013) on 364 breast cancer patients in Spain reported a decrease in fatigue, insomnia, pain, arm symptoms at one, six and 12-month follow-up intervals. Moreover, sexual enjoyment showed no significant changes over time, while the decrease in sexual functioning was attributed to the perception of attractiveness diminishing and menopausal factors (Moro-Valdezate et al., 2013). However, no baseline measures were available to assess conditions before treatment, drawing the validity of the follow-up into question.

Based on the studies mentioned above, it is evident that breast cancer treatment poses several physical challenges to the patient. Furthermore, these physical challenges have been found to significantly impact both role and physical functioning among different breast cancer samples across the world (Calderon et al., 2019; Doege et al., 2019; Z. Liu et al., 2020; Sibhat et al., 2019). Additionally, several of the physical symptoms reported by breast cancer patients were also significantly associated with other domains of HRQOL such as emotional, cognitive, and social functioning (Fisher et al., 2021; Haddou Rahou et al., 2016). Therefore, physical aspects of breast cancer impact several domains of functioning of patients while also being significantly associated with several psychological challenges that breast cancer patients face (Kobeissi et al., 2014; Lai et al., 2019).

2.8.4 Psychological aspects of breast cancer treatment. Breast cancer is experienced by many patients as a threat to their identity, self-value and femininity (Al-Azri et al., 2014; Mansoor & Abid, 2020; Smit et al., 2019). Taking this into account, breast cancer treatments can be viewed as mutilating and invasive (Webster & Michalowski, 2020), causing women to experience negative emotional experiences and psychological distress (Kagee et al., 2018; Lai et al., 2019; Love, 2015). Other psychological factors associated with breast cancer treatment have been reported as fear of recurrence (S. Park et al., 2020), intrusive thoughts and nightmares and a decrease in femininity and sex drive (Dinapoli et al., 2021).

2.8.4.1 Experiences of psychological distress. Distress is one of the vital signs used to monitor breast cancer patients and refers to a broad range of psychological and social aspects affiliated with breast cancer (Agarwal et al., 2013; Bultz et al., 2012). Studies show that patients and their partners may have similar psychological experiences in response to breast cancer (Hammersen et al., 2021; Lamore et al., 2020). Lamore and colleagues (2020) conducted a quantitative study on 15 breast cancer patients and their partners in Canada where participants completed online surveys assessing informational needs, emotional adjustment, and breast reconstruction decision-making. Results indicated that both patients and partners had similar levels of informational needs, shared decision-making, and emotional adjustment. Partners of patients that had to undergo a mastectomy alone reported a greater level of mood disturbances and a greater need for information compared to partners of patients undergoing a mastectomy and breast reconstruction surgery (Lamore et al., 2020).

Breast cancer patients may also experience other forms of distress. Al-Azri and colleagues' (2014) qualitative study, investigated the psychosocial needs of 19 Arabic women with breast cancer and reported that women frequently experienced a fear of death, disbelief, self-blame, a false self-perception, and low self-esteem. Moreover, receiving a breast cancer diagnosis may elicit a sense of shock, despair, disbelief, absence of control (Gallagher-Squires et al., 2020; Liamputtong & Suwankhong, 2016), and denial causing a delay in initiating treatment (Moodley et al., 2016; Salem & Daher-Nashif, 2020).

Findings from a descriptive longitudinal study in 117 Korean breast cancer patients reported that patients also experienced feelings of distress, such as worry, sadness, anxiety, fear, sadness and depression, from the diagnosis through every phase of the disease trajectory (J. H. Park et al., 2017). The study's group-based trajectory models found that 19,4% of patients experience consistently high distress and 80.6% were on a low-decreasing distress trajectory. Another longitudinal study by Iwatani et al. (2013), on 222 Japanese breast cancer patients, exploring psychological distress following a breast cancer diagnosis reported that 20-40% experienced a form of psychological distress. Similar findings were reported in a cross-sectional evaluation of 200 Nigerian breast cancer patients (Fatiregun et al., 2016,

2017) as well as a quantitative study performed on 150 Portuguese breast cancer patients (Tojal & Costa, 2015). Furthermore, patients were found to be vulnerable to symptoms of depression and anxiety disorders (Fatiregun et al., 2016, 2017), while Tojal and colleagues (2015) reported that patients may also experience feelings of helplessness and even hopelessness.

Furthermore, fear of cancer recurrence is an ongoing concern for breast cancer survivors (Soriano et al., 2019). In a study by (Lebel et al., 2013), investigating fear of recurrence in 3239 American breast cancer patients, a constant fear of recurrence was reported by participants, particularly among women younger than 34 and patients with children. Similar findings were reported in a more recent study by Soriano and colleagues (2019) on 72 American breast cancer patients. Avdi and Koutri (2016) report on the fear of death and dying, while also demonstrating that patients have underlying doubts and fears even in the absence of any illnesses at the time. This statement is supported by Soriano and colleagues (2019) who reported that fear of recurrence is a chronic experience that persists even years after breast cancer treatment has concluded. Notably, fear of recurrence has been associated with poorer physical and mental functioning in breast cancer patients (D. Cho & Park, 2017).

Breast cancer patients experience several forms of psychological distress when coping with the disease. Furthermore, it has been found that these experiences of distress have a significant negative association with the functioning and QOL of breast cancer patients. For example, breast cancer patients with symptoms of anxiety reported worse physical-, emotional-, social- and cognitive functioning as well as poorer global health status (Fatiregun et al., 2017). Moreover, symptoms of depression and pessimism were associated with physical functioning, emotional functioning, role functioning, social functioning and cognitive functioning and the global health status of breast cancer patients (Calderon et al., 2019).

2.8.4.2 Changes in body image, self-esteem, and self-perception. Besides the above-mentioned effects of the breast cancer patient's psychological experiences on domains of quality of life, these psychological experiences bring about a modified sense of self to the patient (Barel-Shoshani & Kreitler, 2017). Results from a quantitative study with 112 Chinese American breast cancer patients revealed that self-stigma -internalizing and endorsing discriminatory and prejudiced behaviour on oneself (Corrigan & Watson, 2002)- was a significant predictor of depressive symptoms, particularly in breast cancer patients with higher levels of ambivalence over emotional expression -reluctance for expressing emotions (King & Emmons, 1990)- and intrusive thoughts (Tsai & Lu, 2019). These intrusive thoughts embody the patient's existential challenges and self-perception, both during and after treatment (Dupont et al., 2014; Tsai & Lu, 2019). Existential challenges include stigmatization (Elewonibi & BeLue, 2019; Gallagher-Squires et al., 2020), fear of discrimination, resentment and isolation (Bosire et al., 2020), threats to personal health and a fear of death (S. Park et al., 2020). Seeing that breast cancer treatments often cause disfigurement (Boatemaa Benson et al., 2020; Foerster et al., 2019), patients regularly report changes in body image and self-concept (Fatiregun et al., 2017; Hsiao et al., 2019).

Body image, as defined by Przezdziecki et al. (2013), is a self-assessment and experiential perception of one's physical appearance. A disruption of body image is frequently caused by negative thoughts and emotions concerning one's body (Przezdziecki et al., 2013). Besides negative emotions, personal and interpersonal psychological factors, biological factors (age, gender, race, education), disease-and treatment-related factors and sociocultural factors (cultural influences, social relations, financial status) were all found to impact breast cancer patients' body image (Davis et al., 2020; Rezaei et al., 2016).

Furthermore, Rezaei and colleagues (2016) reviewed 44 articles of factors influencing the body image of breast cancer found that younger women and those less educated experienced increased levels of distress concerning body image, sexual functioning, and physical appearance.

Most women changed their perceptions concerning their bodies following breast surgery. The changes in perceptions are caused by physical alterations brought about by treatment (Lambert et al., 2020). These changes include hair loss, bloating, weight gain/loss, scarring, deformity, and skin problems (Assaf et al., 2017; Rezaei et al., 2016; Vuotto et al., 2018). In a narrative research study by Naidu (2012) with 15 South African cancer patients (consisting of breast cancer, colorectal cancer, lung cancer, ovarian cancer, and renal cancer patients) bodily changes were reported as visible and visceral, with the body symbolizing the core of ‘the self’. Similar findings were reported by Schwartz and von Glascoe (2020) in their interpretive phenomenological study among six breast cancer survivors from a rural community on the US-Mexico border. Alterations in body image along with experiences of disconnect and alienation to one’s body often result in biographical disruption (Naidu, 2012; Schwartz & von Glascoe, 2020). Biographical disruption (identity disruption) refers to both negative and positive consequences of breast cancer at the different phases of the disease (Avdi & Koutri, 2016; Schwartz & von Glascoe, 2020).

Developing a new sense of identity (biographical renewal) for one’s altered body was reported as part of the findings of several studies on breast cancer patients (Dahhan et al., 2021; Mansoor & Abid, 2020; Naidu, 2012; Schwartz & von Glascoe, 2020). Supporting these findings results from a study by (Erturhan Turk & Yilmaz, 2018) on 57 breast cancer patients in Turkey found that surgery (mastectomy) harmed the body image and removing one or both breasts was associated with fertility, charm, fear of recurrence, sexuality and a loss of femininity. Moreover, the study indicated a significant association between body image and the physical functioning, emotional functioning, role functioning, and cognitive functioning of patients (Erturhan Turk & Yilmaz, 2018).

Breast cancer treatment interventions lead to difficulties in the patient's connection with their body, sexuality, perception of self and identity (Mansoor & Abid, 2020; Naidu, 2012; Smit et al., 2019). For this reason, treatment and experiences thereof bring about a disruption in the identity and psychological well-being of the patient (Avdi & Koutri, 2016; Soriano et al., 2019). Furthermore, these changes in body image, self-esteem, and self-perception have been associated with several domains of QOL. From the literature review above, it is evident that there is a scant amount of research on how South African women experience and make sense of breast cancer. Furthermore, no South African study has explored how the perception that breast cancer patients hold influence their coping ability and HRQOL.

2.9 Subjective experiences and coping with breast cancer

Making sense of the disease and coping with its effects are integral aspects of living with breast cancer (Martino et al., 2019; Martino & Freda, 2016). Receiving a breast cancer diagnosis and undergoing treatment may change the patient's life perspective, attitude, and lifestyle habits (Cipora et al., 2018; Kvillemo & Bränström, 2014). These changes are brought on by patients' complex psychological, emotional, physical, and spiritual experiences related to the diagnosis and treatment (Lai et al., 2019; S. Park et al., 2020). Moreover, these experiences are influenced by cancer-related factors (stage, treatment, time since diagnosis), socio-economic factors (education, income level, access to health care) and sociocultural factors (language, cultural influences, beliefs, religion) (Cipora et al., 2018; Khalili et al., 2013; Martino, Lemmo, et al., 2019; Tu et al., 2020). Additionally, managing factors (i.e., coping strategies) have also been associated with these experiences (Khalili et al., 2013; Kvillemo & Bränström, 2014; Mehrabi et al., 2016; Tu et al., 2020). Research has shown that coping processes and making sense of breast cancer are personal and may be different for each individual (Martino et al., 2019; Martino & Freda, 2016; Mehrabi et al., 2016).

Section 3: Coping

2.10 Conceptualizing coping

Extensive research has been conducted on the role of coping on the physical, emotional, functional and social well-being of patients with chronic diseases (Kristofferzon et al., 2018; Pusswald et al., 2012; Savvakis & Kolokouras, 2019). As stressors related to chronic diseases affect the functioning and well-being of patients, how people manage and cope with these stressors have grown in importance (Tu et al., 2020). Many definitions of coping are offered (Dewe, 1987; Latack, 1986), but the theory of Lazarus and Folkman is the most frequently used to define the concept (Sanaeinasab et al., 2017). To illustrate the applicability of coping on breast cancer, certain key constructs will be discussed in this section.

As defined in section 1.2.2, coping is process-orientated, which means that coping strategies and actions are influenced by environmental factors and personal factors, which causes the individual to adapt their coping to deal with the specific stressor(s) (Lazarus & Folkman, 1984). According to Lazarus and Folkman (1984), the process of coping comprises three characteristics. Firstly, observations and evaluations refer to what the individual actually thinks or does, as opposed to their usual behaviour. Secondly, the thoughts and actions of the individual are then evaluated within a particular setting, as Lazarus and Folkman (1984) suggest that coping actions are focused on specific conditions. Therefore, to understand how an individual copes, the context within which they are situated needs to be defined (Lazarus & Folkman, 1984). The third characteristic of the coping process refers to the shifting nature of the process seeing that coping thoughts and actions are modified as the stressors and the person-environment relationship change (Lazarus & Folkman, 1984). Based on the characteristics mentioned, coping becomes a sequential transaction between the patient's resources, values and commitments and the specific environment with its stressors, restraints and resources (Taylor, 2010).

2.10.1 Categorizing coping strategies. Coping strategies can be conceptualized and categorized in different ways (Solberg et al., 2021). The theoretical framework of Lazarus and Folkman (1984) assigns coping strategies to one of three categories: strategies aimed at addressing the stressor/s (problem-focused coping strategies), strategies that regulate emotions (emotion-focused coping strategies) and strategies aimed at avoiding the stressor/s (avoidance coping strategies). It is important to note that the strategies used by a patient to cope are determined by their current and available resources, which include the patient's level of energy and health, belief, problem-solving ability, social skills, material resources, commitments, and social support (Ackerman, 2020; Lazarus & Folkman, 1984). The categories of coping according to Lazarus and Folkman (1984) are discussed in detail in section 2.20, while examples of the strategies comprising the categories are provided below.

2.10.1.1 Problem-focused coping strategies. Problem-focused coping refers to strategies like planning, active coping, and instrumental support (Lazarus & Folkman, 1984**.** Planning is thinking about how to confront and deal with the stressor by coming up with steps to take (Carver et al., 1989; Kvillemo & Bränström, 2014). Active coping refers to direct action, increasing efforts and executing steps to deal with the stressor (Carver et al., 1989; Lazarus & Folkman, 1984), while the use of instrumental support refers to seeking information, guidance and advice to deal with the stressor (Carver et al., 1989; Fisher et al., 2021).

2.10.1.2 Emotion-focused coping strategies. These strategies refer to venting, emotional support, positive reframing, humour, acceptance, and religion**,** as well as self-blame and self-punishment (Lazarus & Folkman, 1984). Venting is defined by Carver and colleagues (1989) as focusing on the feelings of distress and ventilating those experiences and feelings, while they define emotional support as seeking out sympathy, understanding and moral support. Lazarus and Folkman (1984) define positive framing as reconstruing a stressor into a positive event. Acceptance as a coping strategy entails accepting the reality of the stressful situation to deal with its consequences (Carver et al., 1989). Self-blame entails blaming oneself for the cause of the stressor (Nipp et al., 2016), while self-punishment refers to both physical and psychological acts to harm oneself for perceived misdeeds (Y. Liu et al., 2020).

2.10.1.3 Avoidance coping strategies. These strategies refer to efforts such as behavioural disengagement, mental disengagement, substance abuse, denial and self-blame (defined above) (Lazarus & Folkman, 1984). Behavioural disengagement is defined by Carver and colleagues (1989) as reducing efforts to deal with the stressor(s), while mental disengagement refers to activities that remove one's focus from the stressor (Carver et al., 1989; Ho et al., 2003). Denial as a coping strategy refers to ignoring the presence of the stressor or a refusal to believe that the stressor exists (Carver et al., 1989; Ho et al., 2003).

2.11 Coping with cancer

Research has repeatedly confirmed that a cancer diagnosis is a stressful life event with the consequences of diagnosis and treatment influencing the HRQOL of both patients and affected partners, carers, and family members. As individuals report different physical and psychological outcomes, many theorists propose that how cancer patients cope could predict the way patients adjust to a diagnosis and subsequent treatment and/or also predict if the patient will survive the threat to their health (Livneh, 2019; Ozkan, 2019).

In a systematic review by Lashbrook et al. (2018) of 19 studies on coping strategies used by breast, colorectal, and prostate cancer survivors, they found that breast cancer patients relied on different coping strategies compared to the two other groups. Breast cancer patients relied on a wider variety of avoidance-coping strategies, and they were the only group that relied on problem-focused coping and emotion-focused coping strategies (Lashbrook et al., 2018). However, it must be noted that most included studies (15) were focused on breast cancer. Moreover, most of the studies had an overrepresentation of white, married, well-educated participants, situated in high-income settings (Lashbrook et al., 2018). Beyond challenges posed by the illness, patients in LMIC have to cope with socioeconomic circumstances, and a lack of access to adequate health care (Lukong et al., 2017), influencing the coping strategies they use (Mehrabi et al., 2016).

2.12 Coping with breast cancer

2.12.1 Factors influencing coping among breast cancer patients. Breast cancer patients employ a variety of coping strategies to deal with the diagnosis and treatment of the disease (Castillo et al., 2019; Lashbrook et al., 2018; Torralba-Martínez et al., 2021). Research on coping among breast cancer patients have found that several factors are influencing the coping strategies that patients use (Boatemaa Benson et al., 2020; Kvillemo & Bränström, 2014). These factors can be categorized into individual-level characteristics, clinical features, and psychological aspects of the disease. Individual-level factors that influence coping have been reported as age, marital status, employment status, monthly household income (Boatemaa Benson et al., 2020; Kang et al., 2020) and personality (Lai et al., 2019). A meta-analysis by Kvillemo and Bränström (2014) on 78 studies and 11,948 participants, on coping with breast cancer found that clinical features such as cancer stage, treatment (receiving vs. not receiving) and time since diagnosis were all found to influence coping strategies that patients employ. Other aspects include coping, emotional difficulties

(Firouzi et al., 2020), psychosocial stressors (Hajian et al., 2017; Jang & Kim, 2018; Tu et al., 2020), level of social support (Durá-Ferrandis et al., 2017; Lashbrook et al., 2018), sense of coherence (Zamanian et al., 2021), and were all identified as factors significantly influencing the coping strategies that breast cancer patients use.

2.12.2 Coping strategies used by breast cancer patients. In the context of breast cancer, coping may be necessary to deal with several stressful challenges related to the illness (Kvillemo & Bränström, 2014). These challenges threaten the physical well-being, psychological well-being, social well-being and functional well-being of the patient, both during and after treatment (Boatemaa Benson et al., 2020). In the systematic review by Lashbrook and colleagues (2018), breast cancer patients were found to utilise avoidance coping strategies such as denial (Aguado Loi et al., 2013; Bellizzi & Blank, 2006; Kraemer et al., 2011), behavioural disengagement, mental disengagement (Kraemer et al., 2011), distraction (Aguado Loi et al., 2013; Bellizzi & Blank, 2006; Sabiston et al., 2007), substance abuse (Aguado Loi et al., 2013; Bellizzi & Blank, 2006), wishful thinking (Manuel et al., 2007) and self-blame (Bellizzi & Blank, 2006). Additionally, they also reported that breast cancer patients utilized problem-focused coping strategies that included planning (Bellizzi & Blank, 2006), active coping (Aguado Loi et al., 2013), and use of instrumental support (Aguado Loi et al., 2013; Bellizzi & Blank, 2006) as well as emotion-focused coping strategies like positive reframing (Bellizzi & Blank, 2006; Manuel et al., 2007), use of emotional support (Bellizzi & Blank, 2006) and religion (Bellizzi & Blank, 2006; Veit & de Castro, 2013)**.**

In line with the findings of the review, a qualitative study by Hajian and colleagues (2017) on 22 Iranian breast cancer patients found that coping strategies from all three categories were utilised. The study highlighted the influence of culture on coping strategies as patients reportedly utilized their religion to deal with the fear of recurrence and to maintain hope that breast cancer has been eradicated. Contrastingly, in a sample of 131 Swedish patients with primary and recurring breast cancer, religion was the least relied on coping strategy, with acceptance (58.5%) and distraction (56.9%) being the most frequently used strategies (Browall et al., 2016). However, Browall and colleagues (2016) found that women with recurring breast cancer relied significantly more on distraction as a coping strategy to deal with physical symptoms compared to primary breast cancer patients who relied on direct action (active coping) and catharsis (venting). The findings of the study are however limited, as individuals could only indicate the coping strategies they use from a predetermined list of eight strategies. These studies indicate how different cultures influence the coping strategies that patients utilise

Supporting the findings Haijan and colleagues (2017), Boatemaa Benson et al. (2020) conducted a quantitative study on 202 breast cancer patients in Ghana and found religious coping to be the most frequently used ‘active coping’ strategy. Self-distraction as the most frequently used ‘avoidant/emotion-focused’ coping strategy (Boatemaa Benson et al., 2020). Furthermore, the study found that receiving support from five or more sources was associated with greater use of both ‘active coping strategies’ as well as ‘avoidant’ coping strategies when compared to only receiving support from two or fewer sources (Boatemaa Benson et al., 2020). The coping measure used in the study, the Brief-COPE, is yet to be validated in this setting, which draws the reliability of the findings into question. The importance of social support was confirmed by a systematic review of Mehrabi et al. (2016) on coping responses following a breast cancer diagnosis. From the 20 studies included in the review, seeking social support was reported as the most frequently used coping strategy, followed by positive reframing and religion (Mehrabi et al., 2016). Furthermore, Durá-Ferrandis and colleagues (2017) found that using maladaptive coping strategies (measured by the Brief-COPE) and having lower social support was associated with a decline in all domains of HRQOL among a sample of 1,280 American breast cancer patients. From these studies, it is evident that across different cultures, social support influenced how breast cancer patients cope with the disease, either enabling the use of coping strategies or as a strategy itself.

Liu and colleagues (2020) report that treatment type and financial status may also influence the coping strategies that patients utilize. In their quantitative study on 133 Chinese breast cancer patients, it was found that active coping (as measured by the Brief-COPE) was positively correlated with subjective well-being in the patients, while both acceptance and avoidance had no significant effect on subjective well-being (Y. Liu et al., 2020). Contrastingly, in a quantitative study by Khalili and colleagues (2013) on 62 Iranian breast cancer patients, no significant correlation between problem-focused coping strategies (measured by the Brief-COPE) and any dimension of quality of life was found. Confirming the findings of Haijan and colleagues (2017) religion was the most frequently used strategy, followed by acceptance, self-distraction, planning, active coping, positive reframing, and denial (Khalili et al., 2013). A qualitative study on 23 Latina breast cancer survivors in America reported that women identified spirituality and family support as the best coping strategies for dealing with the disease (Castillo et al., 2019). Other strategies that this group reportedly relied on were emotion suppression and staying busy (Castillo et al., 2019). A quantitative study by Toscano et al. (2020) on 215 breast cancer patients found that patients most frequently used positive coping strategies such as active coping, planning, positive reframing, acceptance, and humour to deal with breast-cancer related factors. However, throughout the trajectory of the disease, an increase in ‘negative coping strategies’ like behavioural disengagement, denial, and self-blame was recorded (Toscano et al., 2020). This indicates that patients rely on different strategies at different phases of the disease. This was confirmed by studies on breast cancer samples in Canada (Gall & Bilodeau, 2020), China (W. Wang et al., 2013), Brazil (Leite et al., 2012), and the United States (Kahana et al., 2016).

Coping strategies may change based on the phase of the disease. In a phenomenological qualitative study by Torralba-Martínez and colleagues (2021) on 16 breast cancer patients in Spain, patients were found to utilize several coping strategies in the acute phase (following the cancer diagnosis). In this phase, patients predominantly relied on social support, followed by planning, self-control, active coping, avoidance, acceptance, and positive reframing (Torralba-Martínez et al., 2021). During treatment, seeking social support remained the predominant strategy followed by planning, self-control, and avoidance (Torralba-Martínez et al., 2021). Active coping, acceptance and positive reframing were not utilised by breast cancer patients in this phase (Torralba-Martínez et al., 2021). Following treatment and during remission, patients more frequently utilised distancing, self-control, positive reframing, planning as well as avoidance (Torralba-Martínez et al., 2021). Patients' age and income levels were also found to influence their coping strategies (Torralba-Martínez et al., 2021). These changes in coping strategies indicate that patients rely on a variety of different coping strategies throughout the trajectory of the illness.

Gallagher-Squires and colleagues (2020) undertook a qualitative study on 21 South African breast cancer survivors to determine the cognitive coping strategies they utilized. The study reported that patients relied on coping strategies such as reappraisal (downward social comparison, normalization, positive self-talk), acceptance (accepting unpleasantness, preparing for future challenges, acceptance as a component of healing, acceptance, and spirituality), relinquishing control (giving up, religion, trust in doctors) and benefit finding (personal and spiritual growth, altruism, appreciation of life). The study was the first to document South African women's experiences of coping with the disease. Furthermore, the study only focused on cognitive coping strategies. For this reason, more in-depth research on coping strategies in South African breast cancer patients is warranted.

Breast cancer patients rely on a variety of coping strategies to deal with the diagnosis and treatment of the disease. Importantly, factors like employment status and income were found to influence the coping strategies that breast cancer patients use (Boatemaa Benson et al., 2020; Kang et al., 2020). This factor is important in the South African context with its high unemployment rate of 32,6% (Statistics South Africa, 2021) and low average monthly household income (Statista, 2020), which may affect coping strategies that South African breast cancer patients utilize. Furthermore, patients across the world rely on both adaptive and maladaptive coping strategies to deal with breast cancer. Similarly, the coping strategies identified by Gallagher-Squires and colleagues (2020) coincide with adaptive strategies found in other studies (Browall et al., 2016; Y. Liu et al., 2020). However, no study has performed a quantitative assessment of the coping strategies used by South African breast cancer patients, which indicates a gap in the research. Based on the great variance of coping strategies that breast cancer patients use, there is a need to identify the unique coping strategies that South African breast cancer patients may rely on. Moreover, to address the research gap on the relationship between coping strategies and HRQOL of South African breast cancer patients, the coping strategies that South African breast cancer patients use need to be identified.

2.13 Measuring coping among breast cancer patients

Several measures have been used to evaluate the coping strategies used by breast cancer patients (Giesler & Weis, 2021). In a meta-analysis of coping with breast cancer, Kvillemo and Bränström (2014) found that the five measures most frequently used coping measures were the Ways of Coping Questionnaire (Aldwin et al., 1980), the Mental Adjustment of Cancer (MAC) (Watson et al., 1988), the Mini-Mental Adjustment of Cancer (Hulbert-Williams et al., 2012), the Coping Orientation to Problems Experienced (COPE) (C. Carver et al., 1989) and the Brief-COPE (Perry et al., 2007). Similarly, in the review of Lashbrook and colleagues (2018), the Brief-COPE (Aguado Loi et al., 2013; Bellizzi &

Blank, 2006), the Mini-MAC (Boehmer et al., 2013), the COPE (Kraemer et al., 2011), the Religious-COPE (Schreiber, 2011) and the Ways of Coping Questionnaire (Manuel et al., 2007) were identified as the most frequently used measures of coping. Moreover, in the systematic review of Mehrabi and colleagues (2016), the use of the same coping measures as mentioned by Kvillemo and Bränström (2014) and Lashbrook and colleagues (2018), were reported. Additionally, (Hervatin et al., 2012), utilized the Hannover Coping Manual in their prospective longitudinal study on the emotional responses of breast cancer patients while the qualitative studies included relied on interviews to determine the coping strategies used by breast cancer patients (Al-Azri et al., 2014; Goldblatt et al., 2013; Taleghani et al., 2006, 2008).

Across all three reviews (Kvillemo & Bränström, 2014; Lashbrook et al., 2018; Mehrabi et al., 2016) and as illustrated in the review of coping strategies above (Boatemaa Benson et al., 2020; Khalili et al., 2013; Y. Liu et al., 2020), the Brief-COPE is the most frequently used measure of coping among breast cancer samples. As the data for the current study was collected with the Brief-COPE (Roomaney et al., 2020), the background on this measure will be discussed.

2.13.1 The Coping Orientation to Problems Experienced (COPE) scale. The full COPE is a self-report measure consisting of 60 items categorized into 15 factors with four items per factor (Carver et al., 1989). It is based upon Lazarus and Folkman's (1984) model of coping and partly on the model of behavioural self-regulation (Carver & Scheier, 1981). The measure has been validated amongst various breast cancer patients samples (Kvillemo & Bränström, 2014; Stanton et al., 2000, 2002). Later on, Carver et al. (1999) produced a shortened 45 item version for a study investigating how coping mediates the effect of optimism on distress. This eventually led to Carver (1997), validating the factor structure of an even shortened, 28-item, version of the COPE, which became the most frequently used measure of coping amongst breast cancer patients (Kvillemo & Bränström, 2014).

2.13.2 The Brief Coping Orientation to Problems Experienced scale. The Brief-COPE, the shortened version of the original COPE scale, comprises of 28-items, with each item being rated on a four-point Likert scale (Carver, 1997). The measure has 14 subscales with two items to represent each subscale. The shortened version was constructed by omitting two scales from the COPE (restraint coping and suppression of competing activities) and adding a self-blame subscale (Carver, 1997). Each item is totalled with its assigned counterpart to produce a subscale score, indicating the individual's propensity to use that specific coping strategy. The 14 coping subscales are self-distraction, active coping, denial, use of emotional support, use of instrumental support, substance abuse, behavioural disengagement, venting, humour, planning, acceptance, religion, self-blame and positive framing (Carver, 1997). According to Carver (1997), the Brief-COPE is more beneficial than the COPE as it can be adapted by removing/modifying scales or items to match the sample. However, considering the number of subscales that the Brief-COPE consists of, a factor analysis is recommended before removing any items (Solberg et al., 2021). Nevertheless, researchers frequently modify the measure without performing a factor analysis (Nipp et al., 2016). This in turn leads to psychometric inconsistencies when different versions of the measure are compared (Solberg et al., 2021).

The factor structure of the Brief-COPE has been explored amongst six breast cancer samples in the world (Solberg et al., 2021). Although Kershaw et al. (2004) also explored the factor structure among breast cancer patients, their sample consisted of non-breast cancer patients as well, influencing the factor structure produced. The exploration of the factor structure of the Brief-COPE was undertaken amongst breast cancer samples in the USA (Bellizzi & Blank, 2006; Fletcher et al., 2006), Canada (Fillion et al., 2002), the United

Kingdom (Brain et al., 2008) and Taiwan (A. W. T. Wang et al., 2018), producing two-, three-, eight-seven-, and three-factor structures, respectively. Belizzi and Blank's (2006) principal component analysis produced a two-factor structure, with the factors labelled as active adaptive coping, and maladaptive coping, which explained 34% and 14% of the item variance. Interestingly, Fletcher and colleagues (2006) removed 10 items before their principal axis factor analysis, which resulted in a three-factor structure consisting of engagement-, disengagement-, and religious and spiritual coping strategies. The amount of item variance explained by the factors was however not reported on. Similarly, Fillion and colleagues (2002) also did not report on the item variance explained by each of the eight factors produced in their study, but only on the total variance explained by the measure (68%). These eight factors were identified as disengagement, active coping, self-distraction, using emotional support from friends, using emotional support from partner, humour, religion and substance abuse (Fillion et al., 2002). Similarly, Brain et al. (2008) also only reported on the total variance explained by the seven-factor version of the measure (65%), with these factors labelled as task-orientated coping, avoidance-orientated coping, emotional support, substance use, religion, acceptance, and humour. Furthermore, Wang and colleagues (2018) performed a confirmatory factor analysis on the Brief-COPE among two samples consisting of flood survivors (n=180) and breast cancer patients (n=180). Their findings confirmed a three-factor structure labelled as Self-sufficient coping, Socially-supported Coping and Avoidant-coping (A.W.T. Wang et al., 2018). The item variance was however not reported on.

In terms of the internal consistency of the subscales, Brain and colleagues (2008) recorded Cronbach's alpha scores greater than 0.70 for all the subscales, while Fillion and colleagues (2002) had 11 subscales with scores greater than 0.60, with planning (α=0.56) and active coping (α=0.57) achieving the lowest scores. Fletcher et al. (2006) recorded an internal consistency score of .79 for the Engagement Coping scale, .65 for the Avoidance Coping scale and .84 for the Religious Coping scale. Interestingly, Bellizzi and Blank (2006) failed to report on the internal consistency of the subscales. Wang and colleagues (2018) reported good internal consistency scores for Self-sufficient coping (α=.91), Socially supported coping (α=.86), with an internal consistency score reported for the Avoidant-coping scale (α=.69).

Looking at the use of the measure in LMIC, the measure proved reliable when measuring coping strategies amongst breast cancer patients in Egypt with a test-retest reliability of 0.85 reported (Elsheshtawy et al., 2014). Supporting this, a breast cancer study in Ghana reported a Cronbach's alpha of 0.86 for the measure (Boatemaa Benson et al., 2020). Beyond breast cancer, the measure demonstrated reliability in various samples, including HIV samples in India and South Africa (Mohanraj et al., 2015; Olley et al., 2005), adolescents in Malaysia (M. S. B. Yusoff, 2011) and trauma-exposed women in Chile (García et al., 2018).

The widespread use of the Brief-COPE has led to the cultural adaptation of the measure to match the characteristics of the sample group (Solberg et al., 2021). This is important as a person's culture, language, beliefs and norms, and socioeconomic circumstances have been found to influence the coping strategies they employ (Boatemaa Benson et al., 2020; Chun et al., 2006). Therefore, ensuring the cultural adaptation of the Brief-COPE is an essential precursor to understanding how breast cancer patients in South Africa cope with the disease.

Section 4: The health-related quality of life of breast cancer patients

2.14 Conceptualizing health-related quality of life

The concept of quality of life (QOL) has transcended the scope of life-and-death situations (Romney et al., 1992) and has become an increasingly important factor to determine treatment effectiveness and to inform future treatment plans (Maratia et al., 2016; Neuner et al., 2014). The dynamic and subjective nature of HRQOL allows for different areas of interest to be investigated (Tessier et al., 2017). These areas of interest include (1) HRQOL of patients living with a chronic illness such as breast cancer (Fatiregun et al., 2017); (2) the HRQOL of patients suffering from a chronic illness compared to the general population (LeMasters et al., 2013) or (3) the number of chronic illnesses that an individual has and its relationship with HRQOL (Levine et al., 2017).

2.15 Health-related quality of life and cancer

As HRQOL is a multidimensional construct, multiple psychological, social and physical factors have been associated with the HRQOL of chronically ill patients (Brandl et al., 2018; Bravo et al., 2020). HRQOL has been investigated in several cancer types, such as prostate (Odeo & Degu, 2020), gastric, liver, colon, cervical and thyroid (Kim & Yoon, 2021), and breast cancer (Kim & Yoon, 2021; Z. Liu et al., 2020). Cancer survivors report experiences of physical, mental, social role confusion, and other socioeconomic challenges (Edwards & Greeff, 2017). Generally, cancer patients report a worse HRQOL following treatment compared to patients that are yet to initiate treatment (Fatiregun et al., 2017; Odeo & Degu, 2020). Even after recovery patients experience physical and cognitive challenges, fear of recurrence, and even anxiety and depression (Stanton & Bower, 2015). These physical and mental challenges are further exacerbated by the economic difficulties that patients face (Vayr et al., 2020). All of these factors have been associated with a worse HRQOL (Deckx et al., 2015). Supporting this, a systematic review by Odeo and Degu (2020) on factors affecting HRQOL of prostate cancer patients reported that comorbidities, older age, more advanced cancer stage, greater cancer severity, race, impaired mental health, and a lower level of education were the major predictors of lower HRQOL. Additionally, a study by Kim and Yoon (2021) on 615 Korean patients with different cancer types (gastric, liver, colon, cervical, thyroid, and breast cancer) found that working cancer survivors had a higher HRQOL than non-working cancer survivors. Moreover, the HRQOL of working cancer survivors was not affected by psychological factors such as suicidal ideation and depressive symptoms (Kim & Yoon, 2021). The study by Kim and Yoon (2021) also underlined the influence of marital status on HRQOL of cancer patients, in line with findings of previous studies (Jansen van Rensburg et al., 2017; Salakari et al., 2017; Shafaie et al., 2019). Their study of 615 cancer survivors indicated that those that are married tended to report a better HRQOL compared to single counterparts (Kim & Yoon, 2021)

A review on the QOL of female cancer survivors in Africa, by Muliira and colleagues (2017), confirmed the findings mentioned above, while identifying cultural factors such as bewitching and fatalism as additional factors that influence the QOL of cancer survivors. This was reported in a quantitative study on 167 South African ovarian and breast cancer patients (Cooper & Mullin, 2001). Contrastingly, in a qualitative study exploring the QOL of 14 female breast cancer, skin cancer, ovarian cancer and cervical cancer patients in South Africa, no cultural factors were reported as influencers of QOL (Jansen van Rensburg et al., 2017). Confirming the findings of Cooper and Mullin (2001), poverty was identified as a major challenge and the biggest threat to the physical aspect of QOL, while social support from partners, family, church members and friends reportedly enhanced QOL (Jansen van Rensburg et al., 2017). Interestingly, Jansen van Rensburg and colleagues (2017), called for the investigation of the validity of existing QOL measures on the female South African cancer patient population.

2.15 Health-related quality of life and breast cancer

The HRQOL of breast cancer patients is dependent on many factors (Maratia et al., 2016). When compared to the general population, women with breast cancer reported significantly lower levels of HRQOL (Doege et al., 2019; Setyowibowo et al., 2018). In the quantitative study by Setyowibowo and colleagues (2018) on 471 Indonesian women from the general population and 132 women with breast cancer symptoms who visited the hospital for a diagnosis, the suspected breast cancer sample reported lower QOL, with significantly lower scores in the physical and psychological domains. Notably, the breast cancer sample was much smaller than the control group, possibly influencing the results of the study. To this point, in a study by Doege and colleagues (2019) on a German sample of 2647 disease-free breast cancer survivors (5-16 months after the diagnosis) and 1,005 population controls, disease-free individuals reported overall QOL comparable to the controls. Despite this, statistically, significantly lower physical, emotional, social, role and cognitive functioning were reported by the breast cancer sample (Doege et al., 2019). Doege and colleagues (2019) ascribed the similarity in overall QOL of breast cancer survivors and controls to the duration of time since diagnosis as well as a decrease in several treatment side effects over time.

Furthermore, Setyowibowo and colleagues (2018) found that higher education levels and monthly income were associated with higher QOL among the breast cancer sample in their study. A similar finding was reported by Yan and colleagues (2016) in their quantitative study on 1,160 Chinese breast cancer patients who found that a higher household income and medical coverage with low co-payments were associated with higher QOL scores in all domains. Furthermore, the use of traditional Chinese medicine as part of the treatment regime was also significantly associated with higher scores of physical well-being, emotional well-being, and breast cancer-specific well-being (Yan et al., 2016). Similar findings with regards to income and medical payments were reported by research conducted on the HRQOL of breast cancer samples in Lebanon (Abu-Saad Huijer & Abboud, 2012), Yemen (Al-Naggar et al., 2011), India (Gangane et al., 2017), Ethiopia (Sibhat et al., 2019) as well as Cameroon (Kunyangna, 2019) and the United States (Vadaparampil et al., 2017).

Contrastingly, Al-Naggar and colleagues (2016) conducted a quantitative study on the QOL and characteristic factors of 166 Iraqi breast cancer patients that indicated that no demographic variables (age, race, marital status, family income) significantly influenced any domain of QOL. These studies indicated that income and ability to cover medical expenses may significantly influence QOL, but this may not always be the case. Furthermore, cultural practices such as the use of traditional medicine also influence domains of QOL (Yan et al., 2016).

Besides demographic factors, clinical characteristics were also significantly associated with HRQOL of breast cancer patients (Al-Naggar et al., 2016; Kunyanga, 2019; Sibhat et al., 2019). Al-Naggar and colleagues (2016) found that the cancer stage was significantly associated with emotional well-being. In terms of treatment methods, Tamoxifen (a selective estrogen receptor modulator) was significantly negatively associated with physical well-being, while chemotherapy was significantly negatively associated with emotional well-being. Furthermore, radiotherapy was found to be significantly negatively associated with the overall QOL of the breast cancer patients in the sample. The study indicated that different treatment methods have different significant associations with the domains of QOL that breast cancer patients report.

Sibhat and colleagues (2019), undertook a quantitative study to investigate the predictors of HRQOL among a sample of 404 breast cancer patients in Ethiopia, and found cancer stage, pain, cognitive functioning, financial difficulties, and the future perspective of the patients to be the most significant predictor of HRQOL. Similarly, radiotherapy was significantly associated with lower emotional functioning, role functioning, cognitive functioning and overall HRQOL scores (Sibhat et al., 2019). These findings confirm the influence of clinical characteristics on the QOL of breast cancer patients. Other clinical characteristics found to be significantly associated with domains of HRQOL include cancer stage (Gangane et al., 2017; Sibhat et al., 2019), age at diagnosis (Levine et al., 2017; Vadaparampil et al., 2017), tumour size (Al-Naggar et al., 2016; Mogal et al., 2017), the presence of metastasis (Al-Naggar et al., 2011; Haddou Rahou et al., 2016; Kunyanga, 2019), symptoms (pain, fatigue, nausea, insomnia) (Al-Naggar et al., 2016; Levine et al., 2017), time since diagnosis (Lai et al., 2019; Sibhat et al., 2019), and the type of treatment received (Al-Naggar et al., 2016; Lôbo et al., 2014; Ramadas et al., 2015; Yan et al., 2016). Evidently, from the research mentioned above, it is clear that across different cultural settings, clinical characteristics of breast cancer had a varying significant influence on the domains of patients' HRQOL.

Among psychosocial factors associated with the HRQOL of breast cancer, social support was found to be commonly reported across different cultural settings. As previously mentioned by Yan and colleagues (2016), social support has been significantly associated with HRQOL among breast cancer patients. Supporting this, in a quantitative study by Gangane et al. (2017) on 208 breast cancer patients in rural India, being divorced, widowed or unmarried were negatively associated with the psychological well-being and social well-being dimensions of QOL. Similarly, in a small, quantitative study undertaken by (Ramadas et al., 2015), on 40 Malaysian breast cancer patients, it was found that living with family or being married, along with completing treatment were the most significant predictors of QOL. Additionally, living with family and having ever given birth were significantly associated with physical well-being (Ramadas et al., 2015). This indicated that living with family or having ever given birth was associated with better QOL, highlighting the role that social support can play in HRQOL.

In line with the findings of Ramadas and colleagues (2015), a qualitative study by (Sibeoni et al., 2018), on the QOL during treatment in 30 French breast cancer patients, identified two themes: (1) things that harmed their QOL; and (2) things that had a positive effect on their QOL. Things that harmed patients' QOL were identified as treatment side-effects and negative psychological experiences associated with these side-effects. On the other hand, things that had a positive effect on the QOL were identified as the interest of the patient in a 'support object' (an object, relationship, or an activity), belief in the efficacy of treatment, and the positive effects of relationships with friends, family, and the physician. The findings of Sibeoni and colleagues (2018) indicate the positive effects of social support on the QOL of breast cancer patients. Supporting this, Leung et al. (2014), investigated the relationship between social support and HRQOL in a sample of 412 Australian breast cancer patients and found social support to be a significant predictor of higher mental and physical HRQOL at three-year follow-up. Moreover, informational support and positive emotional support were identified as instrumental in maintaining HRQOL (Leung et al., 2014).

Similarly, findings from a quantitative study undertaken by Levine et al. (2017), on the predictors of QOL among an ethnically diverse sample of 116 breast cancer survivors, indicated that at each follow-up social/family well-being was determined by previous levels of social well-being as well as perceived social support. Levine and colleagues (2017) did not include any socioeconomic factors or healthcare aspects (e.g. patient-physician communication and treatment adherence) which has been associated with HRQOL domains in previous studies (Gangane et al., 2017; Setyowibowo et al., 2018). Similarly, in the study of Vadaparampil and colleagues (2017) on the HRQOL of 355 black breast cancer patients in America, less social support was significantly associated with lower HRQOL scores. Furthermore, depression and anxiety were also positively associated with lower HRQOL scores (Vadaparampil et al., 2017). Additionally, other factors influencing the HRQOL of breast cancer patients were identified as perceived medical discrimination, higher levels of fatalism, and a perceived worse patient-provider communication relationship (Vadaparampil et al., 2017).

In a review of systematic reviews conducted between 2008-2018 on the HRQOL in breast cancer patients, Mokhatri-Hesari and Montazeri (2020) identified physical activity interventions (yoga, art therapies, complementary exercise, and mind-body exercise therapy), psychoeducational support and cognitive behavioural therapy as factors that could improve the HRQOL of breast cancer patients. Additionally, receiving social support was also found to improve HRQOL, while less social support and unmet social needs were factors associated with worse HRQOL. Besides social support, other coping strategies have also been significantly associated with the HRQOL of breast cancer patients (Y. U. Cho et al., 2020; Fasano et al., 2020; Lai et al., 2019). A detailed discussion on the relationship between coping and HRQOL of breast cancer patients will follow in the next section.

2.16 Measuring HRQOL

Investigating HRQOL among patients living with a chronic illness or chronic illnesses continues to grow as a topic in health psychology. Ustjanauskas and Malcarne (2020) and has led to the development of various HRQOL assessment measures. Measures of HRQOL aim to discern between people with better or worse HRQOL or to capture a change in the individual's HRQOL (Guyatt et al., 1993). This allows HRQOL measures to inform treatment decision-making (Maratia et al., 2016) as these measures can be utilized to examine treatment appropriateness and progress in achieving treatment goals (Bray et al., 2018; Osoba, 2011). Furthermore, these measures inform healthcare providers of other services that patients may require (Bray et al., 2018; Maratia et al., 2016; Osoba, 2011).

2.16.1 Generic and disease-specific measures of HRQOL. Measures of HRQOL are categorized as generic or disease-specific. Generic HRQOL scales are used to evaluate the effect of a wide variety of diseases on the HRQOL of individuals and are useful in comparing the HRQOL of individuals with different diseases and conditions (Harding, 2001). Despite the usefulness of these measures, they are unable to detect disease-specific concerns that affect the health of the individual (Ware et al., 2016). Disease-specific HRQOL measures are useful in evaluating treatment effects of specific illnesses as they are designed to be more sensitive to differences in health status when compared to generic HRQOL measures (Maratia et al., 2016; Ware et al., 2016). Examples of generic HRQOL measures include the SF-36 (Leung et al., 2014), the WHOQOL-BREF (Van Esch et al., 2011) and the Functional Assessment of Non-Life Threatening Conditions (FANLTC) (Giurgi-Oncu et al., 2021). Besides adaptations of these generic measures, several disease-specific measures have been developed for use among breast cancer populations (Mokhatri-Hesari & Montazeri, 2020).

2.17 Measuring HRQOL among breast cancer patients

Since the diagnosis and treatment of breast cancer have improved greatly over time, the focus has shifted from survival to the inclusion of HRQOL as an important outcome measure in research of breast cancer clinical investigations and survivorship studies (Bottomley et al., 2019; Van Leeuwen et al., 2018). Mokhatri-Hesari and Montazeri (2020), identified three types of HRQOL measures used in their review: generic, specific and measures of psychological issues and breast cancer symptoms. Among generic measures, the WHOQOL-BREF and the SF-36 measures both showcased good reliability and validity (Maratia et al., 2016). Moreover, Maratia and colleagues (2016) recommended the SF-36 as the best generic measure in their evaluation of HRQOL measures in breast cancer patients. Mokhatri-Hesari and Montazeri (2020) however found the European Organisation for Research and Treatment of Cancer quality of life core cancer questionnaire (EORTC QOL-C30) and the Functional Assessment of Cancer Therapy/Functional Assessment of Chronic Illness Therapy (FACIT) as the most frequently used generic measures of HRQOL in breast cancer studies (Lemieux et al., 2011; Reed et al., 2012). Several reviews of HRQOL measures in breast cancer patients found that breast cancer-specific measures like the Functional Assessment of Cancer Therapy-Breast specific scale and the European

Organisation for Research and Treatment of Cancer quality of life core breast cancer (EORTC QLQ-BR23) were the most frequently used breast cancer-specific QOL scales (Maratia et al., 2016; Nguyen et al., 2015; Oliveira et al., 2015; Reed et al., 2012). Additionally, measures of psychological issues and breast cancer symptoms with good applicability were identified as the Functional Assessment of Cancer Therapy- Endocrine Symptom subscale (FACT-ES) and the Hot Flash Related Daily Interference Scale (HFDIS) (Niu et al., 2014). These scales showcased good reliability in patients who receive hormonal therapy and who experience hot flashes (Mokhatri-Hesari & Montazeri, 2020).

In line with these findings, a review of QOL measurements used in randomized clinical trials of breast cancer found the EORTC QLQ-BR23, the FACT, the FACT-B, and the Short-Form 12 and 36 to be the most commonly used measures (Lemieux et al., 2011). Maratia and colleagues (2016) assessed and compared HRQOL measures in breast cancer patients and found the FACT-B as the instrument with the best global performance. Moreover, the FACT-B obtained the highest Evaluating Measures of Patient-Reported Outcomes scores on the dimensions of the Concept and Measurement Model, Reliability, and Interpretability (Maratia et al., 2016). This was confirmed by a review of Salas et al. (2021) on HRQOL measures in breast cancer patients. Their review of twelve breast cancer-specific measures included the EORTC QLQ-BR23, EORTC QLQ-C30, FACT B, Functional Assessment of Cancer Therapy-Breast Symptom Index, Breast Cancer Symptom Scale, National Comprehensive Cancer Network-Functional Assessment of Cancer Therapy-Breast Cancer Symptom Index-16, QuEST Breast Cancer Questionnaire, Young Women with Breast Cancer Inventory, Indonesian Breast Cancer Health-Related Quality of Life and Quality of Life Instruments for Cancer Patients-Breast Cancer as well two unnamed measures by (Deshpande et al., 2012) and (Vanlemmens et al., 2013). Based on an evaluation of the validity and reliability of all 12 measures, Salas and colleagues (2021) support the use of the

FACT-B and the EORTC QLQ-C30 in studies investigating the HRQOL of breast cancer patients. Seeing that the HRQOL data for the current study was captured with the FACT-B, the measure will be discussed in detail below.

2.17.1 The Functional Assessment of Cancer Therapy. The questionnaire was designed to be self-administered, but it can also be applied in the form of an interview to measure the general quality of life of patients receiving cancer treatment (Cella et al., 1993). The original 28-item version produces a total score as well as subscale scores for physical, social, functional, and emotional well-being as well as a score for the relationship with the doctor. The measure has been reported as being reliable and having a valid factor structure amongst various samples in several countries (Lemieux et al., 2011). For example, studies among breast cancer patients in South Korea (α=.89), Japan (α=.85), France (α=.88) and Malaysia (α=.80) all reported good overall internal consistency reliability for the FACT measure (Conroy et al., 2004; Fumimoto et al., 2001; Lee et al., 2004; Thomas et al., 2004). Furthermore, all the studies reconfirmed the five-factor structure of the measure (Conroy et al., 2004; Fumimoto et al., 2001; Lee et al., 2004; Thomas et al., 2004). To measure the HRQOL of patients receiving treatment for breast cancer, a supplementary breast cancer subscale was developed to produce the FACT-B (Shen et al., 2020).

2.17.2 The Functional Assessment of Cancer Therapy- Breast-related. This modified version of the FACT consists of 37 items categorized into five dimensions: physical well-being (PWB), social/family well-being (SWB), emotional well-being (EWB), functional well-being (FWB) and breast cancer-specific concerns (BCS) (Brady et al., 1997; Shen et al., 2020). The BCS focuses on the specific experiences of breast cancer patients and its overall contribution to HRQOL (Shen et al., 2020). The scoring system is the same as the original FACT, with the additional BCS subscale added to the other subscales to derive the total FACT-B score. A higher total score indicates a higher HRQOL (Kobeissi et al., 2014). The

FACT-B has demonstrated validity and reliability across diverse cultural contexts which have seen the measure translated into several languages (Dano et al., 2019; Shen et al., 2020; Tu et al., 2020; H. J. Yoo et al., 2005).

The FACT-B has shown varying levels of reliability across breast cancer samples (Maratia et al., 2016; Mokhatri-Hesari & Montazeri, 2020). In the original report on the validity and reliability of the FACT-B in a sample of 47 breast cancer patients, Brady and colleagues (1997) recorded a high total internal consistency score for the measure (α=0.90), with the following scores recorded for the subscales: PWB (α=0.81), SWB (α=0.69), EWB (α=0.69), FWB (α=0.86) and BCS (0.63). Interestingly, the trend of a lower BCS internal consistency score was found across several breast cancer samples. For example, Pandey and colleagues (2002) translated the FACT-B into Malayalam to determine its validity and reliability in a sample of 31 Indian breast cancer patients and found a Cronbach's α score of 0.87 for the total FACT-B. The α scores of the four primary QOL domains (PWB, SWB, EWB, FWB) were recorded as 0.75, 0.63, 0.84 and 0.84, respectively (Pandey et al., 2002). Interestingly, the BCS subscale achieved a poor α score of 0.41, which Pandey and colleagues (2002) attributed to most patients not completing question B4 ('I feel sexually attractive').

Among a sample of 300 Iranian women, the Persian version of the FACT-B produced a good α score of 0.92 for the total scale, with the PWB (0.71), SWB (0.91), EWB (0.78) and FWB (0.91) subscales α scores ranging from fair to excellent (Patoo et al., 2015). Like Pandey et al. (2002), the BCS achieved a lower score (α=0.63) when compared to the other QOL domains. Similarly, in a study by Wan et al. (2007) among 376 breast cancer patients, the simplified Chinese version of the FACT-B, recorded α scores greater than 0.80 for all four subscales (0.82-0.85), while the BCS subscale recorded an α score of 0.59. In a cross-cultural adaptation of the FACT-B in 113 Malaysian breast cancer survivors, Yusof and colleagues (2021) recorded a total α value of 0.88 and the α scores of the PWB, SWB, EWB and FWB subscales recorded as 0.85, 0.86, 0.67, 0.85, respectively. Continuing the trend reported above, the BCS recorded a lower α score (0.62), which was also attributed to a refusal of participants to answer item B4 (Yusof et al., 2021). In a quantitative study by Algamdi and Hanneman (2019), the psychometric properties of the Arabic FACT-B were explored among a sample of 167 breast cancer where a lower α score (0.63) was once again recorded for the BCS. Overall, the FACT-B recorded a good internal consistency score (α=0.88) with α scores of 0.86, 0.75, 0.75, 0.89, for the PWB, SWB, EWB and FWB subscales (Algamdi & Hanneman, 2019).

Despite several studies producing good internal consistency scores for the FACT-B, this is not always the case. Dano and colleagues (2019) conducted a quantitative study to investigate the QOL of breast cancer patients receiving chemotherapy in Senegal and produced a total α score of 0.60. Furthermore, the EWB and BCS subscales recorded α scores of 0.52 and 0.37, respectively (Dano et al., 2019). This was attributed to a lack of understanding of the items by breast cancer patients (Dano et al., 2019). Upon investigation of the literature, it was found that several studies fail to report the reliability of the total FACT-B or the measure’s subscales (Al-Naggar et al., 2016; Cooper & Mullin, 2001; Naja et al., 2015; Shen et al., 2020). In a study by Erturhan Turk and Yilmaz (2018), on 57 Turkish breast cancer patients, the FACT-B produce a total α score of 0.93, with subscales α scores ranging between 0.67 and 0.90. The study did however not specify each subscale’s specific score. Furthermore, in an investigation of the QOL of 121 Chinese triple-negative breast cancer patients, only the total α value (0.84) of the measure was reported (Shen et al., 2020). The same was found in a study by Tu et al. (2020) on positive psychological changes in breast cancer patients where only a total α value of 0.89 was reported. Furthermore, in a study on the QOL of 106 breast cancer patients in Yemen, no internal consistency scores for subscales or the total measure is provided (Al-Naggar et al., 2011). Similarly, no internal consistency scores were provided in the study of Al-Naggar and colleagues (2016) on the QOL of 166 breast cancer patients in Iraq. The same was found for studies on HRQOL of breast cancer patients in the United States (Vadaparampil et al., 2017) and Lebanon (Naja et al., 2015).

Despite the FACT-B being rated as one of the two most reliable HRQOL measures for breast cancer patients (Maratia et al., 2016; Salas et al., 2021), only two studies have explored the factor structure of the measure (Algamdi & Hanneman, 2019; Patoo et al., 2015). Following the confirmatory factor analysis on the Persian FACT-B among 300 breast cancer patients, all the fit indices indicated a relatively modest fit (Patoo et al., 2015). An exploratory factor analysis was undertaken on the Arabic version of the FACT-B among 167 breast cancer patients which confirmed a four-factor structure of PWB (7 items), SWB (7 items), EWB (6 items) and FWB (7 items) (Algamdi & Hanneman, 2019). The BCS had no significant factor loadings, which led to its exclusion. Algamdi and Hanneman (2019) ascribed this to a low response rate of items B4 and B9 ('I am able to feel like a woman') to femininity as a socio-cultural issue in the gender restrictive Arabic culture. For this reason, the BCS was found to not help determine the QOL of Arabic breast cancer patients.

From the literature above, it is evident that several factors influence the HRQOL in breast cancer patients. To measure the HRQOL of these patients, several generic and breast cancer-specific scales are available. However, the EORTC QLQ-BR 23/30 and the FACT-B were identified as having the best validity and reliability among the breast cancer-specific measures (Maratia et al., 2016; Salas, Mordin, Castro, Islam, et al., 2021). Although variations in reliability of the FACT-B were reported, the measure generally showcases good reliability across different languages and cultures. Taking this into account, there is a need to explore the factor structure of the FACT-B in the South African context to provide more information on the measure's factor validity. Furthermore, to explore the relationship between coping and HRQOL of breast cancer patients in South Africa, a reliable and valid version of the measure is required.

Section 5: The relationship between coping and health-related quality of life of breast cancer patients

2.18 The relationship between coping and HRQOL

As early as 1987, Lazarus and Folkman established an association between coping strategies and psychological well-being (Lazarus & Folkman, 1987). Subsequent research found that specific coping strategies (active coping, planning, and use of instrumental support) are associated with less psychological distress as well as higher levels of well-being in the other domains of HRQOL, while other strategies (distancing and avoidance) are often associated with symptoms of depression, anxiety and a lower levels of well-being across the domains of HRQOL (Elsheshtawy et al., 2014; Kvillemo & Bränström, 2014; N. Yusoff et al., 2010). According to (Lazarus, 1993), no coping strategy is entirely good or bad. Lazarus postulated that coping strategies should rather be viewed on a spectrum of helpfulness (Lazarus, 1993, p. 235). Additionally, the relationship between coping strategies and HRQOL are often mediated by situational, cultural, and socioeconomic factors. This sees different coping strategies associated with varying levels of HRQOL in cancer patients (Kvillemo & Bränström, 2014).

2.19 Coping strategies and HRQOL of breast cancer patients

Breast cancer patients utilize various coping strategies to deal with the symptoms of the illness and the consequences of treatment (Elumelu et al., 2015; Gallagher-Squires et al., 2020; Kvillemo & Bränström, 2014). Over the years several studies have found an association between coping strategies (both adaptive and maladaptive) and the HRQOL of breast cancers (Filazoglu & Griva, 2008; Khalili et al., 2013; Kvillemo & Bränström, 2014). Generally, adaptive coping strategies are associated with higher HRQOL scores, compared to maladaptive coping strategies (Filazoglu & Griva, 2008; Kvillemo & Bränström, 2014; Yan et al., 2016). The meta-analysis of Kvillemo and Bränström (2014) on coping with breast cancer, included 78 studies with 11 948 participants across the studies and found that acceptance and positive reappraisal were associated with higher HRQOL, while disengagement and avoidance coping strategies were associated with lower HRQOL. Furthermore, the use of coping strategies focused on adjusting to the disease and not utilising disengagement (avoidance) coping strategies were related to better psychological well-being and physical well-being (Kvillemo & Bränström, 2014).

In a quantitative study by Y.U Cho and colleagues (2020) on the coping style and HRQOL in 101 South Korean breast cancer patients, two coping groupings were identified (fighting spirit and helpless-hopeless and anxious preoccupation). The ‘fighting spirit’ (FS) grouping had higher scores on the fighting spirit subscale and lower scores on the anxious preoccupation and helpless-hopeless subscales. The converse scores were recorded for the ‘helpless-hopeless and anxious preoccupation’ (HHAP) grouping. At the year one follow-up, the FS group scored significantly higher than the HHAP grouping in emotional well-being, role function, and overall QOL. Similarly, in year two the FS grouping scored significantly higher than the HHAP grouping all the HRQOL subscales, however at year three, only a significant difference was recorded in the social well-being in the FS grouping. Most notably, maladaptive coping (helpless-hopeless, anxious preoccupation, fatalism, cognitive avoidance) at diagnosis was found to be a significant predictor of poor HRQOL (Y. U. Cho et al., 2020).

Similarly, in a quantitative study by Kugbey et al. (2019), on the mental adjustment and quality of life among 205 women living with breast cancer in Ghana helplessness-hopelessness was significantly associated with physical well-being, emotional well-being, functional well-being and breast cancer-specific concerns. Anxious preoccupation predicted significant decreases in all the domains of HRQOL while fighting spirit was positively correlated with emotional well-being and functional well-being, and cognitive avoidance with only functional well-being (Kugbey et al., 2019). Interestingly, fatalism was positively related to all domains of HRQOL (Kugbey et al., 2019). Despite the difference in the effects of coping strategies on the effect of HRQOL, both studies indicate that anxious preoccupation and other maladaptive coping strategies had a negative effect on the domains of HRQOL. Velasco et al. (2020), investigated the association between QOL and positive coping strategies in 113 Mexican breast cancer patients and found that positive affect and fighting spirit were associated with better QOL. This may contribute to affective responses and the use of a positive attitude to contribute to an improved HRQOL (Elsheshtawy et al., 2014; Watson et al., 2000).

Although religious coping is viewed as an adaptive strategy associated with higher HRQOL (Culver et al., 2002; Danhauer et al., 2009), this is not always the case. Amongst breast cancer patients in Egypt and Qatar, religious coping was reported as a barrier to early diagnosis and treatment of the disease (Al-Naggar et al., 2011; Hwang et al., 2017). Patients reportedly first relied on their faith to improve their symptoms before consulting a medical professional (Al-Naggar et al., 2011; Hwang et al., 2017). Furthermore, Hebert and colleagues (2009) found that positive religious coping (i.e., partnering with God or looking to God for strength, support, or guidance) was not significantly associated with HRQOL, while negative religious coping (i.e., being angry at God or feeling abandoned) predicted lower life satisfaction, depression, and lower overall mental well-being. Interestingly, the breast cancer stage did not moderate the relationship between religious coping and well-being (Hebert et al., 2009). This may indicate that negative affect and a negative attitude towards the disease in the form of negative religious coping may influence the HRQOL of breast cancer patients.

Préau et al. (2013) conducted a quantitative study on the relationship between HRQOL, coping strategies and spirituality among 4,270 French breast cancer patients and found through a multivariate analysis that lower mental well-being was associated with patients that found moderate comfort in spirituality. Furthermore, finding greater comfort in spirituality was associated with a higher fighting spirit coping style, and lower physical well-being. This supports the findings of Herbert and colleagues (2009) and contradicts the findings of previous research that found that active religious coping was associated with higher levels of well-being and positive changes in psychological distress (Gall et al., 2009). Additionally, the findings with regards to fighting spirit and HRQOL contradicts the reports of Cho et al. (2020) and Kugbey et al. (2019), indicating that the relationship between fighting spirit and HRQOL should be interpreted within the specific cultural context of breast cancer patients.

Across the disease trajectory, different coping strategies may be utilised to influence the HRQOL of breast cancer patients (Browall et al., 2016; Toscano et al., 2020). Women in different parts of the cancer trajectory differ in what they experience as stressful events (Browall et al., 2016). In the study of associations between locus of control, coping strategies, and HRQOL in patients with breast cancer or melanoma, the use of emotional coping strategies (venting, use of instrumental- and emotional support, and religion) decreased in the 215 breast cancer patients over the progression of the disease (Toscano et al., 2020). Emotional coping strategies were significantly associated with emotional well-being, while positive coping strategies (planning, active coping, self-distraction, humour, positive reframing, acceptance and substance abuse) were also significantly positively associated with emotional well-being (Toscano et al., 2020). Negative coping strategies (self-blame, disengagement, denial) were significantly negatively associated with both emotional well-being and social well-being across breast cancer patients throughout the disease (Toscano et al., 2020).

Investigating the sense of coherence and coping strategies and their influence on the QOL of 221 Iranian breast cancer patients, sense of coherence (the individual's global perspective of life and personal resources for coping with stressors) was confirmed to carry the effects of active coping, use of emotional support and use of informational support and positive reframing on HRQOL, while it dampened the effect of behavioural disengagement and self-blame on HRQOL (Zamanian et al., 2021). As disengagement coping strategies have been associated with both negative affect and poorer HRQOL (Kvillemo & Bränström, 2014), the findings suggest that a higher sense of coherence can mediate the negative effect of dysfunctional coping strategies on HRQOL. Additionally, engagement-oriented coping strategies (i.e., positive reframing and active coping) were associated with a higher HRQOL in previous studies (Kvillemo & Bränström, 2014; Yang et al., 2008) with the current findings suggesting that adaptive coping strategies enhanced sense of coherence, in turn leading to better HRQOL (Zamanian et al., 2021). Notably, humour, substance use and denial were not significantly associated with the sense of coherence or HRQOL and in contrast to the findings of (Hebert et al., 2009), religion as a coping strategy was also not significantly associated with either sense of coherence or HRQOL (Zamanian et al., 2021). This study indicated that as a sense of coherence increased, the effect of coping strategies on HRQOL decreased.

Furthermore, Khalili et al. (2013) investigated coping strategies, pain and QOL in 62 Iranian breast cancer patients found the most frequently used coping strategies were acceptance, self-distraction, religion, planning, positive reframing, denial and active coping. Their quantitative study found emotion-focused coping strategies to be positively and significantly associated with the breast cancer-specific aspect of QOL, but also inversely related to functional well-being (Khalili et al., 2013). Interestingly, no significant associations between problem-focused coping and any domains of QOL were found (Khalili et al., 2013). Furthermore, Lai et al. (2019) found in their study of 207 Taiwanese breast cancer patients that active coping, with higher agreeableness traits and lower neuroticism, led to better physical well-being. These studies indicated that in different cultures active coping had varying effects on HRQOL, while emotion-focused coping strategies had both a positive and negative effect on the HRQOL of breast cancer patients.

Tu and colleagues (2020) conducted a quantitative study that investigated the role of trait resilience and coping styles on positive psychological changes following breast cancer diagnosis and treatment in a sample of 201 Chinese breast cancer patients. Their study identified three coping styles: positive-affect coping (more active, accepting and optimistic approaches), negative-affect coping (more anxious, depressed and pessimistic outlooks and behaviours), and cognitive avoidance coping (disengaging and avoiding dealing with the disease) (Tu et al., 2020). Both negative-affect and cognitive avoidance coping were significantly negatively associated with HRQOL, while positive-affect coping was significantly positively related to HRQOL (Tu et al., 2020). This indicated that more active and optimistic coping strategies had a positive effect on HRQOL, while avoidance and pessimistic coping strategies had a negative effect on HRQOL. However, the study did not indicate how the coping styles affected the specific domains of HRQOL.

From the studies above, it is evident that coping strategies may either increase or decrease the level of HRQOL reported by breast cancer patients. However, Reich and Remor (2014), conducted a quantitative study on the psychological variables associated with 116 Uruguayan breast cancer patients that received surgery and found that neither problem-focused coping strategies, emotion-focused coping strategies nor avoidance-orientated coping strategies were significantly associated with any domain of HRQOL. As coping is a dynamic process that changes throughout the disease trajectory (Browall et al., 2016; Toscano et al., 2020), the researchers attributed this lack of a significant association to the cross-sectional design of the study.

From the abovementioned literature, it is clear that across different breast cancer populations a relationship between coping strategies and HRQOL has been established (Kvillemo & Bränström, 2014). More specifically, across the breast cancer samples different coping strategies have either had a positively significant (Kugbey et al., 2019; Toscano et al., 2020), negatively significant (Toscano et al., 2020; Tu et al., 2020) or a non-significant relationship (Reich & Remor, 2014) with the domains of HRQOL. Furthermore, few studies have investigated the relationship between coping and HRQOL in breast cancer patients in African countries. In the context of South Africa, studies have investigated several aspects of the experiences of breast cancer patients (Kagee et al., 2018; Sutherland, 2018; Swinny et al., 2021), and even cognitive coping strategies used by South African breast cancer patients (Gallagher-Squires et al., 2020). However, it was found that no study has investigated the relationship between coping strategies and HRQOL in the South African context. To explore this relationship in the current study, valid theoretical frameworks need to be employed to explain the constructs of coping and HRQOL.

Section 6: The theoretical frameworks underpinning coping and HRQOL

2.20 Theoretical frameworks

There are several conceptual frameworks to describe coping, like Selye's theory of Systemic Stress (Viner, 1999), Conservation of Resources theory (Hobfoll, 1989) and the Stress and Coping Model (Lazarus & Folkman, 1984). In the meta-analysis of Kvillemo and Bränström (2014) of 78 studies on coping with breast cancer, the Stress and Coping Model of Lazarus and Folkman (1984), emerged as the most frequently used model. In line with these findings, a systematic review of 33 studies on breast cancer and coping among women of colour, found the Stress and Coping Model to be the most frequently used to conceptualize coping (G. J. Yoo et al., 2014). Moreover, the same was found in recent studies of coping in breast cancer samples in Ghana (Boatemaa Benson et al., 2020), Taiwan (Lai et al., 2019), China (Shen et al., 2020), South Korea (Y. U. Cho et al., 2020) and Spain (Torralba-Martínez et al., 2021).

To investigate the relationship between coping strategies and the HRQOL of South African breast cancer patients, a theoretical framework for HRQOL is required. The relationship between coping and HRQOL is complex and is dependent on factors such as clinical characteristics, culture, social capital and religion (Préau et al., 2013). There are several theoretical frameworks designed to conceptualize HRQOL. These include frameworks like the Wilson and Cleary model of HRQOL (Wilson & Cleary, 1995), Calman’s model (Calman, 1984), the contextual model of HRQOL (Ashing-Giwa, 2005) and the Biopsychosocial model (Engel, 1977). Due to the multidimensionality of HRQOL and the complexity of the relationship between coping strategies and HRQOL of breast cancer patients, (Bourdieu, 1998), Hefti (2009) and Préau et al. (2013), recommended the use of the Biopsychosocial model.

2.21 The Stress and Coping model

As proposed by Folkman and Lazarus (1984), this model postulates that an individual’s adjustment to a threatening event (e.g., breast cancer) is determined by three factors: cognitive appraisal, coping resources and coping strategies. Following a threatening event (e.g., receiving a breast cancer diagnosis or undergoing treatment), individuals will initiate the process of cognitive appraisal. Cognitive appraisal involves primary appraisal, secondary appraisal and reappraisal (Lazarus & Folkman, 1984). Primary appraisal sees an evaluation of the nature and the quality of the event, whereas the secondary appraisal is when the individual determines if they have the necessary coping resources and potential to deal with the stressor (Lazarus & Folkman, 1984). Finally, reappraisal entails a constant evaluation, modification and relabelling of previous appraisals of the situation based on new information that emerges as the situation changes (Lazarus & Folkman, 1984, 1987).

The coping strategies that individuals use are determined by their coping resources (Lazarus & Folkman, 1984, 1987). Coping resources and potential refer to both internal resources (e.g., hope, self-efficacy, beliefs, health, problem-solving ability) and external resources (e.g., social support structures, material resources). Coping strategies can be categorized as strategies aimed at solving the problem, regulating emotions and avoiding the threatening situation (Lazarus & Folkman, 1984). Although these are three distinct categories of coping which can be used individually, individuals often employ strategies from more than one, simultaneously (Lazarus & Folkman, 1984). The categories of coping are described in detail below, with a description of the specific coping strategies provided earlier (please see section 2.8.1.).

2.21.1 Problem-focused coping strategies. These are strategies that are aimed at overcoming the stressor and are more likely to be employed when an individual feels that the stressful circumstance(s) can be changed. Problem-focused coping strategies can be divided into two groups: those directed at the environment or those directed at oneself (Lazarus & Folkman, 1984). Strategies aimed at the environment aim to address environmental stressors, obstructions, and procedures, while those directed at oneself want to bring about cognitive changes. This could be achieved by finding alternative networks to reach gratification, lessening ego involvement, learning new skills and/or developing new values to guide your behaviour (Lazarus & Folkman, 1984). Problem-focused coping refers to strategies like planning, active coping, and instrumental support (Lazarus & Folkman, 1984).

2.21.2 Emotion-focused coping strategies. These strategies focus on emotional regulation, which sees the individual trying to minimize emotions caused by the stressor without addressing the stressor itself. This approach is usually employed when an individual has evaluated the stressor and concluded that the stressful circumstances cannot be changed (Lazarus & Folkman, 1984). Emotion-focused strategies can be grouped into two categories, namely, those directed at decreasing emotional distress and those that increase distress. The former refers to strategies like venting, emotional support, positive reframing, humour, acceptance, and religion**,** while the latter refers to strategies such as self-blame and self-punishment (Lazarus & Folkman, 1984).

2.21.3 Avoidance coping strategies. This refers to indirect efforts aimed at adjusting to the stressor by diminishing emotions related to the stressor or avoiding the stressor altogether (Eschenbeck et al., 2007). These strategies refer to efforts such as behavioural disengagement, mental disengagement, substance abuse, denial and self-blame (Lazarus & Folkman, 1984).

2.22 Critique of the Stress and Coping model

Although a review of the literature indicated that the Stress and Coping Model is considered appropriate for evaluating the coping of breast cancer patients in South Africa, the model has been critiqued (Y. U. Cho et al., 2020; Kvillemo & Bränström, 2014; Shen et al., 2020; Torralba-Martínez et al., 2021). According to Lazarus and Folkman (1987), the biggest drawback is the contextual focus of the model. Since coping is viewed in the context of the threatening event, it runs the risk of being “too contextual”, disregarding the overall strategies a person utilizes (Lazarus, 1999). This sees the focus shift from the individual’s general coping style to a focus on the specific coping strategies employed in immediately dealing with the threatening event (breast cancer). This could make it more difficult to study the long-term consequences of the threatening event (Lazarus, 1999). Furthermore Lazarus (1990) and

(Aldwin, 2007), both argue that the theory has another drawback with regards to measuring stress. As many variables that influence coping vary across time and within different contexts, the Stress and Coping model only provides a basic "input-output analysis" of coping and its effect on stress and/or well-being (Aldwin, 2007; Lazarus, 1999).

2.23 The Biopsychosocial model

The Biopsychosocial model, as originally developed by George Engel in the 1960s, currently forms the basis of the World Health Organization's International Classification of Functioning (Wade & Halligan, 2017). Engel (1977) developed the Biopsychosocial model, not as an alternative to the Biomedical model, but to offer a more holistic approach to conceptualizing illness and health (Engel, 1977; Wade & Halligan, 2017). The Biopsychosocial model is more holistic as it accounts for the constant interaction between psychological, biological, and social factors (Engel, 1977; Wade & Halligan, 2017).

Furthermore, the holistic nature of the Biopsychosocial model is based on a systems theory (Adler, 2009) which focuses on human experiences. Systems theory refers to the 'whole patient' which includes the interrelatedness of physical, biological, psychological, social and cultural factors (Engel, 1977; Holland et al., 2015). For this reason, the model is capable of acknowledging the contribution of factors related to the biological, psychological and social dimensions of HRQOL (Glyn & Frizelle, 2020; Herdman et al., 2011; Santin et al., 2015). Due to the encompassing scope of the Biopsychosocial model in informing the treatment interventions of breast cancer patients in the past (Campbell et al., 2012), it was selected for this study's exploration of the relationship between patients' coping strategies and HRQOL.

2.24 Critique of the Biopsychosocial model

Over the 40 years of the Biopsychosocial model's application, several critiques and limitations of the model have arisen (Benning, 2015; Papadimitriou, 2017). Benning (2015) and (Borell-Carrió et al., 2004) indicated that the model showcased a lack of philosophical coherence as the model failed to acknowledge the role of the physician in maintaining or ameliorating the illness in the patient. Furthermore, Benning (2015) indicated that the model has failed to bring about effective change in swaying healthcare professionals from a biomedical perspective. This is supported by critiques of Pilgrim (2002) and Ghaemi (2009), which both state that the biopsychosocial model is not applied in practice in the holistic manner that is intended. Other critiques levelled against the Biopsychosocial model include an insensitivity in accounting patient's subjective experiences, not adhering to the systems theory of Adler in which the model is rooted, and no safeguards in ensuring that all three the domains of the model are represented equally (Benning, 2015; Ghaemi, 2009; Henriques, 2011).

2.25 Summary

The chapter reviewed the relevant literature on coping and its relationship with the HRQOL of breast cancer patients. The discussion presents background information on breast cancer aetiology, screening, and diagnostic services as well as treatment methods. The chapter then illustrated the unique context of breast cancer in Africa and more specifically, South Africa. The chapter continued with the specific needs that breast cancer patients have which include biological needs and treatment-related needs, emotional needs and psychological needs, informational and support needs and psychosocial needs. The factors influencing patients' perceptions of breast cancer was then reviewed, whereafter the subjective experiences of breast cancer patients were discussed in detail. From a review of the relevant literature, it is evident that further research on the relationship between coping and HRQOL of breast cancer patients in South Africa is needed.

The chapter also provided a conceptualization of coping which is followed by a discussion of how breast cancer patients cope with the disease. The coping strategies that breast cancer patient use and the measurement of coping is also presented. From the literature review, it was made clear that research on coping with breast cancer in the South African context is scant, with only one study found. The COPE and The Brief-COPE are discussed. After a review of the research on the psychometric properties of the Brief-COPE, it became evident that the factor structure of the measure is yet to be explored amongst a South African breast cancer sample. A conceptualization of HRQOL was provided whereafter HRQOL in the context of breast cancer was discussed. Measures of HRQOL were presented and the FACT-B was discussed in detail. When reporting on the FACT-B, it was discovered that the factor structure of the measure is yet to be explored amongst a breast cancer sample in any LMIC, including South Africa. Moreover, the relationship between coping and HRQOL of breast cancer was detailed. From the literature, it became evident that no study has investigated this relationship in the South African context. The chapter then concludes with a presentation of the theoretical frameworks underpinning coping (The Stress and Coping model) and HRQOL (the Biopsychosocial model), allowing for the frameworks to underpin the relationship between coping and HRQOL.

Chapter 3

Methodology

3.1 Introduction

In the light of the COVID-19 pandemic, a secondary data analysis was undertaken on data collected as part of a larger study conducted by Prof Kagee and Dr Roomaney. Below, I outline the research design used in the study. I also mention the advantages and disadvantages of undertaking a secondary data analysis. I then provide information on the research site as well as the sampling procedure employed to recruit participants for this study. Thereafter, I discuss the data collection procedure with specific reference to the instruments used. I also describe the statistical analyses that I undertook, which includes, data screening and replacing of missing values. This is followed up by a description of the data analysis that was performed.

3.2 Research Design of the study

This study consists of a secondary data analysis (SDA) performed on data collected as part of a larger project on the psychosocial aspects of breast cancer treatment. An SDA is defined as the analysis of data that was collected by a different researcher for another primary purpose (Johnston, 2014). An advantage of an SDA is that time and resources are saved as the data already exists (Smith & Smith Jr, 2008). Furthermore, with the dataset already existing, the research process is accelerated, allowing the results to be disseminated earlier (Doolan & Froelicher, 2009). A disadvantage of SDA is that the researcher has to settle for the original measurement instruments and subsequently have to evaluate and analyse the given instruments (Clarke & Cossette, 2016). Another possible disadvantage of an SDA is the lack of follow-up opportunities and the collection of additional data as participants' information is anonymized (Heaton, 2008).

To study employed a cross-sectional research design. A quantitative approach was used consisting of a statistical analysis of numeric data to obtain a description of a specific phenomenon (Polit & Beck, 2008). This allowed for the validation of the instruments to ensure that the instruments reflect what they intended to measure (Adnane et al., 2016), while also allowing for the exploration of the relationship between coping strategies and HRQOL. This allowed for the exploration of the factor structure of the measures through an exploratory factor analysis; calculating the internal consistency reliability of the measures; multiple regression analyses to investigate the relationship between coping strategies and domains of HRQOL. The design enabled the results to be integrated into a discussion with the proposed underpinning theoretical framework.

3.3 Research site

The data gathered for the research project was undertaken at the Tygerberg Hospital's Breast Clinic outpatient unit. Tygerberg Hospital, a public tertiary hospital, is the largest hospital in the Western Cape and the second largest hospital in South Africa (Western Cape Government, 2021). The BC clinic has provided cancer treatment services to Cape Town and other suburbs surrounding the city for more than 25 years. The clinic weekly enrolled approximately 40 new patients. This sees patients enrolled for diagnosis, treatment, care management and follow-up procedures. Most patients are referred to the clinic by public health clinics in Cape Town and surrounding areas, while a minority are referred by private practitioners. During the first clinic visit, the tumour is diagnosed and subsequently staged through a physical examination, mammography, and fine-needle aspiration. This is followed by treatment, which includes a combination of surgery, chemotherapy, radiation therapy and endocrine therapy. The duration, frequency and intensity of treatment are dependent on patient-specific variables.

3.4 Sampling procedure

Participants were recruited utilizing convenience sampling from the Division of Radiation Oncology at Tygerberg Hospital. Convenience sampling is defined as a non-probability sampling technique where participants are included based on accessibility and proximity to the researcher(s) (Rahi, 2017). Inclusion criteria were that the participants had to be diagnosed with BC and needed to be proficient in English or Afrikaans. Exclusion criteria included being under the age of 18 years and being diagnosed with another life-threatening disease or condition. Patients who were interested in the study met with a research assistant in a private consulting room. Patients were then presented with information about the study and invited to participate. The patients interested in participating were requested to complete an informed consent form.

3.5 Data collection

After providing consent, participants completed a booklet containing several self-report instruments in a private office at the Breast Clinic. As part of the broader study on psychosocial aspects of BC, a series of instruments were administered. The measurements were as follows: A questionnaire that recorded demographic and medical information, the Brief Illness Perception Questionnaire, The Benefit Finding Scale, the 12-item Short-Form Health Survey, The Center for Epidemiological Studies Depression Scale-Revised, 25-item Hopkins Symptom Checklist, the Duke-UNC Functional Social Support Questionnaire, the Berlin Social-Support Scales, the 29-item SAARF Universal Living Standards Measure, the Brief Pain Inventory, the Breast Impact of treatment scale and an adherence questionnaire, developed by Professor Ashraf Kagee and Doctor Rizwana Roomaney, specifically for the study to assess several dimensions of adherence to cancer care. It took participants approximately 45 minutes to complete the booklet of questionnaires. For this study, only data from the demographic questionnaire, the FACT-B and the Brief-COPE were accessed.

3.6 Accessing the data for the current study

To access the data for the current study, I was added as a sub-investigator to a broader study. After approval was granted by the Health Research Ethics Committee (please see Appendix B for the approval letter), I received a Windows Excel document containing participants responses to the demographic questionnaire, the FACT-B, and the Brief-COPE. The Excel sheet was stored in a password-protected drive on a password-protected computer used to perform the statistical analyses.

3.7 Data collection measures

3.7.1 Demographic questionnaire. To provide background information on the BC patients in the sample, several demographic characteristics were recorded. These include age, gender, race, marital status, living situation, the highest level of education, current work situation, annual family income, birth region (rural/urban/farm) as well as a first and second language (see Appendix C).

3.7.2 The Brief-COPE. The Brief-COPE, a shortened version of the original COPE scale (Carver, 1997), was designed to evaluate a range of coping responses in reaction to a disease (Kvillemo & Bränström, 2014). The Brief-COPE comprises of 28-items, with each item being rated on a four-point Likert scale (Appendix D). The measure has 14 subscales with two items to represent each subscale (Carver, 1997). As discussed in section 2.13.2, the measure has been established as valid and reliable amongst different samples across several countries. This led to the Brief-COPE being translated into several languages and validated amongst samples in Egypt, Malaysia, Nepal, India, France, China, and Chile to name a few.

In most instances, the internal consistency scores of the subscales were fair with scores ranging between 0.25 and 1 across the studies (Baumstarck et al., 2017; Elsheshtawy et al., 2014; Mohanraj et al., 2015; Shrestha et al., 2019; Su et al., 2015; N. Yusoff et al., 2010). A more detailed explanation of the psychometric properties of the Brief-COPE is available in section 2.13.2.

3.7.3 The FACT-B. The instrument is a multi-dimensional tool for the assessment of HRQOL among BC patients (Appendix E). It is made up of the Fact-General (FACT-G) and a supplementary Breast Cancer Subscale (BCS) (Kobeissi et al., 2014). It consists of 44 self-reported items categorized into five dimensions (Shen et al., 2020). The BCS focuses on the specific experiences of BC patients and their overall effect on HRQOL. The items are rated using a five-point Likert scale ranging from ‘‘not at all’’ to ‘‘very much’’. A higher subscale score indicates better functioning in that specific domain, while a higher total score reflects better overall HRQOL (Cella et al., 1993; Patoo et al., 2015). The total score ranges between 0 - 144 (Shen et al., 2020). The FACT-B has been translated into multiple languages, including English, French, German, Italian, Norwegian, Dutch, Swedish, Spanish, Japanese, Hebrew, Hungarian, Czech, Danish, Indian, Slovak, Mandarin and Cantonese, Korean, Taiwanese, Malayalam and Wolof (Dano et al., 2019; Pandey et al., 2002; Peterman et al., 1997; Shen et al., 2020; Tu et al., 2020; H. J. Yoo et al., 2005; Yost et al., 2005).

As discussed in detail in section 2.15, the FACT-B has been validated as a measure of HRQOL amongst BC patients in China (Shen et al., 2020), Iran (Patoo et al., 2015) and South Korea (Tu et al., 2020) to name a few countries with internal consistency scores of the subscales ranging between acceptable (0.63) to excellent (0.93) (Patoo et al., 2015; Shen et al., 2020; Tu et al., 2020). The psychometric properties of the measure are discussed in more detail in section 2.15.

3.8 Data analysis

By means of a quantitative research methodology, the data collected through the Brief-COPE and the FACT-B were analysed. All the statistical analyses conducted on the data from this study were performed using the Statistical Package for the Social Sciences (SPSS) version 27.0. All analyses were two-tailed and alpha (α) was set at 0.05.

3.8.1 Data screening. To prepare datasets for statistical procedures, certain steps needed to be taken. The data captured on Microsoft Excel sheets were imported and analysed in SPSS, version 27. Before analysis took place, the data needed to be cleaned. Firstly, the datasheet was screened to check that the scoring format of each measures' subscales only contains permissible values (i.e., if the scale ranges from 0-5, all scores need to fall within this range). If any variables needed to be labelled and named, it was completed during this stage (Field, 2013; Hair et al., 2018).

3.8.2 Missing data. To address missing data, a four-step process was undertaken to identify the missing values and take the necessary remedial action. Step one was to determine if the type of missing data were negligible or if the missing data could be ignored. Based on the sample size required for an exploratory factor analysis (Rummel, 1988), the missing data could not be ignored, and the second step was taken to determine the extent of the missing data. This was done by calculating the percentage of variables with missing data for everyone and the number of cases with missing data for each variable (sub-scale and scale), indicating a pattern or lack thereof in the missing data. These patterns could be due to a concentration of missing data in a specific set of questions or attrition in not completing the measure. I then proceeded to determine the nature of the randomness of the missing values (Hair et al., 2018).

If a non-random missing value needs attention either a Missing at Random (MAR) or Missing Completely at Random (MCAR) procedure provides sufficient randomisation to address missing data (Little & Rubin, 2019). The classification of the data as Missing at Random or Missing Completely at Random will determine the fourth step, the implementation of the chosen imputation method (Hair et al., 2018; Little & Rubin, 2019).

Step four saw the imputation method applied to accommodate the missing data. More details on how the missing data was handled are provided in section 4.3.

3.8.3 Item analysis. An item analysis was undertaken to reduce the number of items in the measurements (Field, 2013; Grünke et al., 2018). This leads to reduced, tentative versions of the measures, before the assessment of an instruments factor validity (Cella et al., 1993). The analysis entailed the calculation of the scale mean if item deleted, scale variance if item deleted, squared multiple correlations, Cronbach's alpha if item deleted and the item-total correlation if item deleted of the Brief-COPE and the FACT-B. The item-total correlation illustrates the correlation between an item on the measurement and the entire measurement (Field, 2013). This allowed me as the researcher to determine the contribution of each specific item to the measure. As stipulated by Field (2013), items with an item-total correlation below 0.35 were removed.

3.8.4 Exploratory factor analysis. Certain assumptions need to be met to allow for the assessment of an instrument's factor validity (Field, 2013). These assumptions refer to the sample size, the correlation between variables and the distribution of the data. As the data met these assumptions, an exploratory factor analysis was undertaken. To determine if the sample size was adequate for factor analysis, an item-to subject ratio of 1:4 was be applied(Rummel, 1988). The correlation between variables was determined by investigating the correlation matrices to assess for multicollinearity. Additionally, the Kaiser-Meyer-Olkin (KMO) value was calculated. The KMO is the ratio of squared correlations to squatted partial correlations between variables and a value close to 1 indicates "compact" patterns of correlations (Hair et al., 2018). This means that there is little variance between common variables in the measure. Bartlett's test of sphericity was also performed on the data. This is done to ensure that the inter-item correlation matrices do not appear as identity matrices (Field, 2013).

EFA as opposed to confirmatory factor analysis was performed because an EFA aims to reduce the number of latent factors in the two measurements under investigation. Latent factors refer to constructs that cannot be measured directly (Field, 2013).

3.8.4.1 Selecting an estimator for the EFA. A maximum likelihood extraction method was followed as it allowed the researcher to calculate various indices of the goodness-of-fit of the model (Field, 2013). After the missing data procedure, all participant data were used for the EFA.

3.8.4.2 Factor rotation. Considering that both coping and HRQOL are multidimensional concepts, a Varimax rotation was be undertaken as it provided an easily interpretable factor structure (Field, 2013; Hair et al., 2018).

3.8.4.3 Determining the number of factors. Firstly, the scree plots of the measures were assessed to ensure that all factors with eigenvalues greater than one were retained (Hair et al., 2018). A scree plot consists of a line plot of the eigenvalues of factors or principal components in an analysis**.** Further criteria were applied to determine if an item needed to be retained: considering the sample size, a loading cut-off point of 0.40 was applied; items loading on more than one factor were removed; and a minimum of three items needed to load on a factor for it to be considered a stable factor (Hair et al., 2018). Factor loadings are defined as the correlation between each variable and the factor (Hair et al., 2018).

3.8.5 Reliability analysis. Reliability is a construct that refers to the consistency of a measurement's scores (Hair et al., 2018). To determine the reliability (internal consistency) of the Brief-COPE and the FACT-B, Cronbach's alpha, (a reliability coefficient), was calculated (Hair et al., 2018). A lower limit of 0.70 for Cronbach's alpha was selected as this indicated good reliability (Hair et al., 2018).

3.8.6 Regression analysis. To explore whether certain coping strategies significantly influence the HRQOL of BC patients in South Africa, forced entry multiple regression analyses were performed. This is a method in which all predictive variables are entered into the model simultaneously. This method is recommended in instances where a theoretical relationship, like the relationship between coping strategies and domains of HRQOL, is evaluated (Field, 2013; Hair et al., 2018). The relationship between coping strategies and HRQOL in BC patients has been explored in previous research (Filazoglu & Griva, 2008; Shim et al., 2006), which motivates the exploration of this relationship in the current study. The association between the new subscales determined by the EFA performed on the Brief-COPE and the FACT-B measurements were explored to investigate the relationship between coping strategies and HRQOL amongst breast cancer patients in South Africa.

Prior to the multiple regression analysis, the normality of the data was assessed. Several multiple regression diagnostics were evaluated to determine if multiple regression was appropriate. These include aspects, such as sample size, outliers, multicollinearity (high correlations between the independent variables), linearity (a linear relationship between the outcome variable and the independent variables), and homoscedasticity (the error variance should be the same across all values of the independent variables) (Field, 2013). As all assumptions were met, multiple regression analyses were undertaken.

To investigate the relationship between coping strategies (Brief-COPE subscales) and HRQOL (FACT-B subscales), the results of the regressions were reported. It provided information on the proportion of variation in the outcome variable (HRQOL) that can be explained by the model (coping strategies). Through analysis of variance, the significance of the model as a predictor of the outcome variable was determined. Lastly, by investigating the coefficients, I was able to conclude which predictors (coping strategies) significantly contributed to the model predicting the outcome variable (HRQOL) (Field, 2013).

3.9 Ethical considerations

Ethical clearance for the main study was granted by the Health Ethics Research Committee (HREC) of the University of Stellenbosch (please see appendix F). Furthermore, permission to access the patients at the breast clinic at Tygerberg hospital was granted by the Western Cape Department of Health (please see Appendix G). Participants received a R50 shopping voucher as a token of appreciation for their time to complete the questionnaire. Furthermore, the patients who experienced distress were referred for psychosocial support. When permission was granted to join the original project, all data used was kept protected by a password-encrypted document. All analyses performed on the data were kept safe on a password-protected computer to which only I had access. Furthermore, all the particulars of the participants were anonymized to ensure confidentiality. Data will be kept for five years and then destroyed.

3.10 Summary

In this chapter, I provided a thorough account of the research design of the study, including information on the research site and the sampling procedure used. A brief description of the data collection procedure of the broader study was provided, whereafter a description of the data collection instruments (a demographic questionnaire, the Brief-COPE and the FACT-B) used in the current study followed. The data analysis procedure was then discussed. This included details on the item analysis, EFA, reliability- and regression analysis. Lastly, the needed ethical considerations of the research study were addressed.

Chapter 4

Results

4.1 Introduction

In this chapter, I present the findings of the current study. Firstly, the demographic characteristics of the sample are presented. After this, I discuss how missing data were handled before the results of the item analysis are detailed. Thereafter I discuss the results of the EFA, and the reliability analyses performed on the new versions of the Brief-COPE and the FACT-B. Following this, the results of the regression analyses are detailed. Lastly, all the findings are summarized to conclude the chapter.

4.2 Sample demographics

The sample consisted of 201 female BC patients receiving healthcare from a public tertiary hospital (Tygerberg Hospital) in the Western Cape, South Africa. Participant demographic information is displayed in Table 4.1. The average age of participants was 55.80 years (SD=55.80; range 27-83). Of the sample, 37.6% indicated that they were married, and 44.8% of the participants indicated that they lived with other adults and children.

Most participants had attended secondary education (high school) as their highest educational level, although only 23.30% completed matric (grade 12). Furthermore, only 6.90% had graduated from a tertiary institution and 43.30% earned less than R5,200 a month. Looking at the breast cancer stage, most patients 51.70% reported that they were diagnosed with stage II cancer. Most of the participants were in remission (76.90%) at the time of completing the survey. Lastly, in terms of time since the first diagnosis, the mean time was found to be 248.30 weeks (SD=254.77; range 7.30-1,263.30).

Table 4.1. Sample characteristics

Characteristics	*N*=201
Age (Years) (Mean)	55.8 years
Gender	
Female	201
Marital status	
Married	76
Widowed	45
Divorced	36
Separated	7
Single	38
***Living situation**	
Live alone	20
Live with other adults(s), no children	48
Live with other adults and children	90
Live with children	37
Live in an institution or retirement home	5
Level of education	
No formal education	14
Completed primary school	26
Attended High School but did not complete matric	83
Completed matric	46
Attended University/college/Technikon (didn't graduate)	17
Graduated from university/college/Technikon	15

Current work situation	
Employed full time	41
Employed part-time	28
Student	1
Unemployment	48
Disabled	11
Homemaker	13
Retired	59
Monthly family income	
Less than R2500	81
R2 501-R5 000	47
R5 001-R10 000	25
R10 001-R15 000	10
R15 001 and above	7
Don't know	17

**Missing values in the data of participants' living situation*

4.3 Missing data

Following a screening of the Brief-COPE dataset, based on the guidelines established by Hair et al. (2018), the amount of missing data was found to be negligible (0.37%) and random. The FACT-B also had a negligible amount of data missing (1.95%), which according to Hair et al. (2018) means that any imputation method can be used. To maximize the number of cases available for the conduction of a factor analysis, I decided to impute the mean score for missing data. This imputation method was selected as this allowed for all the participant data to be used (Hair et al., 2018).

4.4 Item analysis

4.4.1 Results of the item analysis of the Brief-COPE. The item analysis was conducted on all 28 items of the Brief-COPE. The results of the item analysis are displayed below in Table 4.2. Only two items displayed a corrected item-total correlation below 0.35, indicating that these items failed to correlate with the score for the Brief-COPE (Hair et al., 2018). These items (i.e., COP1 and COP19) were removed, which saw the EFA performed on the remaining 26 items.

Table 4.2 *Item analysis of the Brief-COPE*

Subscale	Item code	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Self-distraction	COP1	3.02	1.484	**.311**	.097	.841
	COP19	2.67	1.623	**.311**	.097	.835
Active coping	COP2	2.95	1.458	.567	.322	.834
	COP7	2.72	1.562	.567	.322	.832
Denial	COP3	1.63	1.084	.503	.253	.840
	COP8	1.88	1.399	.503	.253	.839
Substance use	COP4	1.19	.384	.839	.704	.843
	COP11	1.21	.356	.839	.704	.842
Use of emotional support	COP5	3.39	.960	.409	.167	.839
	COP15	3.12	1.276	.409	.167	.838
Use of instrumental support	COP10	3.05	1.242	.516	.266	.834
	COP23	3.12	1.156	.516	.266	.834

Behavioural disengagement	COP6	1.33	.643	.476	.226	.842
	COP16	1.38	.696	.476	.226	.841
Venting	COP9	2.59	1.604	.409	.168	.833
	COP21	2.20	1.523	.409	.168	.836
Positive reframing	COP12	3.36	1.011	.442	.195	.835
	COP17	3.08	1.324	.442	.195	.837
Planning	COP14	3.10	1.414	.397	.157	.828
	COP25	2.72	1.564	.397	.157	.833
Humour	COP18	2.38	1.568	.635	.403	.841
	COP28	2.76	1.595	.635	.403	.840
Acceptance	COP20	3.69	.556	.472	.223	.842
	COP24	3.46	1.020	.472	.223	.840
Religion	COP22	3.75	.408	.505	.255	.840
	COP27	3.66	.555	.505	.255	.841
Self-blame	COP13	1.77	1.307	.436	.190	.840
	COP26	1.67	1.103	.436	.190	.843

Note: item-total correlations <0.35 are in boldface.

4.4.2 Results of item analysis of the FACT-B. The item analysis was conducted on all 30 items of the FACT-B with the results of the item analysis displayed in Table 4.3. A total of six items displayed a corrected item-total correlation below 0.35, indicating that these items failed to correlate with the overall score of the FACT-B (Hair et al., 2018). The items GS7, GE2, B1, B3, B4, B5 were removed, which saw the EFA performed on the remaining 24 items.

Table 4.3 *Item analysis of the FACT-B*

Subscale	Item code	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Physical well-being	GP1	5.30	34.100	.541	.334	.687
	GP2	6.23	35.797	.571	.371	.683
	GP3	6.04	34.473	.594	.381	.687
	GP4	5.46	31.339	.646	.447	.679
	GP5	5.84	33.838	.527	.305	.685
	GP6	6.30	34.952	.684	.556	.685
	GP7	6.35	35.030	.665	.491	.687
Social well-being	GS1	19.84	21.268	.511	.530	.705
	GS2	19.66	20.807	.577	.477	.707
	GS3	19.70	22.030	.530	.542	.701
	GS4	19.37	23.905	.413	.294	.711
	GS5	19.63	20.555	.620	.587	.711
	GS6	19.50	21.481	.568	.384	.706
	GS7	20.30	22.792	**.280**	.182	.712
Emotional well-being	GE1	6.45	15.729	.425	.269	.689
	GE2	4.21	23.556	**-.256**	.076	.709
	GE3	7.30	17.220	.567	.370	.686
	GE4	6.69	13.744	.669	.537	.691
	GE5	6.88	14.266	.635	.555	.686
	GE6	6.38	12.928	.644	.557	.685

Functional well-being	GF1	19.65	23.318	.674	.544	.715
	GF2	19.61	23.879	.627	.515	.708
	GF3	19.30	24.942	.744	.664	.708
	GF4	19.07	28.679	.489	.277	.705
	GF5	20.28	24.494	.408	.210	.729
	GF6	19.48	23.641	.768	.687	.710
	GF7	19.61	24.130	.639	.448	.706
Breast cancer-specific concerns	B1	11.91	39.262	**.317**	.145	.686
	B2	11.83	37.165	.373	.281	.693
	B3	11.47	37.170	**.334**	.226	.694
	B4	11.10	47.874	**-.202**	.069	.711
	B5	12.19	39.404	**.299**	.129	.696
	B6	10.57	36.566	.364	.189	.692
	B7	11.13	34.807	.451	.330	.690
	B8	11.57	34.736	.424	.268	.691
	P2	10.95	35.842	.393	.278	.684

Note: item-total correlations <0.35 are in boldface

4.5 Exploratory factor analysis of the Brief-COPE

After items with poor item-total correlations were removed, the data of the Brief-COPE were assessed to determine if assumptions for performing an EFA were met. After an investigation of the assumptions, an EFA was undertaken.

4.5.1 Assessing assumptions. For data to be considered suitable for factor analysis, three requirements had to be met. These requirements are a minimum item-to-sample size ratio, the correlations between variables, and the distribution of the data.

4.5.1.1 Sample size. Considering the nature of the disease and the socio-economic context of South Africa, it was difficult to recruit participants for the study. Despite these challenges, the study succeeded in collecting data from a total of 201 participants. As suggested by (Rummel, 1988) sample sizes of 150 and item-to subject ratios of 1:4 are required for an EFA to be performed. Both these requirements are met as the sample size exceeds this requirement, while the item-to subject ratios recorded for the Brief-COPE was 1:8.

4.5.1.2 Correlation between variables. To conduct a factor analysis, the variables in the measure should correlate. This correlation should however not exceed 0.9 to avoid multicollinearity (Field, 2013). If variables correlate too much, it will be difficult to determine the contribution that the variable makes to the factor (Field, 2013; Hair et al., 2018). I inspected the correlation matrix of the Brief-COPE to evaluate the correlations between variables (please refer to Appendix H). The correlation matrix showcased that the items met this assumption, and that factor analysis can be conducted. Moreover, the Kaiser-Meyer-Olkin measure was 0.77, indicating good sampling adequacy (Field, 2013). Bartlett's test of sphericity $\chi 2$ (325) = 1949,698, p < .05 was significant and this indicated significantly large correlations between the items of the Brief-COPE.

4.5.1.3 Distribution of data. A normal distribution of data is required to conduct a factor analysis. To assess the distribution of the scores, I plotted histograms as well as P-P plots for the Brief-COPE subscales (Please see Appendices I-V). The normal distribution curves as presented in Appendices I-V show that the points on the P-P plots were near the line which indicates that the requirement of a normal distribution had been met. The assessment of normal data distribution was confirmed by the non-significant Kolmogorov-Smirnov test scores of the Brief-COPE subscales (please refer to table 4.4).

Table 4.4 Kolmogorov-Smirnov scores of the Brief-COPE

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Brief-Cope (Subscales)						
Self-distraction	.167	201	.000	.886	201	.000
Active Coping	.187	201	.000	.858	201	.000
Denial	.305	201	.000	.767	201	.000
Substance use	.494	201	.000	.391	201	.000
Use of emotional support	.272	201	.000	.802	201	.000
Use of instrumental support	.205	201	.000	.847	201	.000
Behavioural disengagement	.420	201	.000	.575	201	.000
Venting	.132	201	.000	.900	201	.000
Positive reframing	.246	201	.000	.807	201	.000
Planning	.166	201	.000	.864	201	.000
Humour	.159	201	.000	.867	201	.000
Acceptance	.390	201	.000	.628	201	.000
Religion	.444	201	.000	.559	201	.000
Self-blame	.278	201	.000	.769	201	.000

4.5.2 Deciding on the number of factors to retain. As a first step in determining the number of factors that should be included, I inspected the scree plot and eigenvalues of the Brief-COPE. The point of infliction seems to occur at Factor 8 on the scree plot (please refer to Appendix W), and 8 items displaying eigenvalues greater than 1, indicating 8 factors (please refer to Appendix X). However, for a more accurate indication of the number of factors to retain, I decided to base the decision on the inspection of items.

4.5.3 Initial factor structure of the Brief-COPE. In Table 4.5 the results of the factor analysis from the rotated factor matrix are displayed. For a factor to be considered as stable, items needed to meet the loading cut-off point of .40, items that cross-loaded were removed, and a minimum of three items needed to load onto the factor (Hair et al., 2018). The factor analysis identified one item that cross-loaded (COP 24) and two items that failed to significantly load on any factor (COP17, COP21). This led to the removal of these items from the measure. Three factors were extracted, each having a minimum of three items. Factor 1 consisted of seven items (COP3, COP6, COP8, COP9, COP13, COP16 and COP26), Factor 2 consisted of four items (COP2, COP7, COP12 and COP14), Factor 3 consisted of four items (COP5, COP10, COP15 and COP23). These 15 items were considered the initial items in the measure and the factors as the initial representation of the subscales.

Table 4.5 Factor loadings for EFA with Varimax rotation: Brief-COPE

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
COP2	.076	**.735**	.024	.035	.011	.059	.012	.169
COP3	**.507**	.068	.048	.038	.093	-.022	.008	.078
COP4	.281	.032	-.101	**.792**	.012	.079	-.050	-.004
COP5	-.064	.319	**.570**	.024	.048	-.078	.097	-.043
COP6	**.625**	.004	.100	.136	-.249	.037	.095	-.129
COP7	.118	**.752**	.250	-.100	.057	.049	.058	.019
COP8	**.574**	.136	.033	-.003	.061	.015	-.025	-.047
COP9	**.423**	.329	.089	.001	.073	.064	.028	.175
COP10	.099	.219	**.737**	-.065	.261	.089	.034	.115

COP11	.365	-.026	-.004	**.928**	-.032	-.004	-.052	.017
COP12	.049	**.441**	.289	-.009	.325	-.009	.149	.008
COP13	**.493**	.116	-.032	.141	-.116	.067	-.016	.031
COP14	.214	**.570**	.282	.083	.121	.182	.072	.155
COP15	-.040	.063	**.569**	-.116	.279	.026	.164	.246
COP16	**.744**	-.072	-.082	.240	.066	.021	-.045	.021
COP17	.022	.354	.080	.024	.389	.169	.120	.082
COP18	.064	.107	-.005	-.003	.065	**.987**	.074	-.017
COP20	-.079	.111	.131	-.105	.044	.172	**.635**	-.004
COP21	.208	.257	.021	.021	.041	.104	.313	.237
COP22	-.015	.144	.194	-.074	**.653**	.018	.186	.000
COP23	.110	.115	**.466**	-.040	.196	.031	.158	**.535**
COP24	-.097	-.003	.166	.016	**.427**	.088	**.646**	.197
COP25	.080	.382	.143	.043	.093	.094	.096	**.659**
COP26	**.516**	.004	-.086	.214	-.123	.074	-.120	.186
COP27	-.055	.017	.168	.037	**.688**	.033	-.004	.095
COP28	.072	.100	.023	.066	.047	**.614**	.169	.102

Notes: Factor loadings > .40 are in boldface.

4.5.4 Second factor analysis with 14 items. Based on the factor structures produced by the first EFA, a second factor analysis was performed to determine the validity of the selected items (Knekta et al., 2019). The same parameters as specified for the initial EFA was applied to the second factor analysis. Table 4.6 displays the factor matrix of the second factor analysis. For a factor to be considered stable, the same criteria of Hair et al. (2014) were applied. The factor analysis identified one item that cross-loaded (COP12) and one item that failed to load on any factor (COP9). These items were removed from the measure. Three factors were extracted, Factor 1 consisted of four items (COP6, COP13, COP16 and COP26), Factor 2 consisted of three items (COP2, COP7 and COP14) and Factor 3 consisted of four items (COP5, COP10, COP15). These 10 items were considered the final items and the factors the final representation of the subscales. The model explained 54.52% of the total variance among the items.

Table 4.6 *Factor loadings of the new Brief-COPE*

Item code	Factor 1	Factor 2	Factor 3	Factor 4
COP2	.061	**.711**	.076	.037
COP3	.347	.066	.086	**.421**
COP5	-.100	.274	**.551**	.021
COP6	**.532**	.046	-.024	.262
COP7	.013	**.779**	.246	.120
COP8	.264	.113	.009	**.957**
COP9	.377	.311	.198	.175
COP10	.044	.249	**.746**	.063
COP12	.033	**.417**	**.424**	-.006
COP13	**.584**	.136	-.023	.020
COP14	.204	**.617**	.319	.045
COP15	-.074	.048	**.710**	.014
COP16	**.760**	-.034	-.047	.180
COP26	**.613**	.020	-.079	.066

Note: Factor loadings > .40 are in boldface.

4.5.5 Presentation of the new version of the Brief-COPE. The final measure consists of 10 items and three subscales. Table 4.7 displays the factor number, the item, and a description of the item. Factor 1 is labelled as "Avoidant-focused coping" as the items that loaded on this factor all related to strategies that avoid dealing with aspects related to breast cancer. I labelled Factor 2 as "Problem-focused coping" as the items that loaded on this factor were all focused on dealing with breast cancer. I named Factor 3 "Emotion-focused coping" as the items that loaded significantly on the factor all related to emotional coping strategies

Table 4.7 *Description of final items and factors: Brief-COPE*

Factor	Item	Item description
Factor 1	COP6	I've been giving up trying to deal with it.
	COP13	I've been criticizing myself.
	COP16	I've been giving up the attempt to cope.
	COP26	I've been blaming myself for things that happened.
Factor 2	COP2	I've been concentrating my efforts on doing something about the situation I'm in.
	COP7	I've been taking action to try to make the situation better.
	COP14	I've been trying to come up with a strategy about what to do.
Factor 3	COP5	I've been getting emotional support from others.
	COP10	I've been getting help and advice from other people.
	COP15	I've been getting comfort and understanding from someone.

Factor 1= Avoidant-focused coping
Factor 2= Problem-focused coping
Factor 3= Emotion-focused coping

4.6 Exploratory factor analysis of the FACT-B

After items with poor item-total correlations were removed, the data of the FACT-B were assessed to determine if assumptions for performing an EFA were met. After an investigation of the assumptions, an EFA was undertaken.

4.6.1 Assessing assumptions.

The same assumptions applied to the data of the Brief-COPE was applied. These requirements are a minimum item- to sample size ratio, the correlations between variables, and the distribution of the data.

4.6.1.1 Sample size. As suggested by Rummel (1988), sample sizes of 150 and item-to subject ratios of 1:4 are required for an EFA to be performed. Both these requirements are met as the sample size exceeds this requirement, while the item-to subject ratios recorded for the FACT-B was 1:7.

4.6.1.2 Correlation between variables. I inspected the correlation matrix of the FACT-B to evaluate the correlations between variables (please refer to Appendix H). The correlation matrix showcased that the items met this assumption, and that factor analysis can be conducted. Moreover, the Kaiser-Meyer-Olkin measure was 0.85, indicating excellent sampling adequacy (Field, 2013). Bartlett's test of sphericity $\chi 2$ (435) = 3095,785, p < .05 was significant and this indicated significantly large correlations between the items of the FACT-B.

4.6.1.3 Distribution of data. To assess the distribution of the scores, I plotted histograms as well as P-P plots for the FACT-B (Please see Appendix Y). The normal distribution curves as presented in Appendix Y show that the points on the P-P plots were near the line which indicates that the requirement of a normal distribution had been met. The assessment of normal data distribution was confirmed by the non-significant Kolmogorov-Smirnov test score of the total FACT-B score (please refer to Table 4.8).

Table 4.8 Kolmogorov-Smirnov score of the FACT-B

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
FACT-B	.087	201	.001	.941	201	.000
Brief-Cope						
Self-distraction	.167	201	.000	.886	201	.000
Active Coping	.187	201	.000	.858	201	.000
Denial	.305	201	.000	.767	201	.000
Substance use	.494	201	.000	.391	201	.000
Use of emotional support	.272	201	.000	.802	201	.000
Use of instrumental support	.205	201	.000	.847	201	.000
Behavioural disengagement	.420	201	.000	.575	201	.000
Venting	.132	201	.000	.900	201	.000
Positive reframing	.246	201	.000	.807	201	.000
Planning	.166	201	.000	.864	201	.000
Humor	.159	201	.000	.867	201	.000
Acceptance	.390	201	.000	.628	201	.000
Religion	.444	201	.000	.559	201	.000
Self-blame	.278	201	.000	.769	201	.000

4.6.2 Deciding on the number of factors to retain. To determine the number of factors that should be included, I inspected the scree plot and eigenvalues of the FACT-B. The point of infliction seems to occur at either Factor 7 or Factor 8 on the scree plot (please refer to Appendix W), while 7 items displayed eigenvalues greater than 1, indicating 7 factors (please refer to Appendix Z). However, for a more accurate indication of the number of factors to retain, I decided to base the decision on the inspection of items.

4.6.3 Initial factor structure of the FACT-B. Table 4.9 below displays the results of the factor analysis from the rotated factor matrix. For a factor to be considered as stable, items needed to meet the loading cut-off point of 0.40, items that cross-loaded were removed, and a minimum of three items needed to load onto the factor (Hair et al., 2018). The factor analysis identified two items that cross-loaded (GP4 and GE3) and three items that failed to significantly load on any factor (GP1, GF5 and B6). These items were then removed from the measure. Four factors were extracted, each having a minimum of three items. Factor 1 consisted of six items (GF1, GF2, GF3, GF4, GF6, GF7), Factor 2 consisted of six items (GP5, GE4, GE5, GE6, B2, B7, B8). Factor 3 consisted of five items (GP2, GP3, GP6, GP7, GE1) and Factor 4 consisted of four items (GS2, GS4, GS5, GS6). These 21 items were considered the initial items in the measure and the factors as the initial representation of the subscales.

Table 4.9 Factor loadings for EFA with Varimax rotation: FACT-B

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
GP1	-.119	.294	.391	-.167	.199	-.055	.152
GP2	-.002	.163	**.616**	-.102	.108	.035	-.020
GP3	-.198	.185	**.460**	-.030	.276	.076	.168
GP4	-.111	.193	**.517**	-.063	**.681**	-.010	.055
GP5	-.156	**.444**	.375	-.249	.166	.018	.214
GP6	-.209	.144	**.717**	-.082	.240	-.059	-.067
GP7	-.327	.151	**.657**	-.055	.166	-.021	.095
GS1	.130	-.111	-.064	.223	.008	**.850**	.049
GS2	.127	-.043	-.093	**.628**	-.110	.255	-.090
GS3	.231	-.070	.032	.201	-.057	**.751**	-.068
GS4	.208	-.132	-.229	**.492**	.010	.042	.103
GS5	.142	-.126	-.163	**.934**	-.005	.094	-.038

GS6	.037	-.277	.160	**.473**	-.151	.232	-.022
GE1	-.196	.352	**.413**	-.150	.191	-.111	-.133
GE3	-.008	**.422**	**.607**	-.014	-.075	-.039	-.048
GE4	-.154	**.671**	.277	-.231	-.032	-.173	.077
GE5	-.171	**.688**	.337	.026	-.246	-.074	.109
GE6	-.207	**.748**	.209	-.072	.007	-.037	.164
GF1	**.649**	-.091	-.186	.014	-.188	.074	-.463
GF2	**.661**	-.048	-.015	.152	-.155	.056	-.442
GF3	**.765**	-.150	-.219	.121	-.068	.214	-.008
GF4	**.533**	-.148	-.122	.055	.109	-.024	-.023
GF5	.301	-.228	-.139	.197	-.460	.040	.085
GF6	**.844**	-.140	-.199	.135	-.134	.198	.205
GF7	**.620**	-.224	-.013	.179	-.115	.124	.026
B2	-.147	**.400**	.109	-.086	.159	.006	-.032
B6	-.052	.373	.072	.074	.207	-.019	.001
B7	-.151	**.576**	.159	-.203	.269	-.076	-.112
B8	-.028	**.496**	.079	-.148	.111	-.025	-.064
P2	.011	.135	.395	-.056	**.665**	-.058	.148

Note: Factor loadings > .40 are in boldface.

4.6.4 Second factor analysis with 21 items. Based on the factor structure produced by the first EFA, a second factor analysis was performed to determine the validity of the selected items of the FACT-B (Knekta et al., 2019). The same parameters as specified for the initial EFA was applied to the second factor analysis. Table 4.10 displays the factor matrix of the second factor analysis. For a factor to be considered stable, the same criteria of Hair et al. (2014) were applied. The factor analysis identified two items that cross-loaded (GP5 and

GF2) and one item that failed to load on any factor (B2). These items were removed from the measure. Four factors were extracted, Factor 1 consisted of five items (GF1, GF3, GF4, GF6 and GF7), Factor 2 consisted of five items (items GE4, GE5, GE6, B7 and B8), Factor 3 consisted of four items (GP2, GP3, GP6 and GP7). Although the emotional well-being item (E1) succeeded in achieving a significant factor loading (0.461), I decided to not include it as it did not fit the theme of Factor 3 (please refer to Table 4.10). Factor 4 consisted of 4 items (GS2, GS4, GS5 and GS6). These 18 items were considered the final items and the established factors were the final representation of the subscales. The model explains 55.61% of the total variance among the items.

Table 4.10 *Factor loadings of the new FACT-B*

Item code	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
GP2	.027	.190	**.612**	-.090	-.023
GP3	-.142	.190	**.534**	-.034	-.196
GP5	-.087	**.467**	**.436**	-.257	-.161
GP6	-.209	.195	**.761**	-.072	.067
GP7	-.278	.206	**.690**	-.052	-.104
GS2	.144	-.055	-.101	**.674**	.118
GS4	.218	-.140	-.208	**.502**	-.107
GS5	.133	-.155	-.159	**.900**	-.028
GS6	.066	-.230	.078	**.506**	.079
GE1	-.212	.359	**.461**	-.156	.018
GE4	-.174	**.720**	.166	-.253	-.060
GE5	-.147	**.725**	.183	.020	-.079

GE6	-.189	**.783**	.140	-.073	-.122
GF1	**.566**	-.077	-.256	.066	.777
GF2	**.570**	-.066	-.107	.179	**.405**
GF3	**.799**	-.186	-.193	.147	.070
GF4	**.508**	-.163	-.074	.054	.068
GF6	**.861**	-.142	-.252	.147	-.046
GF7	**.628**	-.207	-.063	.199	.114
B2	-.135	.375	.183	-.080	.004
B7	-.184	**.525**	.237	-.198	.049
B8	-.028	**.457**	.147	-.145	.061

Note: Factor loadings > .40 are in boldface

4.6.5 Presentation of the new version of the FACT-B. The final measure consists of 18 items and four subscales. Table 4.11 displays the factor number, the item, and a description of the item. Factor 1 is labelled as “Functional well-being” as the items that loaded on this factor all related to the functionality of the breast cancer patient. I labelled Factor 2 as “Emotional well-being” as the items that loaded on this factor were all focused on the emotions of the breast cancer patient. I labelled Factor 3 “Physical well-being” as the items that loaded significantly on the factor all related to physical aspects of the disease. Lastly, Factor 4 was labelled “Social well-being” as it referred to social aspects that the patient experiences.

Table 4.11 Description of final items and factors: FACT-B

Factor	Item	Item description
Factor 1	GF1	I am able to work (include work at home)
	GF3	I am able to enjoy life
	GF4	I have accepted my illness
	GF6	I am enjoying the things I usually do for fun
	GF7	I am content with the quality of my life right now
Factor 2	GE4	I feel nervous
	GE5	I worry about dying
	GE6	I worry that my condition will get worse
	B7	I worry about the effect of stress on my illness
	B8	I am bothered by a change in weight
Factor 3	GP2	I have nausea
	GP3	Because of my physical condition, I have trouble meeting the needs of my family
	GP6	I feel ill
	GP7	I am forced to spend time in bed
Factor 4	GS2	I get emotional support from my family
	GS4	My family has accepted my illness
	GS5	I am satisfied with family communication about my illness
	GS6	I feel close to my partner (or the person who is my main support)

Factor 1= Functional well-being
Factor 2= Emotional well-being
Factor 3= Physical well-being
Factor 4= Social well-being

4.7 Reliability Analysis

I calculated the Cronbach's alpha of the subscales of both the Brief-COPE and the FACT-B subscales**.** As stated previously, a lower limit of 0.70 for Cronbach's alpha will be implemented (Hair et al., 2018).

4.7.1 Reliability of the Brief-COPE. I calculated the Cronbach's alpha for each of the three subscales. The results can be found below in Table 4.12. All three of the subscales produced good reliability as the Cronbach's α of all three exceeded the lower limit of 0.70 (Hair et al., 2018).

Table 4.12 Reliability statistics of the Brief-COPE

Scale/Subscale	Cronbach's alpha (α)
Subscale 1 (Avoidant coping) (4 items)	.73
Subscale 2 (Problem-focused coping) (3 items)	.78
Subscale 3 (Emotion-focused coping) (3 items)	.73

4.7.2 Reliability of the FACT-B. I calculated the Cronbach's alpha for the entire measure and each of the four subscales with the results displayed in Table 4.13. All the subscales produced good reliability, with Cronbach's α ranging from .77 to .84. However, the total FACT-B produced a Cronbach's α of .48, which indicates poor reliability. For this reason, only the subscales of the FACT-B (FWB, EWB, PWB and SWB) were utilized in this study.

Table 4.13 Reliability statistics of the FACT-B

Scale/Subscale	Cronbach's alpha (α)
Total FACT-B (18 items)	.48
Subscale 1 (Functional well-being) (5 items)	.84
Subscale 2 (Emotional well-being) (5 items)	.80
Subscale 3 (Physical well-being) (4 items)	.79
Subscale 4 (Social well-being) (4 items)	.77

4.8 Regression Analysis

Multiple regression analyses were conducted to determine the nature of the relationship between coping strategies (as measured by the subscales of the Brief-COPE) and dimensions of HRQOL (as measured by the subscales of the FACT-B). Before the multiple regression analyses were undertaken, the normality of the data was assessed, and the multiple regression diagnostics were tested. These diagnostics include a sufficient sample size, identifying outliers in the data, determining multicollinearity (a high correlation between independent variables), confirming linearity (a linear relationship between the outcome variable and the independent variables), and homoscedasticity (the error of variance should be the same across all values of the independent variables included) (Field, 2013; Hair et al., 2018).

4.8.1 Assessing the multiple regression analysis diagnostics. As the normality of the data was proven (please refer to section 4.5.1.3), the multiple regression diagnostics (sample size, outliers, multicollinearity, linearity, and homoscedasticity) were tested. Following the tests, the sample size was found to be sufficient, no major outliers were detected, multicollinearity figures were below the cut-off point, and the error of variance across all the values of the independent variables were equal.

4.8.2 Results of the regression analysis. Tables 4.14-4.17 present the results of the regression analyses. As the Cronbach's α of the total FACT-B indicated poor reliability (α=.48), regression analysis was performed on only the subscales. In these analyses, FACT-B subscales were entered as the dependent variables, whilst coping strategies were entered as the predictor variables. Table 4.14 shows the regression analysis predicting functional well-being from Brief-COPE subscales as reported by breast cancer patients.

Table 4.14 Summary of multiple regression analysis for variables predicting Functional well-being subscale scores

Model	B	Std. Error	Beta	t	Sig.	R	R Square
(Constant)	17.397	1.284		13.553	.000	.294	.086
Avoidant coping	-.289	.098	-.204	-2.936	.004		
Problem-focused coping	-.171	.100	-.130	-1.714	.088		
Emotion-focused coping	.298	.119	.189	2.506	.013		

p <.05

According to Table 4.14, results indicated that the three coping strategies accounted for nine percent of the variance in functional well-being and that both Avoidant coping strategies and Emotion-focused coping strategies were a significant predictor of functional well-being in the breast cancer sample, F (3,20) = 6.21, p<.05. Table 4.15 shows the regression analysis predicting emotional well-being from Brief-COPE subscales as reported by breast cancer patients. Results indicated that the three coping strategies accounted for 26% of the variance in emotional well-being reported by breast cancer patients. Furthermore, only

Avoidant coping was found to be a significant predictor of emotional well-being, F (3,20) =22,83, p<.05.

Table 4.15 Summary of multiple regression analysis for variables predicting Emotional well-being subscale scores

Model	B	Std. Error	Beta	t	Sig.	R	R Square
(Constant)	-.04	1.58		-.03	.98	.51	.26
Avoidant coping	.92	.12	.48	7.60	.00		
Problem-focused coping	.21	.12	.12	1.69	.09		
Emotion-focused coping	-.17	.15	-.08	-1.13	.26		

p <.05

Table 4.16 displays the regression analysis predicting physical well-being from Brief-COPE subscales as reported by breast cancer patients. As displayed in Table 4.16, the three coping strategies accounted for 20% of the variance in physical well-being reported by breast cancer patients. Only Avoidant coping was found to be a significant predictor of physical well-being, F(3,20)= 16,86, p<.05. Table 4.17 shows the regression analysis predicting social well-being from Brief-COPE subscales as reported by breast cancer patients.

Table 4.16 Summary of multiple regression analysis for variables predicting Physical well-being subscale scores

Model	B	Std. Error	Beta	t	Sig.	R	R Square
(Constant)	-2.18	1.11		-1.98	.05	.45	.20
Avoidant coping	.57	.09	.44	6.77	.00		
Problem-focused coping	.06	.09	.05	.74	.46		
Emotion-focused coping	.09	.10	.06	.89	.37		

P <.05

According to Table 4.17, the three coping strategies accounted for 16% of the variance in physical well-being reported by breast cancer patients. Both Avoidant coping and Emotion-focused coping were found to be significant predictors of Social well-being, F(3,20)=12.01, p<.05.

Table 4.17 *Summary of multiple regression analyses for variables predicting Social well-being subscale scores*

Model	B	Std. Error	Beta	t	Sig.	R	R Square
(Constant)	11.21	1.04		10.77	.00	.39	.16
Avoidant coping	-.21	.08	-.18	-2.62	.01		
Problem-focused coping	-.09	.08	-.08	-1.05	.29		
Emotion-focused coping	.48	1.00	.36	4.98	.00		

p <.05

4.9 Summary

In chapter four I presented the findings of the data analysis of the present study. I outlined the sample demographics and other sample characteristics. Following this, I presented the findings of the item analysis of both measures which saw the removal of two items from the Brief-COPE and six of the items of the FACT-B. The exploratory factor analysis of the Brief-COPE then delivered a new 10-item, three-factor structured version, while the exploratory factor analysis of the FACT-B produced a new 18 item, four-factor structured version. The chapter then continued with the results of the reliability analysis. Lastly, the results of the regression analysis between the three Brief-COPE subscales and the subscales of the FACT-B were then presented showing that Avoidant coping strategies and Emotion-focused coping strategies were a significant predictor of functional well-being and social well-being. Moreover, Avoidant coping was found to be a significant predictor of emotional well-being, physical well-being.

Chapter 5

Discussion

5.1 Introduction

The increased survival rate of breast cancer patients (Kim & Yoon, 2021) has led to a focus of research on how these patients cope with the disease and the HRQOL they experience (Fasano et al., 2020; Mokhatri-Hesari & Montazeri, 2020; Zamanian et al., 2021). Despite the increased focus on the relationship between coping and HRQOL of breast cancer patients, no study in South Africa has investigated this topic. For this reason, this study serves as a contribution to global literature on this topic. Furthermore, the study aims to provide novel insight into the relationship between coping and HRQOL of breast cancer patients in the South African context, where patients may face unique challenges and stressors related to economic, social, political, and contextual circumstances.

In this chapter, the results presented in Chapter 4 will be discussed and interpreted. The chapter will first present a discussion of the biographical characteristics of the participants included in the study is presented. Secondly, the findings of the study will be discussed with regard to the three study objectives. Following this, an integration of the two theoretical frameworks (Stress and Coping Model and the Biopsychosocial Model) and the findings of the relationship between coping strategies and HRQOL in the current study will be presented.

The objectives of the study were (1) To explore the factor structure of the Brief-COPE and the FACT-B measures among women seeking treatment for breast cancer at a tertiary hospital in the Western Cape, South Africa, (2) To determine the internal consistency reliability of the subscales of the Brief-COPE and the FACT-B among women seeking treatment for breast cancer at a tertiary hospital in the Western Cape, South Africa, and (3)

To investigate the relationship between coping and HRQOL among women seeking treatment for breast cancer at a tertiary hospital in the Western Cape, South Africa.

5.2 Biographical characteristics of the breast cancer patients in the current study

Participants in the current study were all female and in the age range 27-83, with a mean age of 55.8 years. The age range of the current study is greater than other studies on coping and QOL in breast cancer patients (Browall et al., 2016; Khalili et al., 2013). Moreover, the mean age was similar to the majority of studies included in the meta-analysis of Kvillemo and Bränström (2014) on coping with breast cancer, as the mean age of 54 of the 78 studies ranged between 50-60 years. The mean age was also similar to several other studies on coping and QOL in breast cancer patients (Y. U. Cho et al., 2020; Hebert et al., 2009; Kugbey et al., 2019; Toscano et al., 2020). Therefore, the age of participants in the current study aligned with samples of previous research on coping and HRQOL in breast cancer patients.

5.3 Findings of the exploratory factor analysis

The first objective was to explore the factor structure of both measures among women seeking treatment for breast cancer at a tertiary hospital in the Western Cape, South Africa. This was done by undertaking an EFA on both the Brief-COPE and the FACT-B in the sample of 201 South African breast cancer patients.

5.3.1 The factor structure of the Brief-COPE. Following an assessment and conclusion that all the requirements for an EFA have been met, the exploratory factor analysis on the Brief-COPE in the current study was done by means of maximum likelihood extraction with a Varimax rotation. This was done to explore the different items that the measure consists of and to determine the factor structure of the Brief-COPE in a South African breast cancer sample. Prior to the EFA, an item analysis was performed which saw the two items measuring Self-distraction (COP 1&19) removed. The current study found the Brief-COPE to have a three-factor structure with 10 items achieving stable loadings across three factors. The lowest factor loading was .42 indicating that the items loaded onto the three factors in a statistically significant way (Hair et al., 2018). The three factors were labelled as Avoidant-coping (four items), Problem-focused coping (three items), and Emotion-focused coping (two items).

The first factor, Avoidant-coping, explained 26.61% of the variance in items, while, the second factor, Problem-focused coping, explained 19.37% of the item variance. The third factor, Emotion-Focused coping successfully explained 8.54% of the item variance. In total, the model successfully explained 54.52% of the variance. According to the systematic review of Solberg and colleagues (2021) on the factor structure of the Brief-COPE, the number of stable factors extracted (three) fell in the same range (2-14 factors) of the 18 studies that performed an exploratory factor analysis on the measure. These studies include a variety of populations (e.g., burn injury victims, refugees, patients with heart conditions, disabled elderly, melanoma patients) from multiple countries (United States, Nepal, Taiwan, and Canada) (Amoyal et al., 2011; Chase et al., 2013; Eisenberg et al., 2012; Hsu & Tung, 2011; Mackay et al., 2021). The different factor structures produced could be attributed to different coping strategies used across conditions, populations, cultures, as well as other factors (Solberg et al., 2021). Another explanation for the differences in factor structure could be the different factor analytic methodologies employed as well as modifications made to the Brief-COPE to match the characteristics of the sample. For example, Fletcher et al. (2006) removed ten items (two items each assessing self-blame, humour, substance use, behavioural disengagement, and planning) prior to the factor analysis as they felt the items were not related to their sample of breast cancer patients.

Upon a review of studies specific to coping with breast cancer, two studies produced three-factor structures in samples in the United States of America (Fletcher et al., 2006) and Taiwan (A. W. T. Wang et al., 2018). Additionally, other studies produced two-, seven-, and eight-factor structures, in breast cancer samples in the United States of America (Bellizzi & Blank, 2006), the United Kingdom (Brain et al., 2008) and Canada (Fillion et al., 2002) respectively. The different factor structures produced could be attributed to the different factor analyses performed as four of the studies conducted a principal component analysis (Bellizzi & Blank, 2006; Brain et al., 2008; Fillion et al., 2002; A. W. T. Wang et al., 2018) and one a principal axis factoring (Fletcher et al., 2006). Moreover, the differences in factor structures produced can also be attributed to the different sample sizes of the studies and the modification made by Fletcher et al. (2006) to the Brief-COPE prior to the factor analysis.

In terms of items retained, the current study retained 10 items across the three factors. The version saw a reduction of items 18 from the original 28 item version (Carver, 1997). Moreover, this is less than the items retained in the previous studies exploring the factor structure in breast cancer samples. For example, Fillion and colleagues (2002) retained all 28 items, Wang and colleagues (2018) retained 26 items while Bellizzi and Blank (2006) and Brain and colleagues (2008) both retained 24 items. Fletcher et al. (2006) had 18 items in their final version, but the ten items were removed prior to the factor. Similar to Fletcher et al. (2006), the factor analysis in the current study also saw the removal of the items related to substance use (COP4&11) and humour (COP18&28) with items related to self-distraction (COP1&19), denial (COP3&8), venting (COP9&21), positive reframing (COP12&17), acceptance (COP20&24) as well as single items related to the use of instrumental support (COP23), and planning (COP25) also removed. The items retained in the current study were all found in the four other studies on the measure's factor structure in breast cancer patients (Bellizzi & Blank, 2006; Brain et al., 2008; Fillion et al., 2002; A. W. T. Wang et al., 2018), suggesting that these certain items are robust and central to measuring coping in breast cancer patients.

Across four of the studies that explored the factor structure of the Brief-COPE in breast cancer samples, Avoidant (disengagement) coping was identified as a subscale (Bellizzi & Blank, 2006; Brain et al., 2008; Fletcher et al., 2006; A. W. T. Wang et al., 2018). This is in line with the Stress and Coping model of Lazarus and Folkman (1984), who identified avoidance coping strategies as mechanisms that patients use to deal with the stressors they face. Moreover, both Problem-focused coping and Emotion-focused coping were identified by Lazarus and Folkman (1984) as categories of coping strategies. However, a problem identified when the factor structures were compared, was the differences in how factor names are conceptualized.

The items comprising the Problem-focused coping subscale in the current study were all included in the factor structures produced in the previous studies, except for Fletcher et al. (2006) who removed the items related to planning prior to the factor analysis. Moreover, the Emotion-focused coping subscale was also identified by previous research (Brain et al., 2008), while the four other studies retained the items of the current study's Emotion-focused coping subscale items, although they were included under different factor names (Brain et al., 2008; Fillion et al., 2002; Fletcher et al., 2006; A. W. T. Wang et al., 2018). This indicated that despite differences in factor structures, the items identified in the current study overlapped with the items identified in the other factor solutions in breast cancer samples.

5.3.2 The factor structure of the FACT-B. Following the same requirement assessment and EFA methodology applied to the Brief-COPE, the EFA on the FACT-B was undertaken This was done to explore the different items that the measure consists of and to determine the factor structure of the FACT-B in a South African breast cancer sample. Prior to the EFA, an item analysis was performed which saw six items, one related to Social well-being (GS7), one related to Emotional well-being (GE2) and four items related to Breast cancer-specific concerns (B1, B3, B4, B5) removed. The current study found the FACT-B to have a four-factor structure with 18 items achieving stable loadings across three factors.

The lowest factor loading was .41 indicating that the items loaded onto the three factors in a statistically significant way (Hair et al., 2018). The four factors were labelled as Functional well-being (five items), Emotional well-being (five items), Physical well-being (four items), Social well-being (four items). The first factor, which explained 32.89% of the variance in items, is Functional well-being, the second factor, Emotional well-being, explained 10.10% of the item variance, the third factor, which explained 8.69% of the item variance, is Physical well-being and the fourth factor explained 6.82% of the variance and is labelled as Social well-being. In total, the model successfully explained 58.50% of the variance.

Upon a review of the literature, it was found that only two-factor analyses have been performed on the measure (Algamdi & Hanneman, 2019; Patoo et al., 2015). The confirmatory factor analysis of Patoo and colleagues (2015) found the model fit to be relatively modest as indicated by the values of the normed fit index (.77), the goodness of fit index (.76), adjusted goodness of fit index (.73), comparative fit index (.84), incremental fit index (.84), and the root-mean-square error of approximation (.08). However, the differences in factor analysis methodology make it difficult to compare the findings of Patoo et al. (2015) to the findings of the current study. The factor structure of the FACT-B produced in the current study differed from the original version of (Brady et al., 1997), as the BCS subscale was not retained. This is similar to the findings of the EFA performed on the Arabic FACT-B (Algamdi & Hanneman, 2019). The principal axis factoring of Algamdi and Hanneman

(2019) found that none of the BCS items achieved significant factor loadings which led to its exclusion from the final FACT-B version in their study.

In the current study, only two items (B7- I worry about the effect of stress on my illness and B8- I am bothered by a change in weight) of the 10 BCS items, achieved significant loadings and was included under the factor of Emotional well-being. Although the item loadings of B7 and B8 do not match the theoretical composition proposed by Brady and colleagues (1997), the relationship of these items to emotional well-being was deemed plausible and therefore led to their inclusion. As mentioned in previous research (Algamdi & Hanneman, 2019; Pandey et al., 2002; Yusof et al., 2021), patients are hesitant to answer B4 ('I feel sexually attractive') as well as B9 ('I am able to feel like a woman'), which could have affected the factor loading of these items (Algamdi & Hanneman, 2019). However, the missing data for those questions in the current study was replaced by the mean imputation method (please see section 4.3). The lack of items included from the BCS scale could indicate that the validity and reliability of this subscale need to be investigated in future research.

In terms of other items retained in the current study, the final version of the FACT-B saw a 19 item reduction from the original FACT-B (Brady et al., 1997). The Functional well-being factor saw a reduction of two items from the original subscale, while the Physical, Emotional and Social well-being factors had a reduction of three items each, while eight items were removed from the BCS subscale (Brady et al., 1997). This is fewer items than the version of Algamdi and Hanneman (2019), who found that all 27 FACT items achieved significant factor loadings in their analysis and was therefore included. The removal of the items in the current could be attributed to a number of factors. For example, a possible explanation for the removal of GF2 ('My work (including my work at home) is fulfilling) might be attributed to the majority of participants being retired or unemployed. Furthermore, the two social well-being items (GS1- 'I feel close to my friends' and GS2- 'I get support from my friends') are both related to support from friends, while the retained items are all related to family support, which could indicate that participants received more support from family than friends.

5.4 Findings of the reliability analysis

The internal consistency reliability of the subscales of the Brief-COPE and the FACT-B were calculated by means of the Cronbach's alpha (**α**) in the sample of breast cancer patients from the tertiary hospital in the Western Cape, South Africa. In comparing the findings of the current study, a lower limit of 0.70 was applied for Cronbach's **α** values to be viewed as reliable (Hair et al., 2018).

5.4.1 The reliability of the Brief-COPE. The widespread use of the Brief-COPE in several studies across multiple conditions confirms the reliability of the measure (Solberg et al., 2021)**.** The current study reported adequate reliability for the subscales of the Brief-COPE as the Avoidant-coping, Problem-focused coping, and Emotion-focused coping recorded α values of .73, .78 and .73, respectively. These α values indicated a good level of reliability (Hair et al., 2018). The α values of the subscales in the current study are comparable to the α values recorded in previous studies that explored the factor structure of the measure (Brain et al., 2008; Fillion et al., 2002; Fletcher et al., 2006; A.W.T. Wang et al., 2018). The Avoidance-coping subscale (α=.73) in the current study achieved a higher internal consistency score compared to the same labelled subscale in the studies of Fletcher and colleagues (α=.65) and Wang and colleagues (α=.69) (Fletcher et al., 2006; Wang et al., 2018). However, Fletcher et al. (2006) had six items and Wang et al. (2018) had eight items assigned to their Avoidant subscale. Seeing that the current study had only four items assigned to the Avoidant coping subscale, the greater number of items in the subscale of previous research could have negatively affected the internal consistency score recorded for the subscale.

The emotion-focused subscale (α=.78) achieved a slightly lower score than the emotion-focused subscale (α=.83) of Brain et al. (2008). However, the current study has fewer items assigned to the emotion-focused subscale, which could explain the lower reliability score as the items included might be less reliable. Although none of the other studies labelled their factors as Problem-focused coping, several items overlapped with the engagement coping subscale **(**α=.79) of Fletcher et al. (2006) and the task-orientated coping subscale **(**α=.84) of Brain et al. (2008), which both produced higher internal consistency scores. However, the Problem-focused coping factor produced in the current study is unique and provided a new conceptualization of Problem-focused coping in a breast cancer sample.

The current study proposed a new factor structure for the Brief-COPE in breast cancer patients and more specifically the first factor validated version of the Brief-COPE in a population of breast cancer patients in South Africa. Furthermore, the factor structure produced highlighted the complexity of comparing internal consistency scores of the measure's subscales across studies. This is due to differences in factor conceptualization and differences in the number of items contained in each factor (Bellizzi & Blank, 2006; Brain et al., 2008; Fletcher et al., 2006;A.W.T. Wang et al., 2018)**.**

5.4.2 The reliability of the FACT-B. The internal consistency of the FACT-B has been proven in different populations of breast cancer patients (Maratia et al., 2016; Mokhatri-Hesari & Montazeri, 2020). As discussed above in section 5.4.2, the BCS subscale did not achieve any significant factor loadings and was not included. In line with this finding, the BCS subscale reported the lowest internal consistency score in all the previous studies reviewed (Algamdi & Hanneman, 2019; Brady et al., 1997; Dano et al., 2019; Pandey et al., 2002; Patoo et al., 2015; Wan et al., 2007; Yusof et al., 2021). The current study reported adequate reliability for the subscales of the FACT-B as the Functional-, Emotional-, Physical- and Social well-being subscales recorded α values of .84, .80, .79, and .77, respectively. However, the total FACT-B recorded a poor internal consistency score of .48. Compared to the original version of Brady et al. (1997), the current study reported higher α values for the EWB and SWB subscales and similar values for the PWB (α=.81) and FWB (α=.86) subscales. This confirms the internal consistency of the subscales in the current study. A possible explanation for the low overall internal consistency score could be the smaller number of items retained in the final version of the FACT-B in the current study

Furthermore, The FWB subscale, the internal consistency reliability (α=.84) in the current study is equal to the value recorded by Pandey et al. (2002) and Wan et al. (2007) and only slightly lower than the value produced for the subscale in other previous studies (Algamdi & Hanneman, 2019; Patoo et al., 2015; Yusof et al., 2021). Similarly, the EWB subscale (α=.80) recorded in the current study is slightly higher than the value recorded in previous research (Algamdi & Hanneman, 2019; Patoo et al., 2015), similar to the α value recorded by (Pandey et al., 2002), but significantly higher compared to other studies (Dano et al., 2019; Yusof et al., 2021). The lower internal consistency scores recorded by Dano et al. (2019) and Yusof et al. (2021) could be attributed to cultural factors prohibiting emotional expression or a lack of comprehension of the emotional-related questions of the subscale. Furthermore, the good internal consistency recorded for the EWB subscale in the current study could be attributed to the inclusion of the breast cancer-specific items, B7 and B8, enhancing the subscale's ability to measure emotional well-being items specific to breast cancer patients.

The PWB subscale (α=.79) in the current study is higher than reported in two previous studies (Pandey et al., 2002; Patoo et al., 2015), and slightly lower than reported in other studies (Algamdi & Hanneman, 2019; Wan et al., 2007; Yusof et al., 2021). This reaffirmed the reliability of the items included in the PWB subscale. Furthermore, the SWB (α=.77) is comparable to the α value recorded by Algamdi and Hanneman (2019) but was significantly lower than the values reported by Patoo et al. (2015), α=.91 and Yusof et al. (2021), α=.86. However, the SWB subscale α value recorded in the current study is still higher than the value recorded in the original study of the FACT-B (Brady et al., 1997).

Considering the internal consistency scores produced in the current study, the FACT-B in South African breast cancer patients is found to be a reliable measure of HRQOL. Furthermore, across studies, the BCS subscale achieved lower scores compared to the other subscales (Algamdi & Hanneman, 2019; Brady et al., 1997; Dano et al., 2019; Pandey et al., 2002; Patoo et al., 2015; Wan et al., 2007; Yusof et al., 2021). The current study was the first to include BCS items under a new factor and provided a new version of the measure that eliminated the low internal consistency of the BCS subscale. To determine if the internal consistency of this version of the FACT-B is not only applicable to breast cancer patients in the Western Cape, further research on the measure in South African breast cancer patients is required.

5.5 The relationship between coping and HRQOL in South African breast cancer patients

Extensive research has been conducted on the relationship between coping and HRQOL of breast cancer patients (Cho et al., 2020; Kugbey et al., 2019; Kvillemo & Bränström, 2014). Furthermore, several studies have confirmed a relationship between the use of various coping strategies and the HRQOL that breast cancer patients report (Browall et al., 2016; Cho et al., 2020; Kugbey et al., 2019; Toscano et al., 2020). Specifically, certain coping strategies such as acceptance, positive reappraisal, planning, and active coping were all significantly positively associated with higher scores of HRQOL, while other strategies such as self-blame, denial, behavioural disengagement and avoidance were all significantly negatively associated with HRQOL, indicating that their use led to poorer physical, emotional, functional, social and breast cancer-specific well-being(Kvillemo & Bränström, 2014; Toscano et al., 2020). However, across breast cancer samples, coping strategies showcased variation in their effect on the domains of HRQOL (Cho et al., 2020; Hebert et al., 2009; Kugbey et al., 2019; Préau et al., 2013). Moreover, no study in South Africa has explored the relationship between coping and HRQOL in breast cancer patients. For these reasons, the third objective of this study was to investigate the relationship between coping and HRQOL among a sample of women seeking treatment for breast cancer at a tertiary hospital in the Western Cape, South Africa.

The study investigated the possible association between coping strategies (the three subscales of the Brief-COPE) and HRQOL (the four subscales of the FACT-B). The study found that a significant association existed between coping strategies and the domains of HRQOL in the current sample of breast cancer patients. More specifically, a significantly negative association between avoidant coping and functional- and social well-being was established. This indicated that patients who used more avoidant coping strategies tended to report poorer functional and social well-being, an association established in previous research on coping and HRQOL in breast cancer patients (Y. U. Cho et al., 2020; Kvillemo & Bränström, 2014). However, significant positive associations were also found between avoidant coping strategies and emotional- and physical well-being. This indicated that patients who relied more on avoidant coping strategies tended to report better emotional- and physical well-being, a finding in contrast with previous research on coping and HRQOL in breast cancer patients (Y. U. Cho et al., 2020; Kvillemo & Bränström, 2014; Reich & Remor, 2014; Tu et al., 2020).

Furthermore, a significant positive correlation was also found between the use of emotion-focused coping strategies and social well-being, which meant that patients who used more emotion-focused coping strategies tended to report better social well-being. This finding was in line with findings recorded in previous research on coping and HRQOL in breast cancer patients (Khalili et al., 2013; Lashbrook et al., 2018). The associations found in the current study will be discussed in detail below.

5.5.1 Avoidant Coping and HRQOL. Regarding the relationship between avoidant coping and HRQOL, several researchers have identified the negative relationship between the use of avoidance coping and worse HRQOL (Y. U. Cho et al., 2020; Kvillemo & Bränström, 2014). The findings of the study aligned with previous research as avoidant coping was significantly associated with worse functional- and social well-being in the current study. Kvillemo and Bränström (2014), ascertained in their meta-analysis on coping in breast cancer, that avoidance/distancing-oriented coping strategies were associated with lower positive affect, higher negative affect or were found to be unrelated to any domains of HRQOL.

In line with these findings, Cho and colleagues (2020) found that patients who relied on maladaptive coping strategies (helpless-hopeless, anxious preoccupation, fatalism, cognitive avoidance) reported worse emotional-, social well-being and overall HRQOL compared to patients who relied on active coping strategies. Similarly, at the year one follow-up, patients who relied on maladaptive coping strategies reported worse role functioning, emotional well-being and overall HRQOL. Interestingly, at the three-year follow-up, only a significant difference in social well-being between patients that relied on maladaptive coping strategies and those who did not was recorded (Y. U. Cho et al., 2020). This suggested that avoidance could have a positive effect on the domains of HRQOL, but that a negative association between avoidance-oriented coping strategies and social well-being remained consistent over time. From the abovementioned studies and the findings of the current study, it is evident that avoidant coping strategies had a significant negative effect on the functional and social well-being of breast cancer patients.

On the other hand, the current study found that patients who relied on avoidant coping strategies had significantly higher emotional- and physical well-being. Most studies reported that avoidance-oriented coping strategies are associated with worse HRQOL (Y. U. Cho et al., 2020; Kvillemo & Bränström, 2014; Tu et al., 2020). For example, both Cho et al. (2020) and Kvillemo and Bränström (2014) reported that avoidance-oriented coping strategies are associated with worse HRQOL in breast cancer patients. Furthermore, Tu and colleagues (2020) found cognitive avoidance coping to be significantly negatively associated with HRQOL. The study did however not identify the domains with which cognitive avoidance was negatively associated. These studies all indicated that across the different cultures, avoidance-oriented strategies had a significantly negative effect on HRQOL. Contrastingly, Reich and Remor (2014), found no significant association between either problem-focused coping, emotion-focused coping or avoidant-coping and any domain of HRQOL. The authors attributed the lack of any significant association to the cross-sectional design of the study (Reich & Remor, 2014). The situational and personal variables of patients impact the effectiveness of coping strategies on HRQOL (Jin et al., 2021) which, according to the authors, was the reason for coping strategies not being significantly associated with HRQOL at the time of measurement (Reich & Remor, 2014).

Contrary to the findings discussed above, Kugbey et al. (2019) found cognitive avoidance to be significantly positively associated with functional well-being. The authors ascribed this to the different meanings assigned to the items measuring avoidance in the Ghanaian context. Kugbey and colleagues (2019) stated that avoidant coping strategies represented protection against the negative experiences of breast cancer. For this reason, it is possible that patients in the current sample utilized avoidant coping strategies, that avoided dealing with the effects of breast cancer, to gain protection against the negative emotional and psychological experiences associated with the disease (Kugbey et al., 2019; Lai et al., 2019; S. Park et al., 2020). Therefore, through the protection provided by avoidant-coping strategies, the emotional- and physical well-being of patients in the current study was protected and improved.

5.5.2 Emotion-focused coping and HRQOL. Several studies have established a relationship between emotion-focused coping and HRQOL in breast cancer patients (Khalili et al., 2013; Lashbrook et al., 2018; Toscano et al., 2020)**.** In the current study, the use of emotion-focused coping was significantly positively associated with social well-being. A possible explanation for this relationship is the nature of items comprising the emotion-focused coping subscale in the current study. The three items, COP5 ('I've been getting emotional support from others'), COP10 ('I've been getting help and advice from other people') and COP15 ('I've been getting comfort and understanding from someone') are all related to social support which could explain the relationship between this subscale and social well-being. This finding contributed to the findings in previous research on emotion-focused coping and HRQOL (Khalili et al., 2013; Toscano et al., 2020). For example, Khalili et al. (2013) found that emotion-focused coping was significantly positively associated with breast cancer-specific aspects of QOL, but also significantly negatively associated with functional well-being. This is similar to the findings of avoidant coping strategies in the current study, which indicated that patients who relied on avoidant coping strategies reported poorer functional- and social well-being, but better emotional- and physical well-being. This illustrates the complexity of coping strategies in the same sample of breast cancer patients and how patients maintain HRQOL through their own unique utilization of coping strategies.

Moreover, Toscano and colleagues (2020), reported that emotion-focused coping strategies were significantly positively associated with emotional well-being. The use of emotion-focused coping is influenced by several factors such as the cancer stage and trajectory of the disease, which leads to increases and decreases in the use of emotion-focused coping strategies (Toscano et al., 2020). This could explain the difference in findings of the relationship between emotion-focused coping and the domains of HRQOL in breast cancer patients across studies.

5.6 Conceptualizing coping and HRQOL in South African breast cancer patients: integrating theory

In conceptualizing the process of coping, the Stress and Coping Model (Lazarus & Folkman, 1984, 1987) was used. The model states that individuals use a variety of coping strategies, influenced by environmental and contextual factors, to deal with the stressor they are facing (Lazarus & Folkman, 1984, 1987). The model has been frequently used in studies of coping in breast cancer (Boatemaa Benson et al., 2020; Y. U. Cho et al., 2020; Kvillemo & Bränström, 2014; Lai et al., 2019; Shen et al., 2020; Torralba-Martínez et al., 2021; G. J. Yoo et al., 2014). In the case of this study, the stressors were the experiences associated with breast cancer. The subjective experiences of breast cancer determined the interpersonal stressors of patients (the primary appraisal), coping strategies as coping and HRQOL as adaptation outcomes. This is similar to the conceptualization of coping in previous studies of coping with breast cancer (Kang et al., 2020; Shen et al., 2020).

Lazarus and Folkman (1984) maintain that an individual (the breast cancer patient) will rely on coping strategies intended to directly address the problem more if they consider the threatening event (breast cancer) as alterable. In contrast, if the breast cancer patient considered the event unalterable, they will utilize strategies that will help them ‘avoid’ or ‘escape’ from the stressor (Lazarus & Folkman, 1984, 1987). Based on this statement, the breast cancer patients in the current sample may have viewed breast cancer as an unalterable event (Lazarus & Folkman, 1984, 1987) and relied on avoidant-coping to avoid the stressor. Lazarus and Folkman (1984) proposed that threats (i.e., breast cancer) that are unalterable and demanding might cause the individual to rely on strategies aimed at avoiding the stressor or diminishing emotions related to the stressor. Supporting this, Boatemaa Benson et al. (2020) noted that the use of avoidant coping can be viewed as an adaptive coping strategy in their study as patients relied on these strategies to deal with breast cancer without dealing with stigmatization brought on by disclosing their illness to their social network.

As the relationship between coping and HRQOL is complex, due to its dependence on clinical characteristics, culture, socioeconomic factors, and social support, the biopsychosocial model has been proposed to conceptualize HRQOL in breast cancer patients (Bourdieu, 1998; Campbell et al., 2012; Hefti, 2009; Préau et al., 2013). The dimensions of HRQOL aligns with the Biopsychosocial Model that holds that biological, psychological and social factors play a significant role in human functioning in the context of breast cancer (El Amine Ragala et al., 2020; Préau et al., 2013). In the current study, human functioning is represented by the four domains of the FACT-B (functional-, emotional-, physical-, and social well-being). Based on the findings in the current study, human functioning, as represented by functional- and social well-being, is negatively affected by the use of avoidant coping strategies. For this reason, by avoiding dealing with the physical and psychological effects of breast cancer, patients experience worse role- and social functioning. However, in the current study avoidant coping strategies also allowed patients to achieve better emotional- and physical functioning. Furthermore, the use of emotion-focused coping is also associated with better social functioning.

Therefore, the findings of the current study illustrated that HRQOL, as conceptualized through the biopsychosocial model, is influenced by an interrelated functioning of coping strategies based on psychological appraisals (Lazarus & Folkman, 1984, 1987). Thus, the interrelated functioning of the coping strategies recorded in the study then had specific effects on role-, social-, emotional- and physical functioning.

5.7 Summary

In this chapter, I presented and discussed the results of the data analysis undertaken on the Brief-COPE and the FACT-B. Firstly, I discussed the biographical characteristics of the participants in the current sample. I then discussed the significant findings that originated from the exploratory factor analysis of the FACT-B and the Brief-COPE. Thereafter, the internal consistency reliability of the FACT-B and the Brief-COPE was discussed. I also presented the findings of the investigation on the relationship between coping strategies and HRQOL in South African breast cancer patients. Following this, the findings of the study were integrated with the theoretical frameworks (Stress and Coping Model and the Biopsychosocial Model).

Chapter 6

Conclusion

6.1 Introduction

Advances in breast cancer detection and breast cancer treatment have led to an increase in survival rates, shifting the scope of research to how patients cope with the disease (Kvillemo & Bränström, 2014) and how these coping strategies affect the HRQOL of breast cancer patients (Y. U. Cho et al., 2020). This has led to numerous measures being utilized in the measurement of coping and HRQOL in breast cancer patients (Lemieux et al., 2011; Mokhatri-Hesari & Montazeri, 2020). From several generic and disease-specific measures, the Brief-COPE (a measure of coping) and the FACT-B (a breast cancer-specific HRQOL measure) emerged as the two of the most reliable and frequently used measures (Kvillemo & Bränström, 2014; Lashbrook et al., 2018; Mokhatri-Hesari & Montazeri, 2020). However, to date, no study has investigated the psychometric properties of these measures in a sample of South African breast cancer patients. Furthermore, no study has explored the relationship between coping strategies and HRQOL in South African breast cancer patients. For this reason, this study set out to evaluate the factor validity and reliability of the Brief-COPE and the FACT-B in a sample of breast cancer patients from a tertiary hospital in Western Cape, South Africa. This allowed the study to then use valid and reliable versions of these two measures to assess if there are any significant associations between coping strategies and HRQOL in the same sample of breast cancer patients.

In Chapter 5, I discussed the main findings in relation to the research objectives of the study and the theoretical frameworks underpinning coping and HRQOL. In this chapter, I present a summary of the main findings. I then discuss the novelty and strengths of the study as well as its contributions to the field of research on coping and HRQOL in breast cancer patients. Following this, I detail the limitations of the study. I also present recommendations for future research and discuss the clinical implications of the findings recorded. Lastly, I provide concluding remarks on the study.

6.2 Summary of main findings

The study provided valuable insights into how South African breast cancer patients coped with the disease and the relationship between their coping strategies and the domains of HRQOL. The first objective of the study was to explore the factor structure of the Brief-COPE and the FACT-B in the current sample of South African breast cancer patients. This was done by conducting an exploratory factor analysis by means of a maximum likelihood extraction with a Varimax rotation on the Brief-COPE and the FACT-B. Prior to the exploratory factor analysis, the item analysis identified two items that needed to be removed. Following this, the exploratory factor analysis on the Brief-COPE identified 16 items that either did not achieve a significant factor loading or that cross-loaded on more than one factor, which I then removed from the measure to reach the final 10 items. The exploratory factor analysis on the Brief-COPE produced a three-factor structure (three subscales), with the factors labelled as Avoidant-coping (four items), Problem-focused coping (three items), and Emotion-focused coping (two items).

Prior to the factor analysis on the FACT-B, the item analysis identified six items that needed to be removed. Following this, the exploratory factor analysis on the FACT-B identified 13 items that either did not achieve a significant factor loading or that cross-loaded on more than one factor, which I then removed from the measure to reach the final 18 items. The exploratory factor analysis produced a four-factor structure with the subscales labelled as Functional well-being (five items), Emotional well-being (five items), Physical well-being (four items), and Social well-being (four items). The breast-cancer specific subscale did not achieve stable and significant factor loadings and was subsequently removed, although two items of the scale were included in the Emotional well-being subscale.

The second objective was to determine the internal consistency reliability of the subscales of the Brief-COPE and the FACT-B in the current sample. To determine the internal consistency reliability of the two measures' subscales, I calculated their Cronbach's α value. The three subscales of the Brief-COPE, Avoidant coping, Problem-focused coping, and Emotion-focused coping produced Cronbach's α values of .73, .78 and .73, respectively which indicated good reliability. In terms of the reliability scores of the FACT-B, the four subscales, Functional-, Emotional-, Physical-, and Social well-being produced Cronbach's α values of .84, .80, .79, and .77, respectively. The subscales all indicate good levels of reliability. However, the overall reliability of the total FACT-B score (α=.48) was poor, rendering only the functioning, emotional, physical and social well-being subscales acceptable for further analysis in the study (Hair et al., 2018).

The third objective was to investigate the relationship between coping and HRQOL among breast cancer patients in the current sample. In order to investigate the association between coping strategies (subscales of the Brief-COPE) and the FACT-B (four subscales of HRQOL), I conducted a multiple regression analysis. The main findings from the regression analysis indicated that patients that utilized avoidant coping strategies tended to report significantly worse functional- and social well-being. However, the analysis also found that patients who utilized avoidant coping strategies reported significantly better emotional- and physical well-being. The regression analysis also indicated that patients that utilized emotion-focused coping strategies tended to report significantly better social well-being.

Therefore, the study produced factor validated versions of the Brief-COPE and the FACT-B for use in South African breast cancer patients. Except for the total score of the FACT-B, the subscales of both measures proved to be reliable. Furthermore, the study confirmed a relationship between coping strategies and HRQOL of breast cancer patients.

Moreover, the study demonstrates the complexity in the use of coping strategies as the same coping strategy can have adverse and positive effects on different domains of HRQOL

6.3 Strengths of the study

The study had several strengths in its contributions to the body of research on coping and HRQOL in breast cancer patients. Based on the research objectives, the first strength of the study was that it provided a new factor structure of the Brief-COPE for use in breast cancer patients. Moreover, the study was the first to explore the factor validity of the Brief-COPE in a sample of breast cancer patients in Africa and more specifically, South Africa. Adding to this, the study was also the first to explore the factor validity of the FACT-B in an African country. The study was also only the second study to perform an exploratory factor analysis on the FACT-B, providing valuable insight into the factor structure of the measure. This allowed the study to provide the first factor validated version of the FACT-B for use among South African breast cancer patients.

The second strength of the study is based on the evaluation of the internal consistency of the Brief-COPE and the FACT-B. According to Field (2013) and Hair et al. (2018), the subscales of the Brief-COPE in the current study showcased adequate reliability. This indicated that the version produced in the current has adequate reliability for future use in studies on coping in South African breast cancer patients. Furthermore, the subscales of the FACT-B produced in the current study also showcased adequate reliability, indicating that it can be utilized in future studies of QOL and HRQOL in South African breast cancer patients. Based on these findings, the Brief-COPE and FACT-B can also be employed in breast cancer samples in other LMIC with similar socioeconomic factors to South Africa.

Thirdly, another strength of the study is that it shed light on the relationship between coping strategies and HRQOL of breast cancer patients in South Africa. The study was the first to indicate that a relationship exists between coping strategies and HRQOL in South African breast cancer patients.

6.4 Limitations of the study

Despite the novel contributions of the study to the field of research on coping and HRQOL in breast cancer patients, the study has several limitations that need to be acknowledged. Firstly, the sample of the study was recruited by means of convenience sampling, which limits the generalizability of the findings. Moreover, all the participants were recruited from a single breast clinic at a tertiary hospital (Tygerberg Hospital, Western Cape), which means that the demographic characteristics of the sample are not representative of all breast cancer patients in the Western Cape province or South Africa.

Another limitation identified was the cross-sectional design of the study. Previous studies on coping and breast cancer regularly criticized the use of cross-sectional designs (Doege et al., 2019; Hashemi et al., 2019; Leung et al., 2014), as this design has been blamed for overlooking the dynamic nature of coping (Lazarus & Folkman, 1984, 1987). Furthermore, South African breast cancer patients may have relied on coping strategies not defined by the Brief-COPE, which was not captured in the current study, as the measure only captures a finite number of coping strategies.

With regards to the factors derived for both measures, the imputation method utilised, mean imputation, could introduce bias. As found by Gelman and Hill (2006), this method pulls estimates of the correlation towards zero, distorting the relationship between variables. Furthermore, the factor structures are limited at this stage as they are sample dependent and are yet to be validated in an independent sample. Although the sample size was suitable for factor analysis, the small sample does limit the validity of the factor structures Considering the reliability of the measures, the low overall reliability of the FACT-B limits the use of the scale to measure overall HRQOL. However, a low Cronbach's α value does not necessarily indicate low reliability, as it can also indicate a variety of different, but conceptually different coping strategies in the same measure (Simms, 2008; Tavakol & Dennick, 2011). Lastly, the use of secondary data limits the study in several ways. The use of secondary data prohibited the collection of additional data to prove the concurrent validity of the factor structures produced. Furthermore, no follow-up data can be collected to compare the relationship between coping strategies and HRQOL of patients in the sample at a later point in time.

6.5 Recommendations for future research and clinical practice

The current study provided valuable contributions to the research on coping and HRQOL in breast cancer patients, especially in the context of an LMIC, like South Africa. These contributions are important in providing guidance to future research in the field as well as providing recommendations for clinical practice to healthcare practitioners.

6.5.1 Recommendations for future research. Future researchers need to examine different factor solutions of both the Brief-COPE and the FACT-B that may occur as a function of culture, age, cancer stage, the socio-cultural- and socioeconomic context within different breast cancer samples and to replicate factor solutions that align closely or are similar to previous studies (Bellizzi & Blank, 2006; Brain et al., 2008; Fillion et al., 2002; Fletcher et al., 2006; Solberg et al., 2021; A.W.T. Wang et al., 2018). This will aid in determining the degree to which differences in factor structures are the result of genuine population differences or methodological and analytic modifications. The versions of the Brief-COPE and the FACT-B produced in the current study need to be utilized in other breast cancer samples in South Africa to further investigate the factor validity and reliability of the measures. Additionally, the results of the second exploratory factor analysis of the Brief-COPE and the FACT-B can be followed up with a third EFA. Alternatively, a Confirmatory

Factor Analysis could be conducted to test the factor structure of the Brief-COPE and the FACT-B produced in the current study.

Furthermore, future research on coping and HRQOL should consider employing a longitudinal study design to investigate the dynamic nature of coping (Lazarus & Folkman, 1984, 1987) across the trajectory of the disease instead of evaluating coping strategies at a single point in time. Moreover, further research should be done to determine how avoidant coping strategies should inform behavioural interventions in breast cancer samples as coping strategies of an avoidant nature can be both beneficial and detrimental to the HRQOL of breast cancer patients. As the Brief-COPE is limited in coping strategies that it captures, a future study should consider a qualitative study design to capture a wider range of coping strategies used by South African breast cancer patients and their effect on HRQOL.

Additionally, as South Africa has 11 official languages (Sobane et al., 2020), future research can explore the translation and adaptation of the Brief-COPE and the FACT-B for research in breast cancer patients' home language. Considering the mean age of participants in the current study (55.8 years), future research on coping and HRQOL can focus on a younger age group as findings in a younger sample may differ from the findings reported in the current sample. As men constitute a small percentage of the breast cancer population, research on this group is very limited (Fentiman, 2018). For this reason, future studies can explore the use of the Brief-COPE and the FACT-B to measure coping and HRQOL among South African men with breast cancer.

Importantly, the study did not investigate the association between demographic characteristics (i.e., marital status, living situation, race, level of education, employment status, level of income) or cancer-specific factors (i.e., cancer stage, treatment type, time since diagnosis) and coping strategies and HRQOL. These factors are noted to be associated with both coping and the HRQOL of breast cancer patients (Boatemaa Benson et al., 2020;

Kang et al., 2020; Kvillemo & Bränström, 2014; Setyowibowo et al., 2018; Yan et al., 2016), future studies investigating coping and HRQOL in South African breast cancer patients should explore these associations.

6.5.2 Implications for clinical practice and recommendations. The findings of the current study have some implications for clinical practice and interventions aimed at assisting breast cancer patients. Based on the findings that breast cancer patients utilize various coping mechanisms with different effects on their HRQOL, healthcare providers must be aware of which coping mechanisms are associated with better HRQOL. Throughout the treatment process, healthcare practitioners should evaluate patients' coping strategies and HRQOL. A screening process should be included in the treatment protocol which sees healthcare providers evaluate the coping strategies and HRQOL of the breast cancer patient. If needed, the patient can then be referred to a psycho-oncology intervention or other available mental health resources (i.e., psychologists, social workers, counsellors).

Additionally, several studies on coping and HRQOL in breast cancer patients call for psychosocial interventions to aid patients in dealing with the disease (Y. U. Cho et al., 2020; Lai et al., 2019; Zamanian et al., 2021). In the context of the findings of the current study, interventions should focus on improving avoidant coping and emotion-focused coping strategies as this may improve HRQOL. These psycho-oncology interventional programs must aid breast cancer patients in understanding the possible physical and psychological experiences that they might encounter. Furthermore, the interventions should educate breast cancer patients on resources available to them that will aid them in adjusting and coping with the disease to optimize their HRQOL.

6.6 Conclusion

Breast cancer is the leading cancer diagnosis among women in both high- and low-income resource settings (Bray et al., 2018). With advances in treatment, it is important to consider all aspects of the patient's life and not only their survival. In light of this, the study produced some important findings with regards to the measurement of coping and HRQOL as well as the relationship between coping and HRQOL in South African breast cancer patients.

The study produced a new factor structure of the Brief-COPE for use among breast cancer patients in South Africa. This is valuable for future research on coping among breast cancer patients in South Africa. Furthermore, as the socio-economic, political, and healthcare system-related barriers in South Africa might be similar to those experienced by breast cancer patients in other LMIC (Edge et al., 2014; Lukong et al., 2017), the version produced in the current study could be utilized in research among other breast cancer populations in these countries. The study also produced a new factor structure of the FACT-B for use among South African breast cancer patients. Importantly, the study was the first to perform an exploratory factor analysis on the measure that retained items from the BCS subscale. This is an important contribution as across all psychometric evaluations of the measure in previous research, including the study on the development of the measure, the BCS subscale items showcased the lowest reliability. Similar to the Brief-COPE, future research could use the version of the FACT-B produced in the current study to explore HRQOL in breast cancer populations in other LMIC.

Furthermore, the study found the subscales of both the Brief-COPE and the FACT-B to meet the minimum requirement (**α** value equal or greater than 0.70) for reliability, which indicated that the Brief-COPE and the FACT-B were consistent in their measurements (Hair et al., 2018). Moreover, the findings with regards to the measures' subscales were comparable with previous research (Algamdi & Hanneman, 2019; Brain et al., 2008; Patoo et al., 2015; A. W. T. Wang et al., 2018; Yusof et al., 2021), reinforcing the reliability of both measures for use in breast cancer populations. Future studies utilizing the version of the

FACT-B produced in the current study should however investigate the low reliability recorded for the overall score of the study.

The study provided valuable insight into coping strategies and HRQOL in South African breast cancer patients. Importantly, the findings with regards to the relationship between coping strategies and HRQOL in the current study was supported by the Stress and Coping Model (Lazarus & Folkman, 1984, 1987). and the Biopsychosocial Model (Engel, 1977). In the context of the current study, human functioning was successfully conceptualized by the functional-, emotional-, physical-, and social well-being domains of the FACT-B.

The study indicated the coping strategies that improved and worsened certain domains of HRQOL. The study found that South African breast cancer patients who utilized avoidant coping strategies tended to report better emotional- and physical well-being. Although previous research indicated that avoidant coping strategies could have a significantly positive association with HRQOL (Kugbey et al., 2019), this study was the first to indicate a significantly positive relationship between avoidant coping and emotional- and physical well-being. Furthermore, the study also found that South African breast cancer patients that utilized emotion-focused coping strategies tended to report better functional well-being. However, the study indicated that patients that utilized avoidant coping strategies also tended to report worse functional- and social well-being. Therefore, the pattern of coping identified in the study can be used to inform interventions on coping with breast cancer. Future studies can investigate the use of interventions that ensure that avoidant coping- and emotion-focused coping strategies are correctly employed to optimize HRQOL. Therefore, the study provided the first insight into the relationship between coping strategies and HRQOL among South African breast cancer patients.

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APPENDICES

Appendix A: Breast cancer treatment methods

Targeted therapies. Endocrine therapy, a form of targeted therapy, is the most commonly prescribed treatment for estrogen receptor (ER) breast cancers (Lukong et al., 2017). There are five different classes of endocrine treatments: selective ER modulators and selective ER degraders, tamoxifen and fulvestrant, and aromatase inhibitors (Lukong et al., 2017).

Surgery. A mastectomy is the standard procedure to remove breast tissue to prevent the further growth of cancer cells (Ogundiran et al., 2013). There are five different types of mastectomies, namely total-, radical-, modified radical-, nipple-sparing, and partial mastectomy (BREASTCANCER.ORG, 2020). If possible, mastectomy is used in combination with other treatment methods to treat breast cancer (A. J. Price et al., 2012). For example, in a Nigerian sample of 1226 breast cancer patients, 35.2% had undergone a mastectomy, while 50% also received primary systemic chemotherapy (Ogundiran et al., 2013). Receiving a combination of treatments methods is however limited to countries where the treatments are routinely available (Kingham et al., 2013).

Radiotherapy. This treatment method, also known as radiation therapy, sees the use of high radiation doses to eliminate cancer cells and halt the growth of tumours (Sharma et al., 2020). One of the greatest challenges in breast cancer treatment in LMIC is to provide cancer patients access to radiotherapy (Lukong et al., 2017; V. Vanderpuye et al., 2017). Where radiotherapy facilities were established, several facilities face high maintenance costs and a shortage of skilled personnel (Abdel-Wahab et al., 2013).

Chemotherapy. This treatment is a form of chemical therapy where drugs are delivered intravenously to halt the growth of cancer cells (Renner et al., 2013). A study on breast cancer management in Sub-Saharan Africa found that neoadjuvant chemotherapy (a first step to reducing tumour size) was the most used approach of this treatment (Vanderpuye et al., 2017). This is possibly due to the high breast cancer incidence and the unavailability of theatre space and time (Vanderpuye et al., 2017).

Traditional medicine. Breast cancer patients in LMIC countries frequently include traditional and herbal medicine in their treatment regimens (X. Li et al., 2013; Lukong et al., 2017). A review by Li and colleagues (2013) on the use of herbal remedies as a breast cancer treatment in most frequently reported clinical symptoms improvement, improvement in biomarker indices, improvements in quality of life, a reduction in radio/chemotherapy-induced side effects, a reduction in tumour size, and an increased sense of safety. Although the success of traditional medicine is limited (X. Li et al., 2013), it serves as the main treatment method for many breast cancer patients based in rural areas (Adib et al., 2009; Lukong et al., 2017; Salem & Daher-Nashif, 2020). Furthermore, it was found in Ghana, Rwanda and South Africa, that some breast cancer patients first sought treatment from a traditional healer before consulting a doctor (Clegg-lamptey et al., 2010; Pace et al., 2015; Pillay, 2002). Both visiting a traditional healer and the use of traditional medicine as first-line treatment have been associated with receiving a more advanced staging at diagnosis (Clegg-lamptey et al., 2010; Pace et al., 2015).

Appendix B: HREC approval letter for the current study

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Approval Letter
Amendment

25/02/2021

Project ID: 3081

Ethics Reference No: N15/08/077

Project Title: PSYCHOSOCIAL ASPECTS OF BREAST CANCER TREATMENT

Dear Prof Ashraf Kagee

We refer to your amendment request received 25/02/2021.

The Health Research Ethics Committee (HREC) reviewed and **approved** the following amendment through an expedited review process:

- To add Mr. Steyn Lodewyk Vogel as a Sub Investigator for the purposes of accessing data for his masters research.

The following document was reviewed and **approved**:

- An Exploratory Factor Analysis of the FACT-B and Brief-COPE 23Feb Final draft, version 1 dated

We **acknowledge** receipt of the CV and HREC Investigators Declaration for Mr Steyn Lodewyk Vogel.

Where to submit any documentation

Kindly note that the HREC uses an electronic ethics review management system, *Infonetica*, to manage ethics applications and ethics review process. To submit any documentation to HREC, please click on the following link: https://applyethics.sun.ac.za.

Please remember to use your project ID 3081 and ethics reference number N15/08/077 on any documents or correspondence with the HREC concerning your research protocol.

Yours sincerely,

Mrs. Melody Shana
Coordinator: Health Research Ethics Committee 1

National Health Research Ethics Council (NHREC) Registration Number:

REC-130408-012 (HREC1)·REC-230208-010 (HREC2)

Federal Wide Assurance Number: 00001372
Office of Human Research Protections
(OHRP) Institutional Review Board (IRB)
Number: IRB0005240 (HREC1)·IRB0005239
(HREC2)

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the *World Medical Association (2013). Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects;the South African Department of Health (2006). Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa (2nd edition); as well as the Department of Health (2015). Ethics in Health Research: Principles, Processes and Structures (2nd edition).*

The Health Research Ethics Committee reviews research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research (United States Code of Federal Regulations Title 45 Part 46); and/or clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

Appendix C: Demographic Questionnaire

1. LAST NAME	
2. FIRST NAME	
3. AGE	

4. DATE OF BIRTH: ________/____________/19__________
Day Month Year

PLEASE INDICATE THE FOLLOWING ANSWERS BY MAKING AN (X) IN THE APPROPRIATE BOX.

5. GENDER: ☐ Male ☐ Female

6. RACE:

☐ AFRICAN ☐ COLOURED

☐ WHITE ☐ INDIAN

☐ OTHER (Please state: _____________________.

7. MARITAL STATUS:
☐ Single ☐ Widowed ☐ Separated ☐ Divorced ☐ Married/ living together

8. LIVING SITUATION:
☐ Live alone ☐ Live with other adults(s), no children
☐ Live with other adults and children ☐ Live with children
☐ Live in an institution or retirement home

9. WHAT IS THE HIGHEST EDUCATION LEVEL YOU HAVE COMPLETED?

☐ No formal education
☐ Completed primary school
☐ Attended high school but did not complete matric
☐ Completed matric
☐ Attended university, college or technikon but did not graduate
☐ Graduated from university, college or technikon

10. WHAT IS YOUR CURRENT WORK SITUATION?
☐ Employed full time ☐ Employed part time

☐ Student
☐ Disabled
☐ Retired
☐ Unemployment
☐ Homemaker

11. WHICH OF THE FOLLOWING BEST DESCRIBES YOUR APPROXIMATE ANNUAL FAMILY INCOME FROM ALL SOURCES, BEFORE TAXES?

☐ Less than R10 000
☐ R10 001-R40 000
☐ R40 001-R80 000
☐ R80 001-R110 000
☐ R110 001-R170 000
☐ R170 001-R240 000
☐ R240 001 and above
☐ Don't know

12. WHERE WERE YOU BORN?

☐ Town ☐ City ☐ Farm

13. WHAT IS YOUR FIRST LANGUAGE? ___________________

14. WHICH OTHER LANGUAGES DO YOU SPEAK? ___________________

Appendix D: Brief COPE questionnaire

These items deal with ways you have been coping with the stress in your life since you were diagnosed with breast cancer. There are many ways to try to deal with problems. These items ask what you've been doing to cope. Make your answers as true FOR YOU as you can.

	I haven't been doing this at all	**I've been doing this a little bit**	**I've been doing this a medium amount**	**I've been doing this a lot**
1. I've been turning to work or other activities to take my mind off things.				
2. I've been concentrating my efforts on doing something about the situation I'm in.				
3. I've been saying to myself "this isn't real.".				
4. I've been using alcohol or other drugs to make myself feel better.				
5. I've been getting emotional support from others.				
6. I've been giving up trying to deal with it.				
7. I've been taking action to try to make the situation better.				
8. I've been refusing to believe that it has happened.				
9. I've been saying things to let my unpleasant feelings escape.				
10. I’ve been getting help and advice from other people.				
11. I've been using alcohol or other drugs to help me get through it.				

12. I've been trying to see it in a different light, to make it seem more positive.				
13. I’ve been criticizing myself.				
14. I've been trying to come up with a strategy about what to do.				
	I haven't been doing this at all	**I've been doing this a little bit**	**I've been doing this a medium amount**	**I've been doing this a lot**
15. I've been getting comfort and understanding from someone.				
16. I've been giving up the attempt to cope.				
17. I've been looking for something good in what is happening.				
18. I've been making jokes about it.				
19. I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.				
20. I've been accepting the reality of the fact that it has happened.				
21. I've been expressing my negative feelings.				
22. I've been trying to find comfort in my religion or spiritual beliefs.				
23. I’ve been trying to get advice or help from other people about what to do.				
24. I've been learning to live with it.				

25. I've been thinking hard about what steps to take.				
26. I've been blaming myself for things that happened.				
27. I've been praying or meditating.				
28. I've been making fun of the situation.				

Appendix E: FACT-B

Below is a list of statements that other people with your illness have said are important. **Please circle or mark one number per line to indicate your response as it applies to the past 7 days.**

	PHYSICAL WELL-BEING	Not at all	A little bit	Some-what	Quitea bit	Very much
GP1	I have a lack of energy	0	1	2	3	4
GP2	I have nausea	0	1	2	3	4
GP3	Because of my physical condition, I have trouble meeting the needs of my family	0	1	2	3	4
GP4	I have pain	0	1	2	3	4
GP5	I am bothered by side effects of treatment	0	1	2	3	4
GP6	I feel ill	0	1	2	3	4
GP7	I am forced to spend time in bed	0	1	2	3	4

	SOCIAL/FAMILY WELL-BEING	Not at all	A little bit	Some-what	Quitea bit	Very much
GS1	I feel close to my friends	0	1	2	3	4
GS2	I get emotional support from my family	0	1	2	3	4
GS3	I get support from my friends	0	1	2	3	4
GS4	My family has accepted my illness	0	1	2	3	4
GS5	I am satisfied with family communication about my illness	0	1	2	3	4
GS6	I feel close to my partner (or the person who is my main support)	0	1	2	3	4
Q1	*Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please mark this box and go to the☐xt section.*					
GS7	I am satisfied with my sex life	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the past 7 days.

	EMOTIONAL WELL-BEING	**Not at all**	**A little bit**	**Somewhat**	**Quite a bit**	**Very much**
GE 1	I feel sad	0	1	2	3	4
GE 2	I am satisfied with how I am coping with my illness	0	1	2	3	4
GE 3	I am losing hope in the fight against my illness	0	1	2	3	4
GE 4	I feel nervous	0	1	2	3	4
GE 5	I worry about dying	0	1	2	3	4
GE	I worry that my condition will get worse	0	1	2	3	4

	FUNCTIONAL WELL-BEING	**Not at all**	**A little bit**	**Somewhat**	**Quitea bit**	**Very much**
GF1	I am able to work (include work at home)	0	1	2	3	4
GF2	My work (include work at home) is fulfilling	0	1	2	3	4
GF3	I am able to enjoy life	0	1	2	3	4
GF4	I have accepted my illness	0	1	2	3	4
GF5	I am sleeping well	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun	0	1	2	3	4
GF7	I am content with the quality of my life right now	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the past 7 days.

	ADDITIONAL CONCERNS	Not at all	A little bit	Some-what	Quite a bit	Very much
B1	I have been short of breath	0	1	2	3	4
B2	I am self-conscious about the way I dress	0	1	2	3	4
B3	One or both of my arms are swollen or tender	0	1	2	3	4
B4	I feel sexually attractive	0	1	2	3	4
B5	I am bothered by hair loss	0	1	2	3	4
B6	I worry that other members of my family might someday get the same illness I have	0	1	2	3	4
B7	I worry about the effect of stress on my illness	0	1	2	3	4
B8	I am bothered by a change in weight	0	1	2	3	4
B9	I am able to feel like a woman	0	1	2	3	4
P2	I have certain parts of my body where I experience pain	0	1	2	3	4

Appendix F: HREC approval letter for the original study

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jou kennisvennoot • your knowledge partner

Ethics Letter

30 January 2018

Ethics Reference #: N15/08/077

Title: Psychosocial aspects of breast cancer treatment.

Dear Prof Shaheen Kagee

The Health Research Ethics Committee reviewed and approved the annual progress report you submitted through an expedited review process.

Progress Report dated 16 January 2018

The approval of this project is extended for a further year.

Approval date: 30 January 2018

Expiry date: 29 January 2019

Kindly be reminded to submit progress reports two (2) months before expiry date.

Where to submit any documentation:
Kindly submit **ONE HARD COPY** to Elvira Rohland, RDSD, Room 5007, Teaching Building, and **ONE ELECTRONIC COPY** to ethics@sun.ac.za .

Please remember to use your **protocol number** **(N15/08/077)** on any documents or correspondence with the HREC concerning your research protocol.

Federal Wide Assurance Number: 00001372
Institutional Review Board (IRB) Number: IRB0005240 for HREC1
Institutional Review Board (IRB) Number: IRB0005239 for HREC2

The Health Research Ethics Committee complies with the SA National Health Act No. 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki and the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles, Structures and Processes 2015 (Department of Health).

Yours sincerely,

Ashleen Fortuin
HREC Administrator
Health Research Ethics Committee 1

STELLENBOSCH UNIVERSITY
Health Research Ethics Committee
30 JAN 2018
STELLENBOSCH UNIVERSITEIT
Gesondheidsnavorsing Etiekkomitee

Fakulteit Geneeskunde en Gesondheidswetenskappe
•
Faculty of Medicine and Health Sciences

Afdeling Navorsingsontwikkeling en -Steun • Research Development and Support Division

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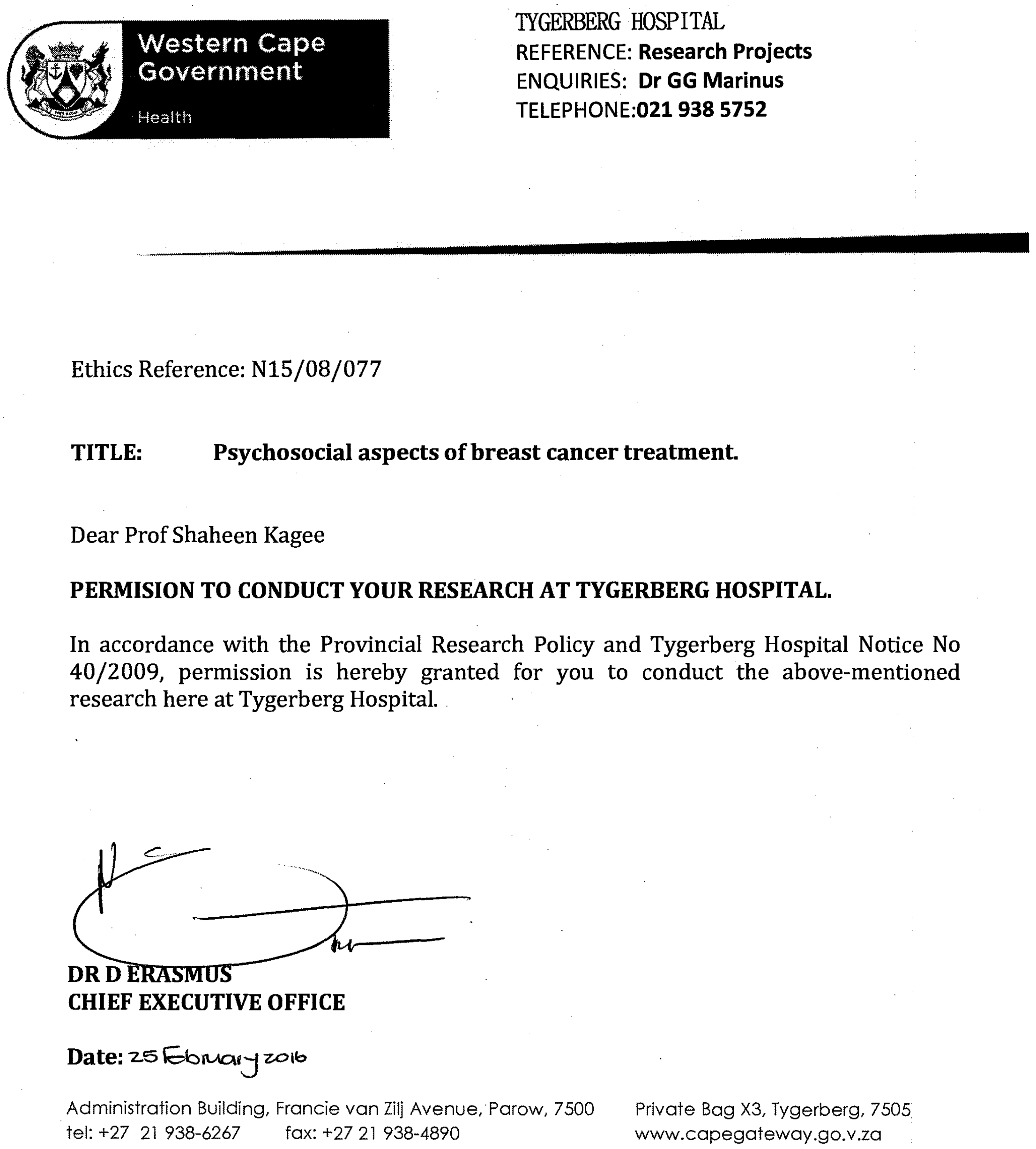
Appendix G: Western Cape Department of Health approval letter



Western Cape Government
Health

TYGERBERG HOSPITAL
REFERENCE: **Research Projects**
ENQUIRIES: **Dr GG Marinus**
TELEPHONE:**021 938 5752**

Ethics Reference: N15/08/077

TITLE: **Psychosocial aspects of breast cancer treatment.**

Dear Prof Shaheen Kagee

PERMISION TO CONDUCT YOUR RESEARCH AT TYGERBERG HOSPITAL.

In accordance with the Provincial Research Policy and Tygerberg Hospital Notice No 40/2009, permission is hereby granted for you to conduct the above-mentioned research here at Tygerberg Hospital.

DR D ERASMUS
CHIEF EXECUTIVE OFFICE

Date: 25 February 2016

Administration Building, Francie van Zilj Avenue, Parow, 7500
tel: +27 21 938-6267 fax: +27 21 938-4890
Private Bag X3, Tygerberg, 7505
www.capegateway.go.v.za

TYGERBERG HOSPITAL

ETHICS REFERENCE: N15/08/077

TITLE: **Psychosocial aspects of breast cancer treatment.**

BY ______________________________

An authorized representative of Tygerberg Hospital

NAME Dr DS Erasmus

TITLE CEO

DATE 25 February 2016

Appendix H: Correlation Matrices

Brief Cope: Correlation matrix

	COP2	COP3	COP4	COP5	COP6	COP7	COP8	COP9	COP10	COP11	COP12	COP13	COP14
COP2	1.000	.146	.099	.261	.044	.567	.132	.277	.196	.043	.360	.154	.480
COP3	.146	1.000	.172	.056	.261	.080	.503	.216	.110	.216	.040	.260	.206
COP4	.099	.172	1.000	-.074	.262	-.041	.197	.159	-.070	.839	-.032	.263	.066
COP5	.261	.056	-.074	1.000	.010	.338	.029	.216	.486	-.018	.343	.013	.279
COP6	.044	.261	.262	.010	1.000	.103	.397	.153	.039	.354	-.005	.316	.142
COP7	.567	.080	-.041	.338	.103	1.000	.208	.309	.417	-.074	.417	.113	.577
COP8	.132	.503	.197	.029	.397	.208	1.000	.304	.106	.201	.054	.189	.169
COP9	.277	.216	.159	.216	.153	.309	.304	1.000	.219	.145	.288	.242	.316
COP10	.196	.110	-.070	.486	.039	.417	.106	.219	1.000	-.042	.388	.031	.423
COP11	.043	.216	.839	-.018	.354	-.074	.201	.145	-.042	1.000	-.021	.312	.134
COP12	.360	.040	-.032	.343	-.005	.417	.054	.288	.388	-.021	1.000	.026	.391
COP13	.154	.260	.263	.013	.316	.113	.189	.242	.031	.312	.026	1.000	.175
COP14	.480	.206	.066	.279	.142	.577	.169	.316	.423	.134	.391	.175	1.000
COP15	.106	.064	-.175	.409	-.066	.186	.005	.132	.534	-.139	.362	-.037	.242
COP16	.013	.360	.387	-.155	.476	-.014	.369	.340	.029	.496	.014	.417	.135
COP17	.267	.029	.033	.173	-.091	.307	.079	.251	.256	.003	.442	-.009	.312
COP18	.140	.023	.094	-.039	.069	.143	.068	.128	.132	.008	.072	.101	.263
COP20	.059	-.023	-.103	.179	.011	.179	-.023	.064	.175	-.164	.170	-.047	.132
COP21	.268	.166	.062	.119	.073	.219	.096	.409	.136	.074	.136	.208	.323
COP22	.140	.117	-.043	.238	-.099	.204	.090	.043	.332	-.110	.352	-.094	.208
COP23	.208	.168	-.025	.261	.042	.247	.095	.235	.516	-.008	.281	-.014	.356
COP24	.056	.007	-.066	.146	-.106	.099	-.066	.026	.284	-.066	.291	-.089	.178
COP25	.420	.144	.054	.181	-.025	.369	.096	.282	.303	.061	.231	.084	.397
COP26	.053	.164	.327	-.114	.385	.006	.227	.274	-.047	.400	-.005	.436	.105
COP27	.013	.025	-.007	.111	-.226	.114	.004	.084	.328	-.007	.231	-.087	.174
COP28	.097	.019	.073	.010	.066	.165	.059	.137	.096	.074	.093	.044	.261

	COP15	COP16	COP17	COP18	COP20	COP21	COP22	COP23	COP24	COP25	COP26	COP2
COP2	.106	.013	.267	.140	.059	.268	.140	.208	.056	.420	.053	.013
COP3	.064	.360	.029	.023	-.023	.166	.117	.168	.007	.144	.164	.025
COP4	-.175	.387	.033	.094	-.103	.062	-.043	-.025	-.066	.054	.327	-.007
COP5	.409	-.155	.173	-.039	.179	.119	.238	.261	.146	.181	-.114	.111
COP6	-.066	.476	-.091	.069	.011	.073	-.099	.042	-.106	-.025	.385	-.226
COP7	.186	-.014	.307	.143	.179	.219	.204	.247	.099	.369	.006	.114
COP8	.005	.369	.079	.068	-.023	.096	.090	.095	-.066	.096	.227	.004
COP9	.132	.340	.251	.128	.064	.409	.043	.235	.026	.282	.274	.084
COP10	.534	.029	.256	.132	.175	.136	.332	.516	.284	.303	-.047	.328
COP11	-.139	.496	.003	.008	-.164	.074	-.110	-.008	-.066	.061	.400	-.007
COP12	.362	.014	.442	.072	.170	.136	.352	.281	.291	.231	-.005	.231
COP13	-.037	.417	-.009	.101	-.047	.208	-.094	-.014	-.089	.084	.436	-.087
COP14	.242	.135	.312	.263	.132	.323	.208	.356	.178	.397	.105	.174
COP15	1.000	-.123	.242	.054	.230	.192	.354	.475	.347	.308	-.053	.317
COP16	-.123	1.000	.043	.061	-.154	.112	-.036	.035	-.050	.042	.438	-.013
COP17	.242	.043	1.000	.238	.215	.152	.329	.201	.264	.295	.006	.280

COP18	.054	.061	.238	1.000	.226	.165	.087	.063	.152	.140	.086	.073
COP20	.230	-.154	.215	.226	1.000	.252	.189	.151	.472	.143	-.094	.063
COP21	.192	.112	.152	.165	.252	1.000	.116	.218	.254	.278	.131	.076
COP22	.354	-.036	.329	.087	.189	.116	1.000	.281	.429	.170	-.168	.505
COP23	.475	.035	.201	.063	.151	.218	.281	1.000	.376	.516	.029	.230
COP24	.347	-.050	.264	.152	.472	.254	.429	.376	1.000	.257	-.190	.350
COP25	.308	.042	.295	.140	.143	.278	.170	.516	.257	1.000	.176	.146
COP26	-.053	.438	.006	.086	-.094	.131	-.168	.029	-.190	.176	1.000	-.024
COP27	.317	-.013	.280	.073	.063	.076	.505	.230	.350	.146	-.024	1.000
COP28	.085	.071	.137	.635	.211	.233	.091	.157	.193	.181	.110	.095

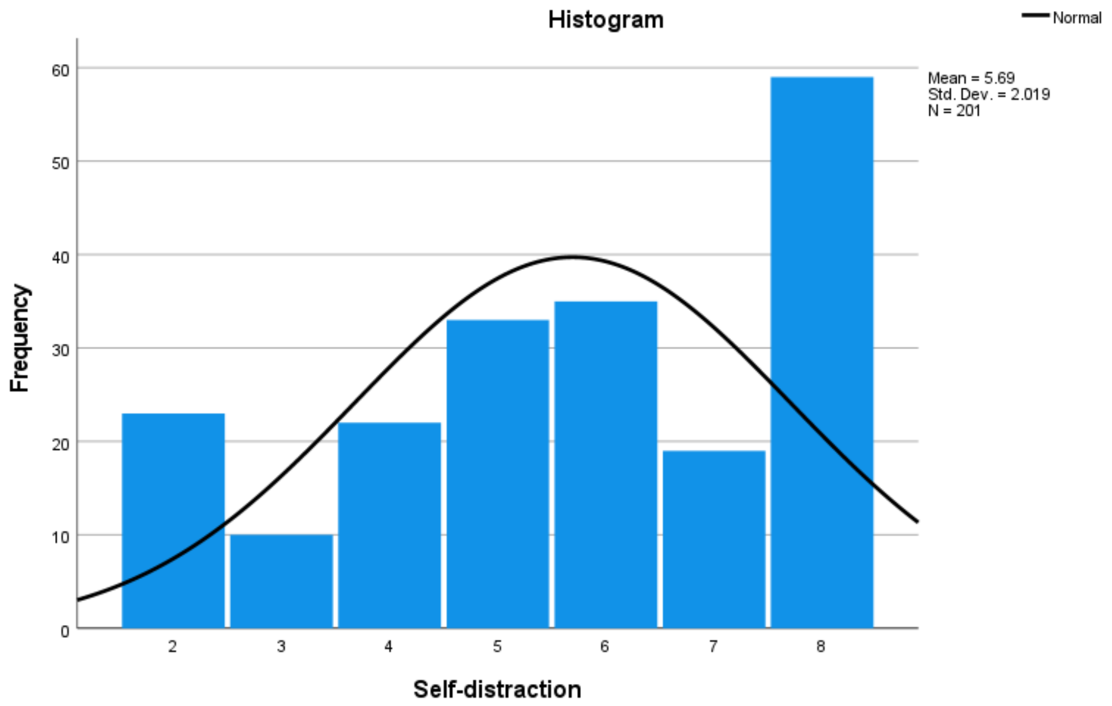
FACT-B: Correlation matrix

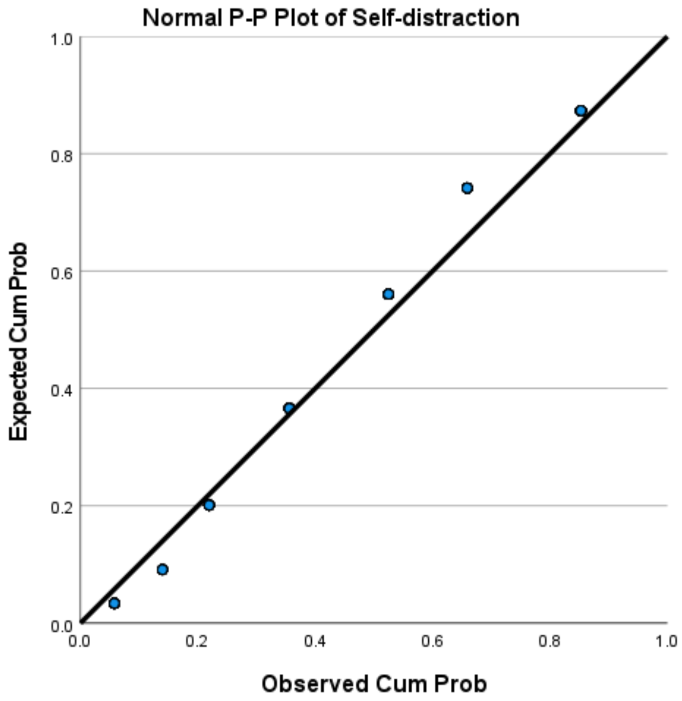
	GP1	GP2	GP3	GP4	GP5	GP6	GP7	GS1	GS2	GS3	GS4	GS5	GS6	GE1	GE
GP1	1.000	.446	.428	.440	.355	.332	.394	-.138	-.194	-.175	-.223	-.290	-.099	.390	.25
GP2	.446	1.000	.409	.418	.328	.524	.417	-.060	-.093	.021	-.173	-.215	-.027	.393	.45
GP3	.428	.409	1.000	.484	.345	.429	.524	.022	-.061	-.082	-.222	-.150	-.179	.345	.34
GP4	.440	.418	.484	1.000	.402	.580	.505	-.082	-.221	-.072	-.187	-.190	-.096	.417	.34
GP5	.355	.328	.345	.402	1.000	.491	.446	-.112	-.280	-.128	-.282	-.375	-.191	.416	.36
GP6	.332	.524	.429	.580	.491	1.000	.619	-.166	-.182	-.106	-.247	-.247	-.011	.468	.47
GP7	.394	.417	.524	.505	.446	.619	1.000	-.122	-.159	-.132	-.274	-.230	.005	.423	.45
GS1	-.138	-.060	.022	-.082	-.112	-.166	-.122	1.000	.371	.715	.207	.330	.317	-.207	-.13
GS2	-.194	-.093	-.061	-.221	-.280	-.182	-.159	.371	1.000	.375	.362	.658	.336	-.208	-.07
GS3	-.175	.021	-.082	-.072	-.128	-.106	-.132	.715	.375	1.000	.182	.294	.359	-.207	-.00
GS4	-.223	-.173	-.222	-.187	-.282	-.247	-.274	.207	.362	.182	1.000	.539	.304	-.320	-.28
GS5	-.290	-.215	-.150	-.190	-.375	-.247	-.230	.330	.658	.294	.539	1.000	.478	-.278	-.16
GS6	-.099	-.027	-.179	-.096	-.191	-.011	.005	.317	.336	.359	.304	.478	1.000	-.199	-.08
GE1	.390	.393	.345	.417	.416	.468	.423	-.207	-.208	-.207	-.320	-.278	-.199	1.000	.40
GE3	.250	.454	.340	.341	.366	.471	.458	-.133	-.075	-.005	-.280	-.163	-.085	.400	1.0
GE4	.355	.303	.246	.306	.537	.274	.342	-.314	-.250	-.235	-.306	-.386	-.299	.468	.51
GE5	.354	.254	.246	.174	.436	.326	.331	-.184	-.115	-.101	-.126	-.154	-.057	.287	.51
GE6	.376	.218	.266	.325	.443	.325	.332	-.140	-.153	-.170	-.182	-.238	-.231	.366	.41
GF1	-.290	-.180	-.386	-.347	-.338	-.281	-.434	.155	.248	.229	.137	.166	.130	-.262	-.13
GF2	-.210	-.031	-.245	-.201	-.338	-.192	-.321	.159	.196	.267	.173	.272	.124	-.133	-.00
GF3	-.259	-.143	-.250	-.297	-.300	-.368	-.403	.330	.262	.383	.332	.297	.099	-.332	-.24
GF4	-.140	-.071	-.186	-.071	-.119	-.174	-.262	.092	.062	.115	.343	.163	.006	-.164	-.16
GF5	-.211	-.217	-.236	-.481	-.387	-.305	-.305	.156	.331	.150	.202	.275	.229	-.317	-.18
GF6	-.258	-.172	-.270	-.319	-.266	-.412	-.452	.345	.269	.368	.308	.309	.153	-.396	-.17
GF7	-.182	-.111	-.259	-.206	-.253	-.248	-.221	.262	.196	.270	.277	.293	.346	-.241	-.11
B2	.299	.123	.235	.261	.359	.188	.295	-.070	-.099	-.125	-.158	-.162	-.200	.326	.19
B6	.139	.215	.168	.230	.260	.179	.139	-.064	.006	-.050	-.063	.000	-.056	.130	.12
B7	.305	.223	.292	.371	.372	.347	.309	-.227	-.174	-.150	-.262	-.317	-.318	.459	.34
B8	.273	.223	.187	.151	.401	.165	.188	-.134	-.144	-.088	-.207	-.211	-.210	.291	.22
P2	.363	.273	.375	.730	.342	.469	.394	-.097	-.149	-.085	-.102	-.150	-.074	.284	.27

	GE4	GE5	GE6	GF1	GF2	GF3	GF4	GF5	GF6	GF7	B2	B6	B7	B8
GP1	.355	.354	.376	-.290	-.210	-.259	-.140	-.211	-.258	-.182	.299	.139	.305	.273

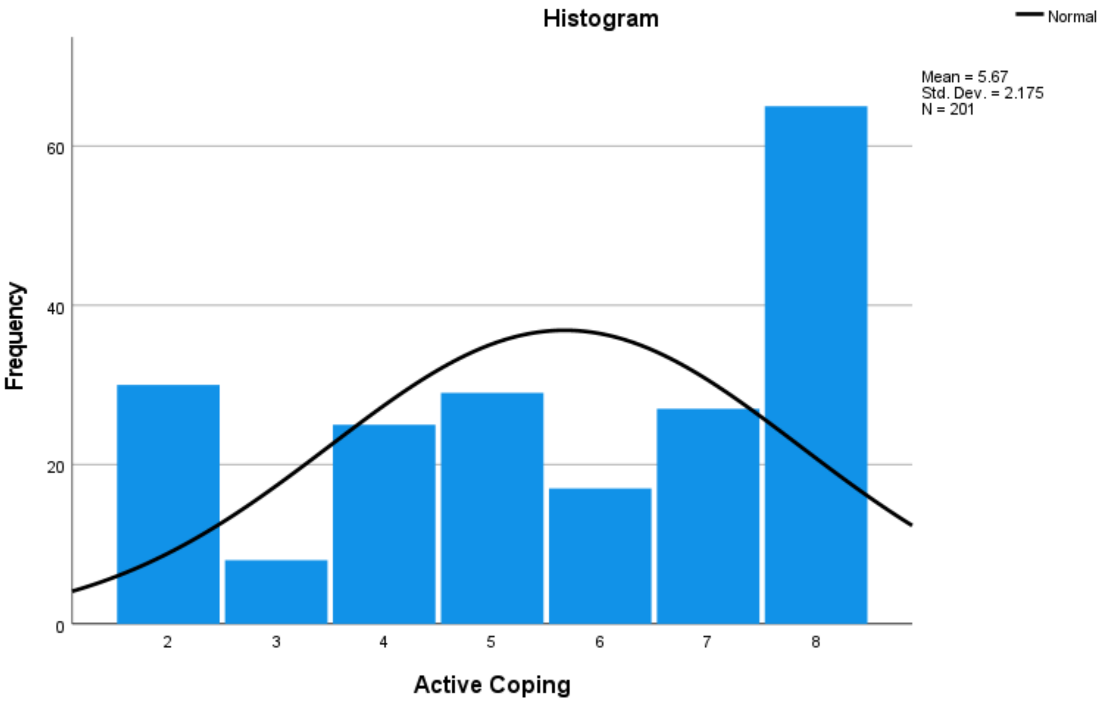
GP2	.303	.254	.218	-.180	-.031	-.143	-.071	-.217	-.172	-.111	.123	.215	.223	.223
GP3	.246	.246	.266	-.386	-.245	-.250	-.186	-.236	-.270	-.259	.235	.168	.292	.187
GP4	.306	.174	.325	-.347	-.201	-.297	-.071	-.481	-.319	-.206	.261	.230	.371	.151
GP5	.537	.436	.443	-.338	-.338	-.300	-.119	-.387	-.266	-.253	.359	.260	.372	.401
GP6	.274	.326	.325	-.281	-.192	-.368	-.174	-.305	-.412	-.248	.188	.179	.347	.165
GP7	.342	.331	.332	-.434	-.321	-.403	-.262	-.305	-.452	-.221	.295	.139	.309	.188
GS1	-.314	-.184	-.140	.155	.159	.330	.092	.156	.345	.262	-.070	-.064	-.227	-.134
GS2	-.250	-.115	-.153	.248	.196	.262	.062	.331	.269	.196	-.099	.006	-.174	-.144
GS3	-.235	-.101	-.170	.229	.267	.383	.115	.150	.368	.270	-.125	-.050	-.150	-.088
GS4	-.306	-.126	-.182	.137	.173	.332	.343	.202	.308	.277	-.158	-.063	-.262	-.207
GS5	-.386	-.154	-.238	.166	.272	.297	.163	.275	.309	.293	-.162	.000	-.317	-.211
GS6	-.299	-.057	-.231	.130	.124	.099	.006	.229	.153	.346	-.200	-.056	-.318	-.210
GE1	.468	.287	.366	-.262	-.133	-.332	-.164	-.317	-.396	-.241	.326	.130	.459	.291
GE3	.515	.518	.412	-.130	-.004	-.249	-.162	-.180	-.179	-.110	.198	.124	.348	.226
GE4	1.000	.589	.634	-.260	-.191	-.389	-.220	-.273	-.316	-.345	.327	.205	.458	.347
GE5	.589	1.000	.685	-.246	-.137	-.280	-.295	-.146	-.277	-.233	.272	.249	.380	.312
GE6	.634	.685	1.000	-.303	-.274	-.352	-.225	-.218	-.311	-.280	.290	.336	.519	.351
GF1	-.260	-.246	-.303	1.000	.681	.580	.375	.320	.536	.489	-.155	-.135	-.180	-.051
GF2	-.191	-.137	-.274	.681	1.000	.562	.360	.256	.534	.427	-.145	-.084	-.204	-.081
GF3	-.389	-.280	-.352	.580	.562	1.000	.472	.334	.781	.565	-.206	-.097	-.273	-.113
GF4	-.220	-.295	-.225	.375	.360	.472	1.000	.190	.456	.432	-.193	-.060	-.130	-.146
GF5	-.273	-.146	-.218	.320	.256	.334	.190	1.000	.435	.348	-.263	-.235	-.369	-.218
GF6	-.316	-.277	-.311	.536	.534	.781	.456	.435	1.000	.623	-.229	-.148	-.342	-.161
GF7	-.345	-.233	-.280	.489	.427	.565	.432	.348	.623	1.000	-.207	-.031	-.300	-.180
B2	.327	.272	.290	-.155	-.145	-.206	-.193	-.263	-.229	-.207	1.000	.124	.349	.396
B6	.205	.249	.336	-.135	-.084	-.097	-.060	-.235	-.148	-.031	.124	1.000	.331	.296
B7	.458	.380	.519	-.180	-.204	-.273	-.130	-.369	-.342	-.300	.349	.331	1.000	.398
B8	.347	.312	.351	-.051	-.081	-.113	-.146	-.218	-.161	-.180	.396	.296	.398	1.000
P2	.226	.082	.214	-.237	-.221	-.195	-.054	-.375	-.156	-.118	.133	.211	.328	.201

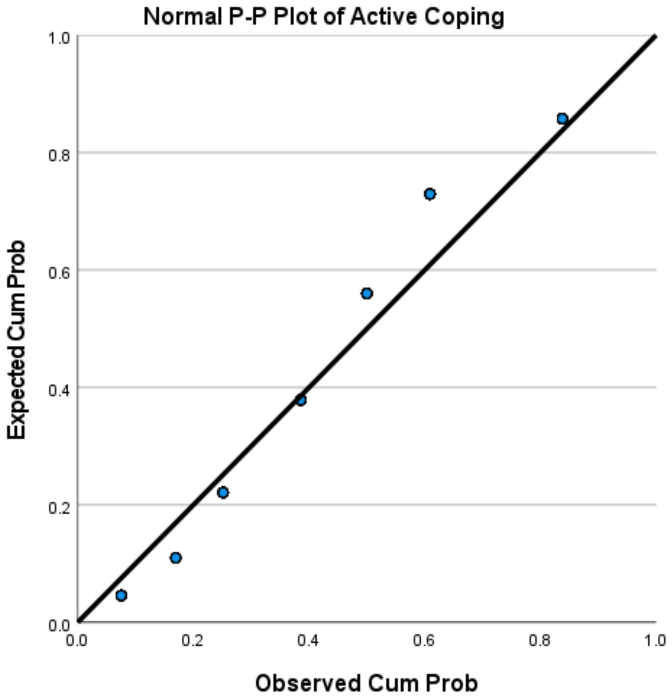
Appendix I: Histogram and P-P plot of the Self-distraction subscale (Brief-COPE)



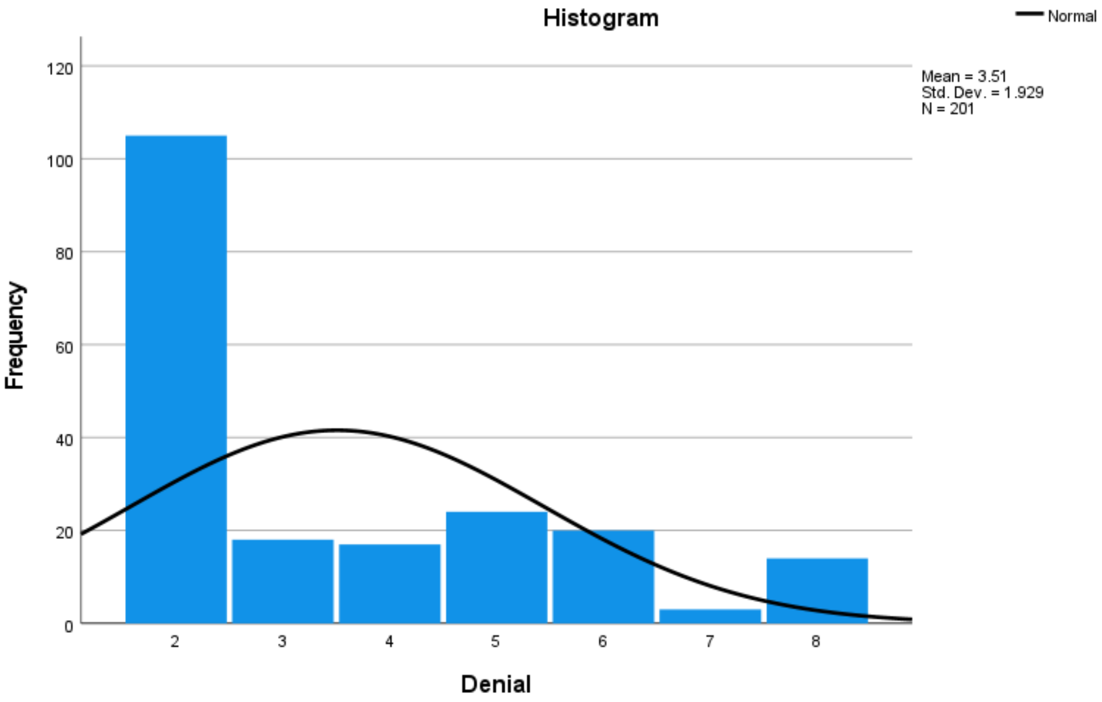


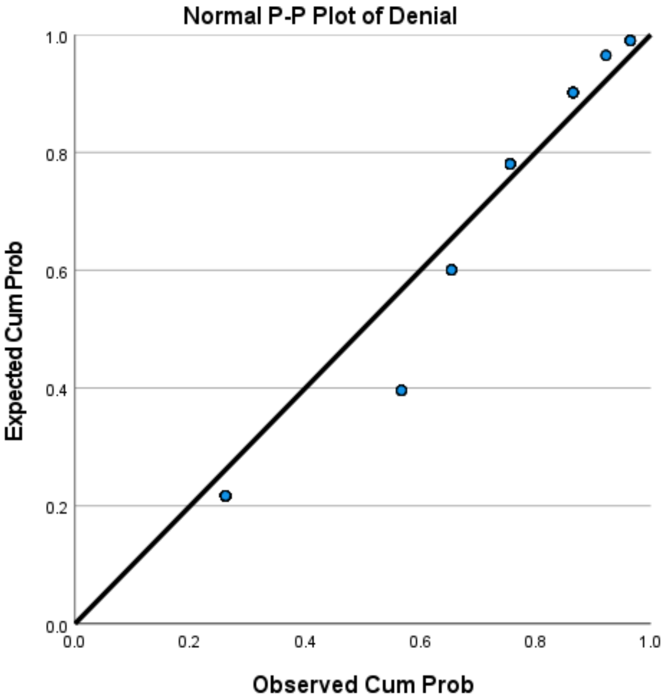
Appendix J: Histogram and P-P plot of the Active coping subscale (Brief-COPE)



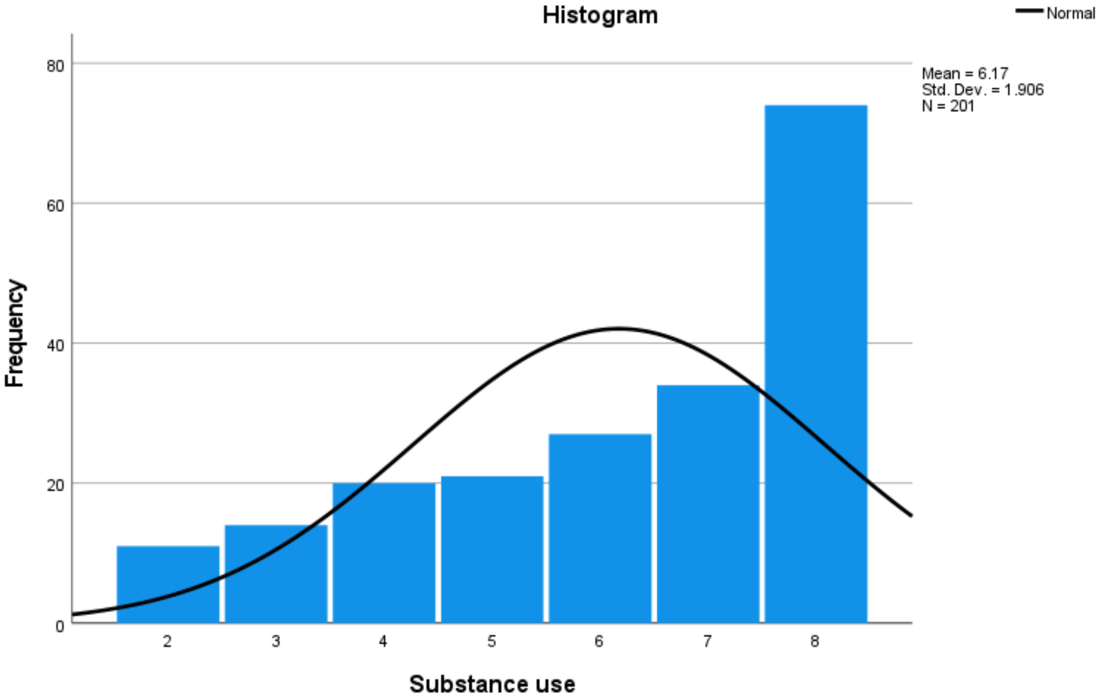


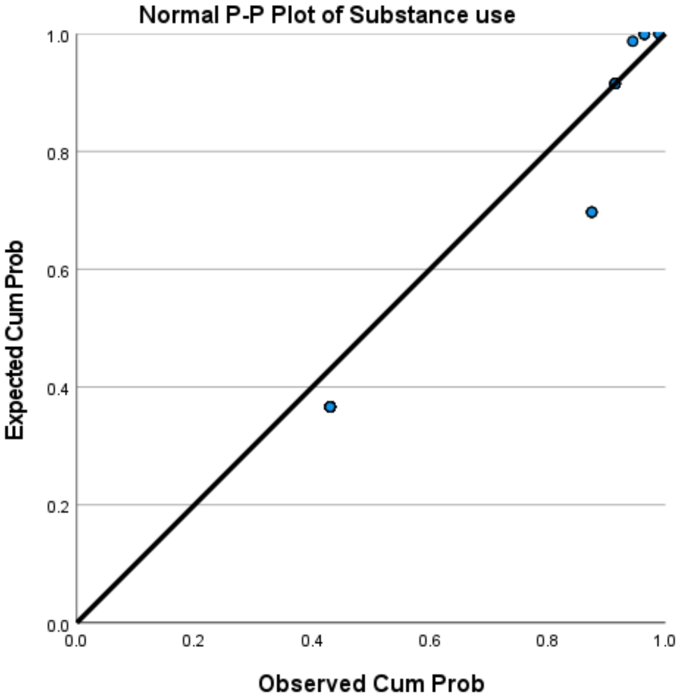
Appendix K: Histogram and P-P plot of the Denial subscale (Brief-COPE)



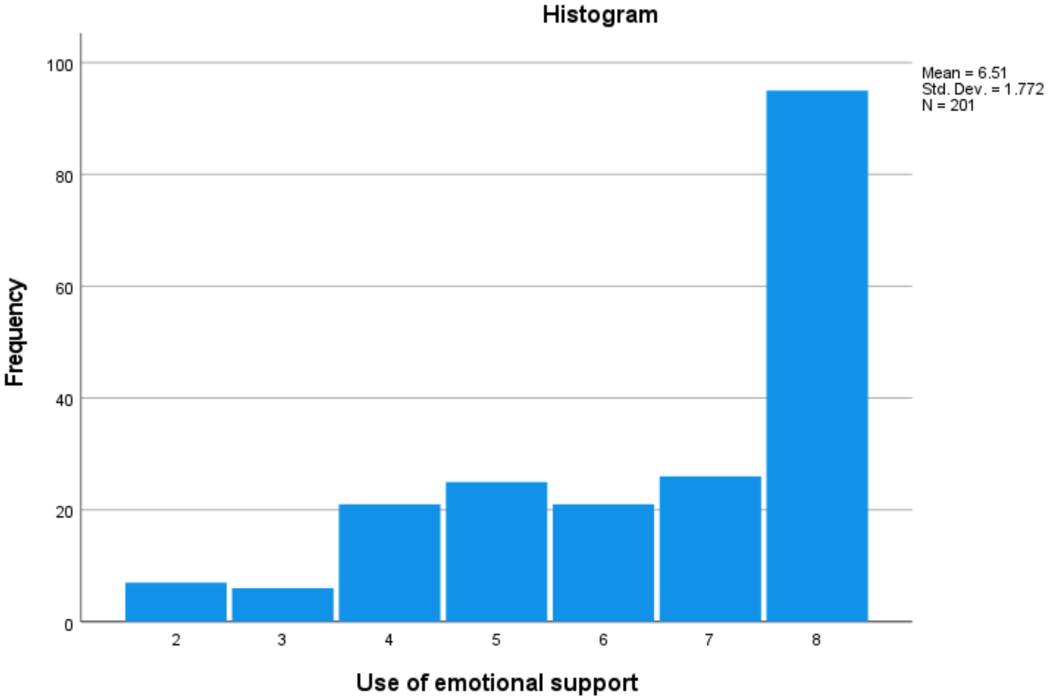


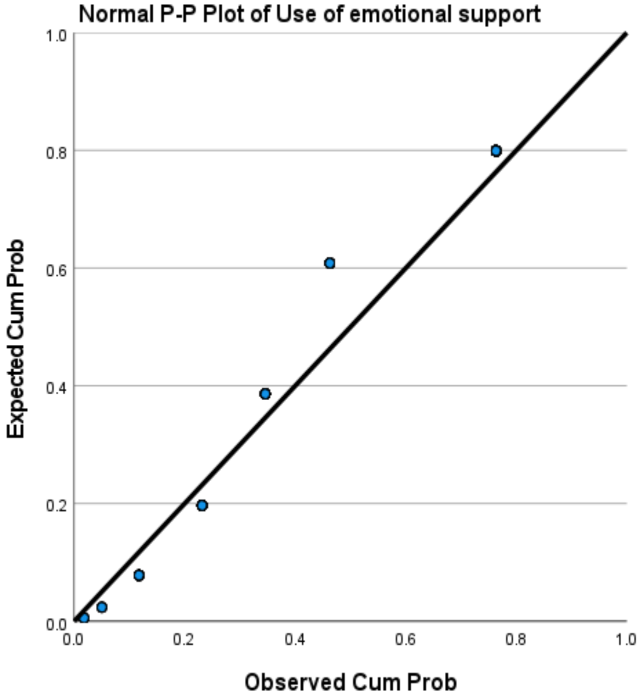
Appendix L: Histogram and P-P plot of the Substance use subscale (Brief-COPE)



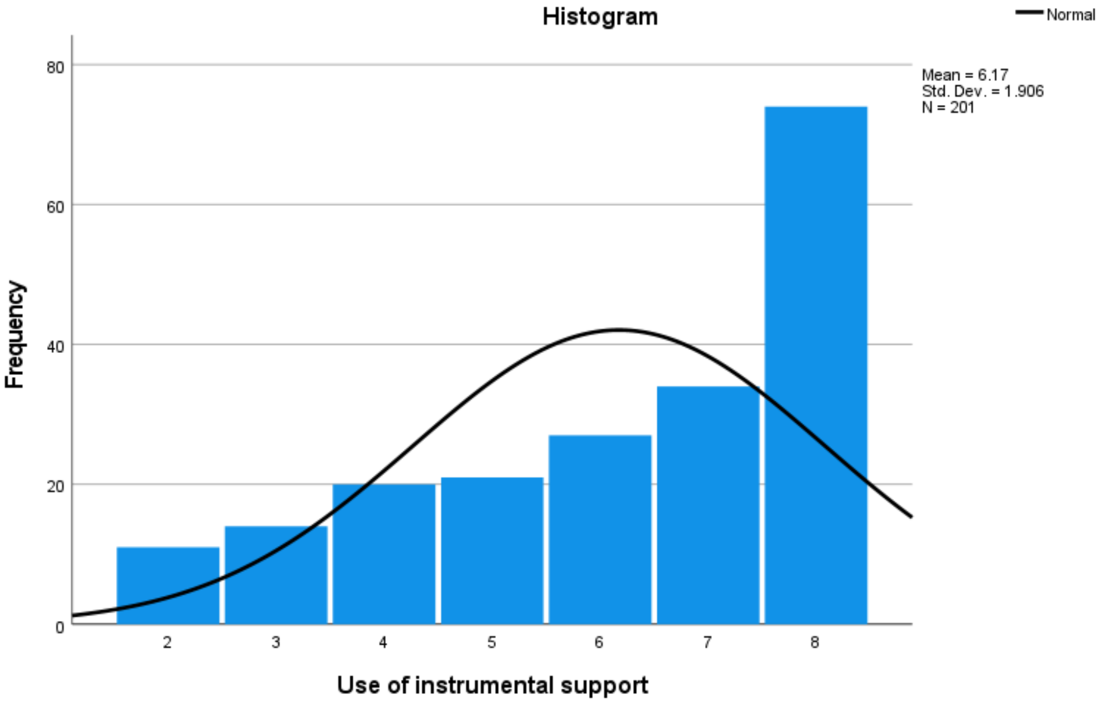


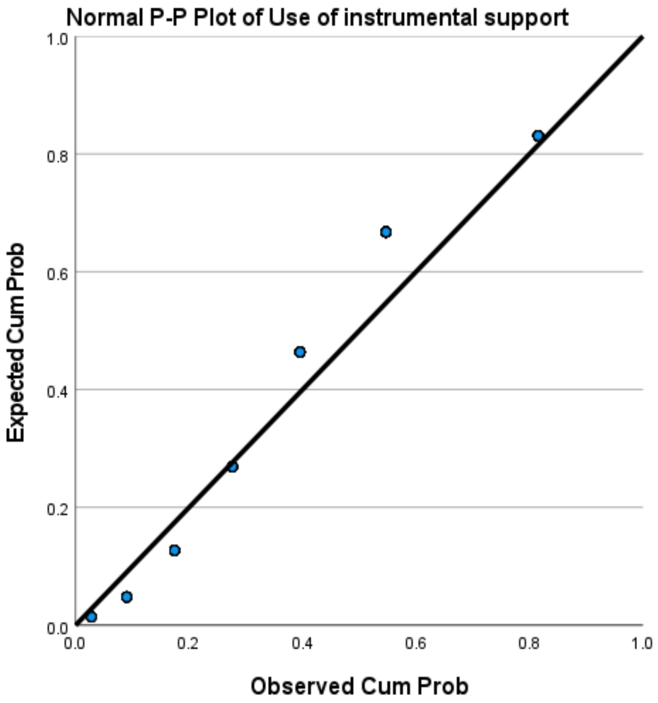
Appendix M: Histogram and P-P plot of the Use of emotional support subscale (Brief-COPE)



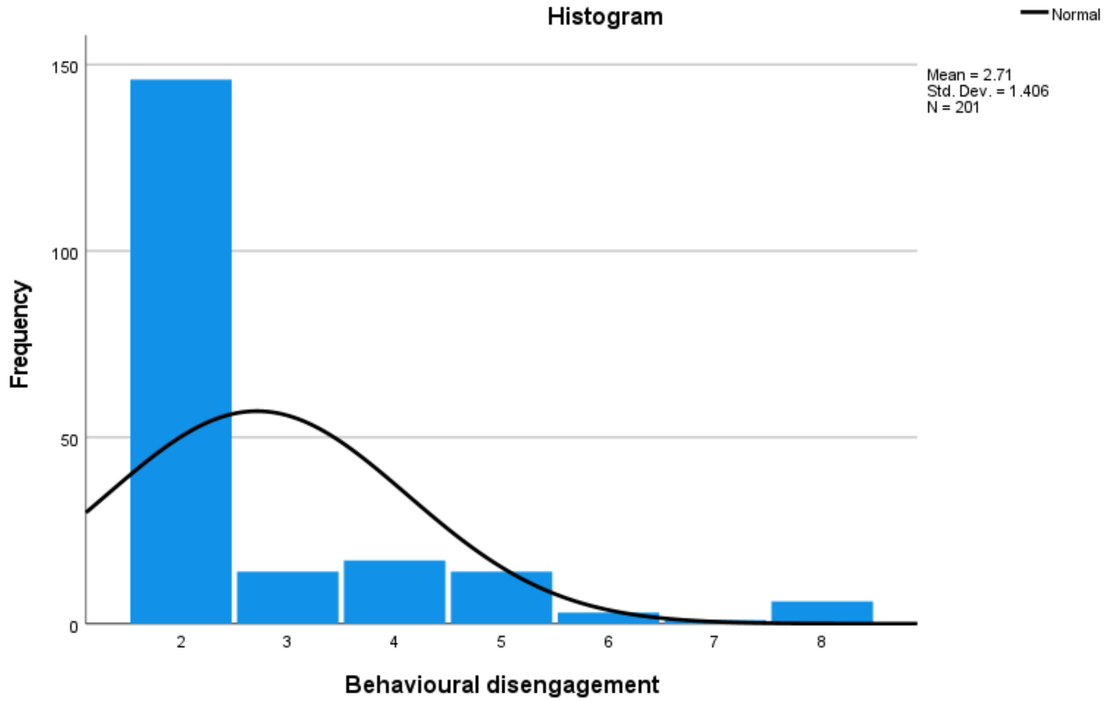


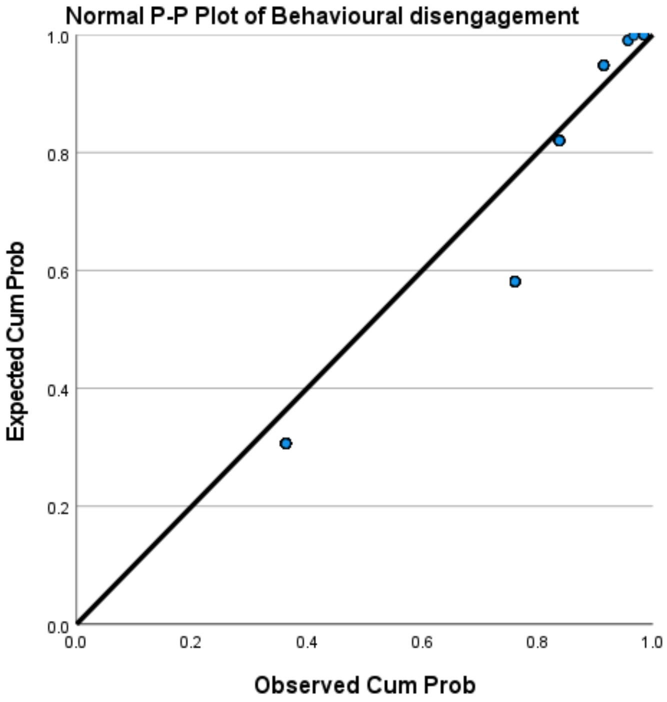
Appendix N: Histogram and P-P plot of the Use of instrumental support subscale (Brief-COPE)



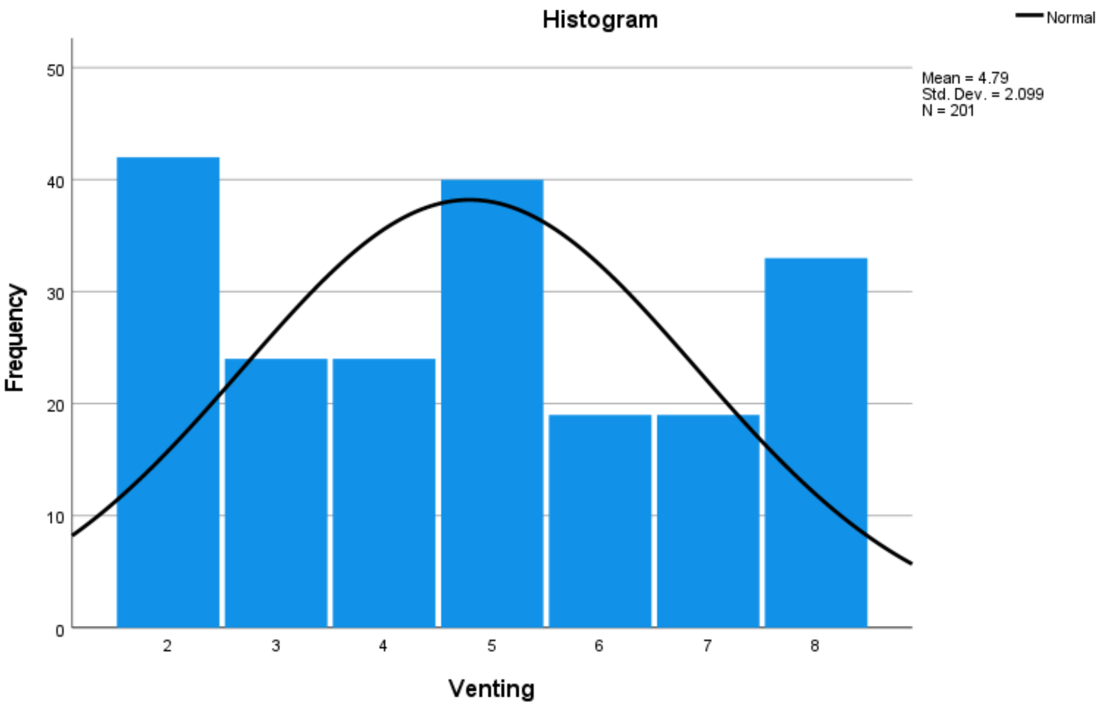


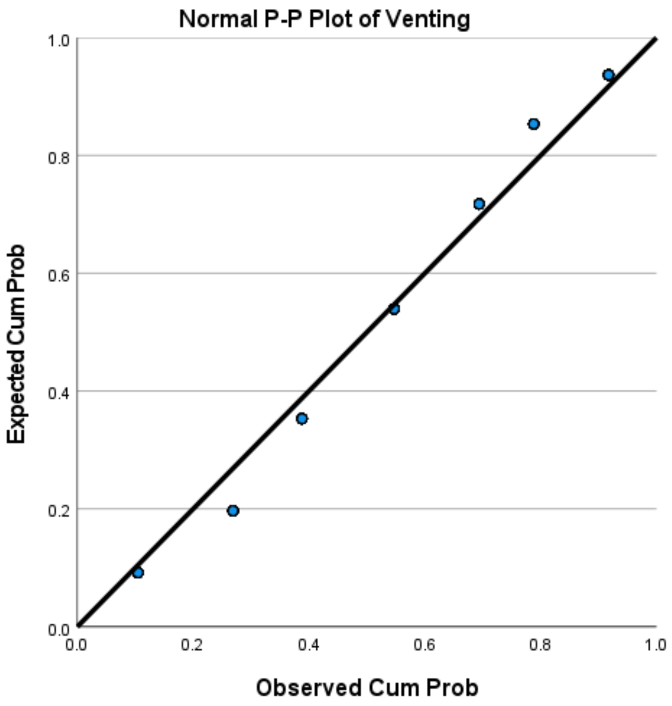
Appendix O: Histogram and P-P plot of the Behavioural disengagement subscale (Brief-COPE)



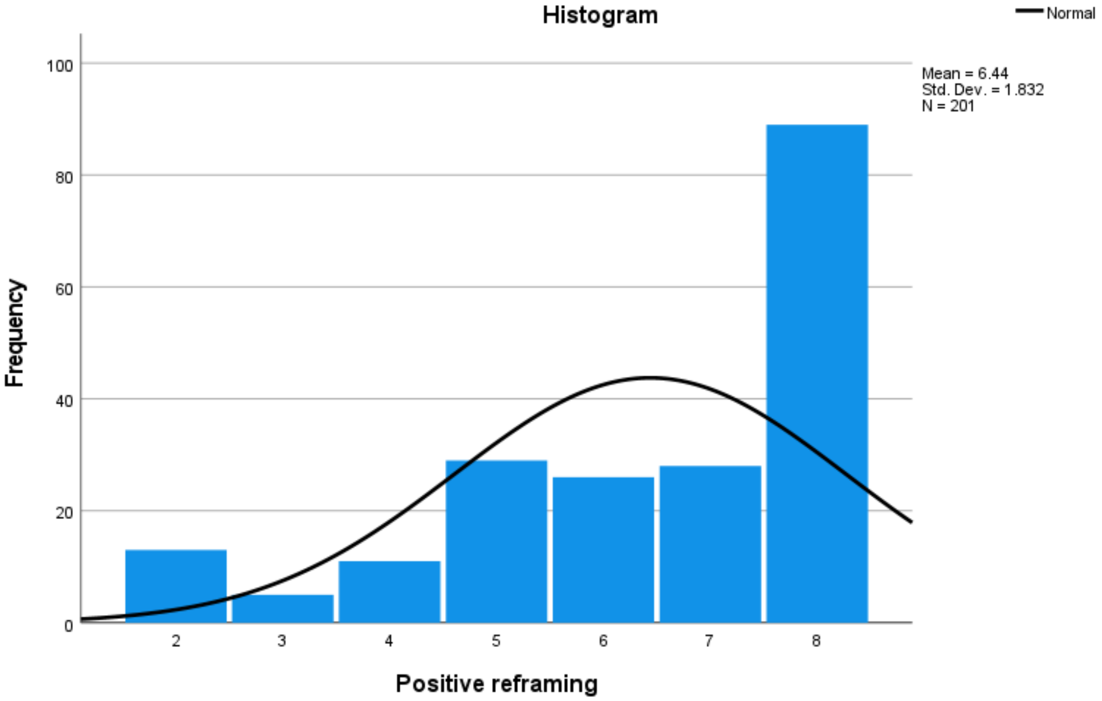


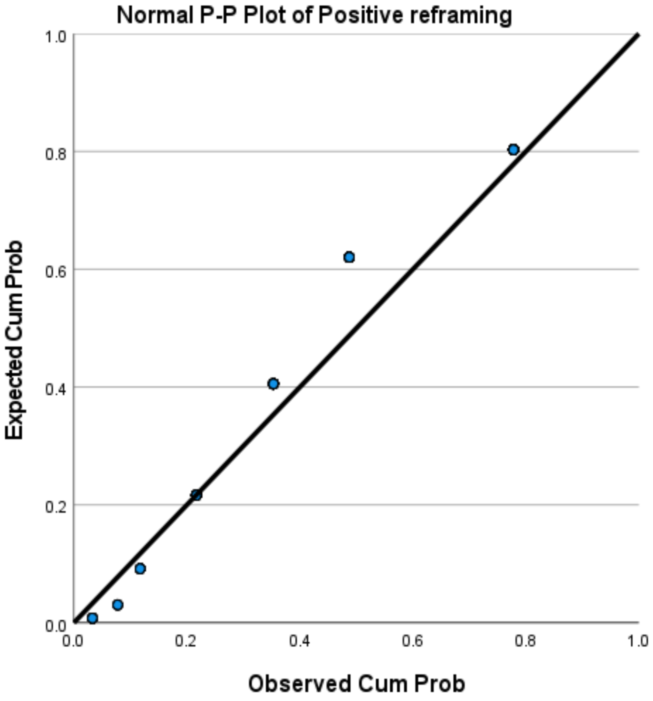
Appendix P: Histogram and P-P plot of the Venting subscale (Brief-COPE)



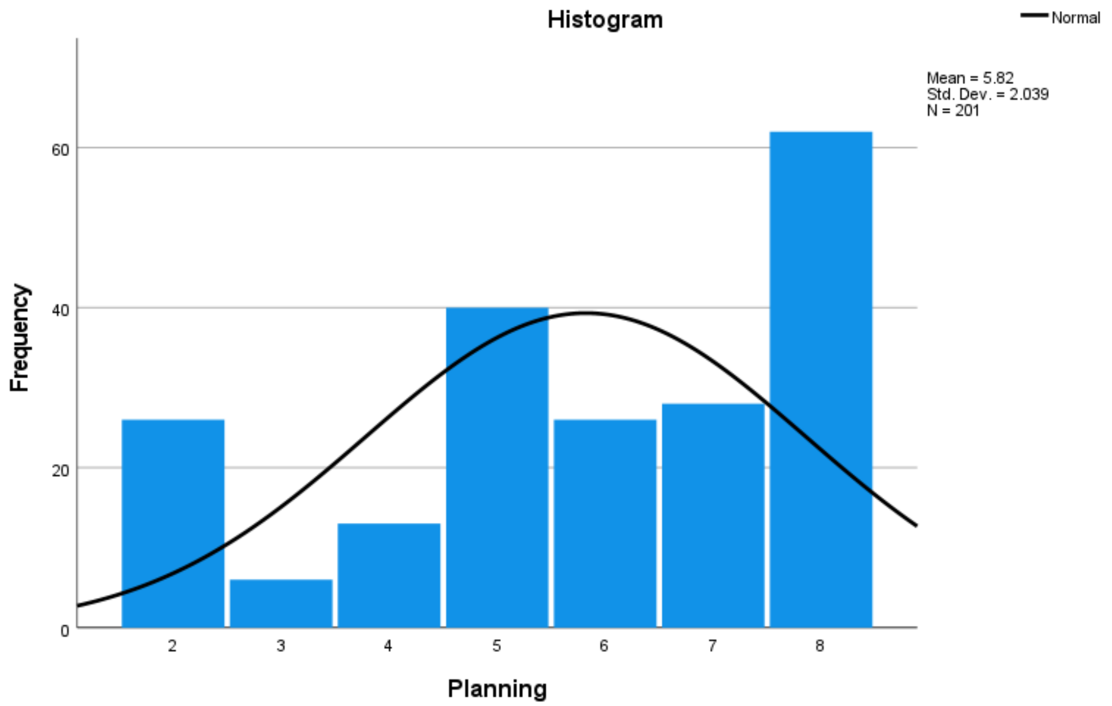


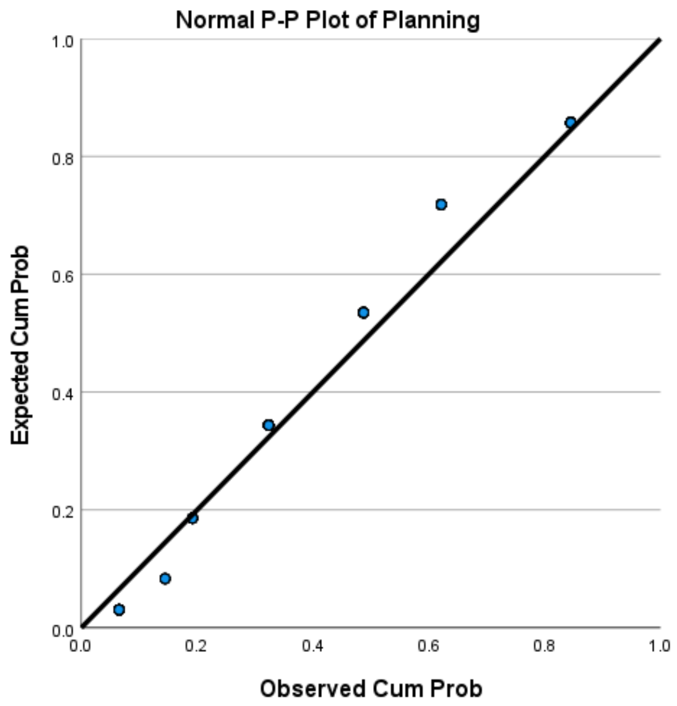
Appendix Q: Histogram and P-P plot of the Positive reframing subscale (Brief-COPE)



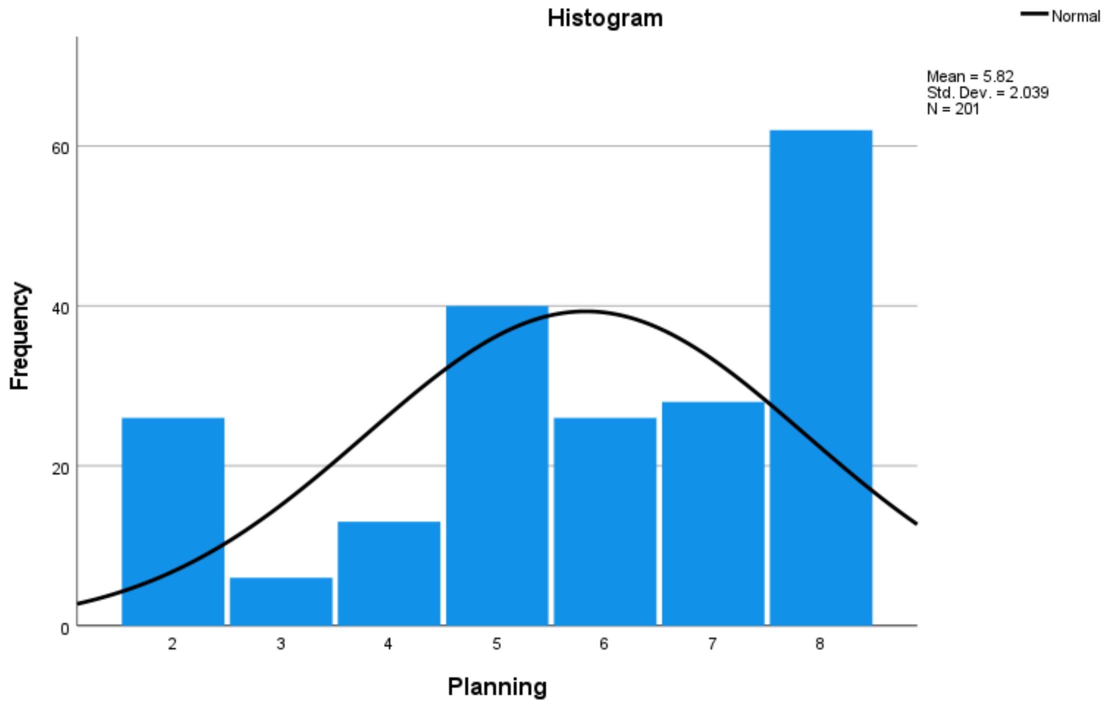


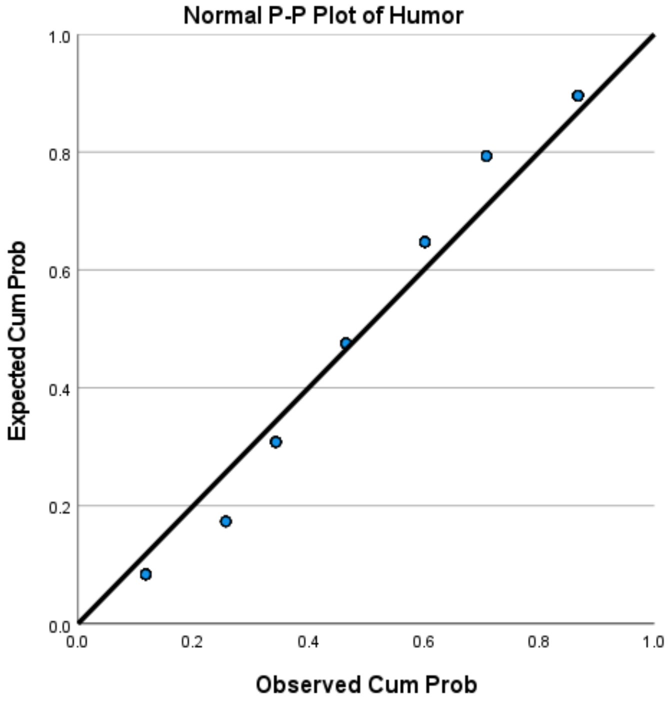
Appendix R: Histogram and P-P plot of the Planning subscale (Brief-COPE)



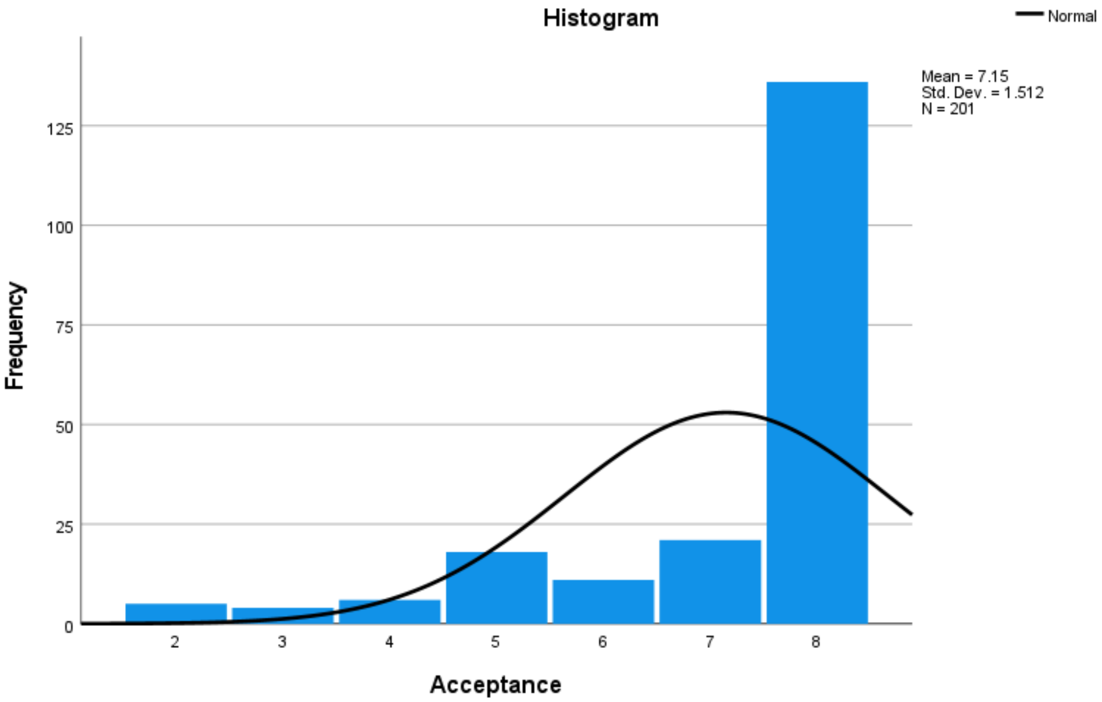


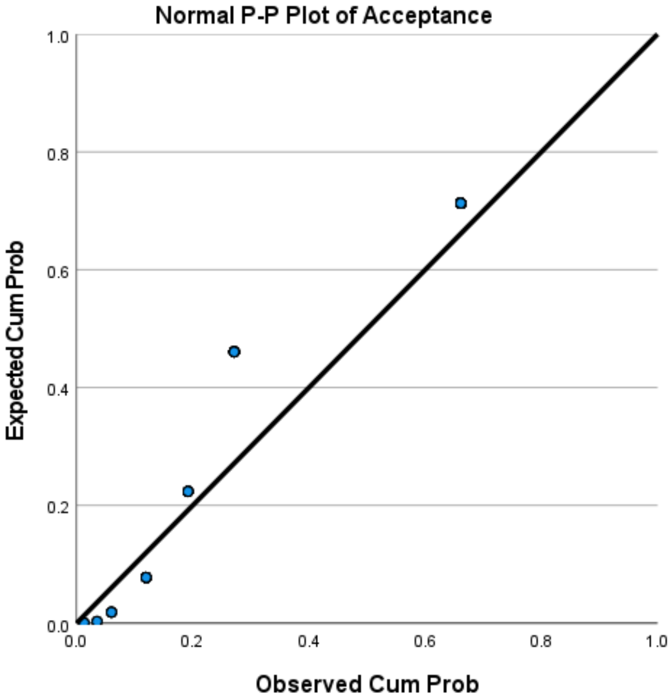
Appendix S: Histogram and P-P plot of the Humour subscale (Brief-COPE)



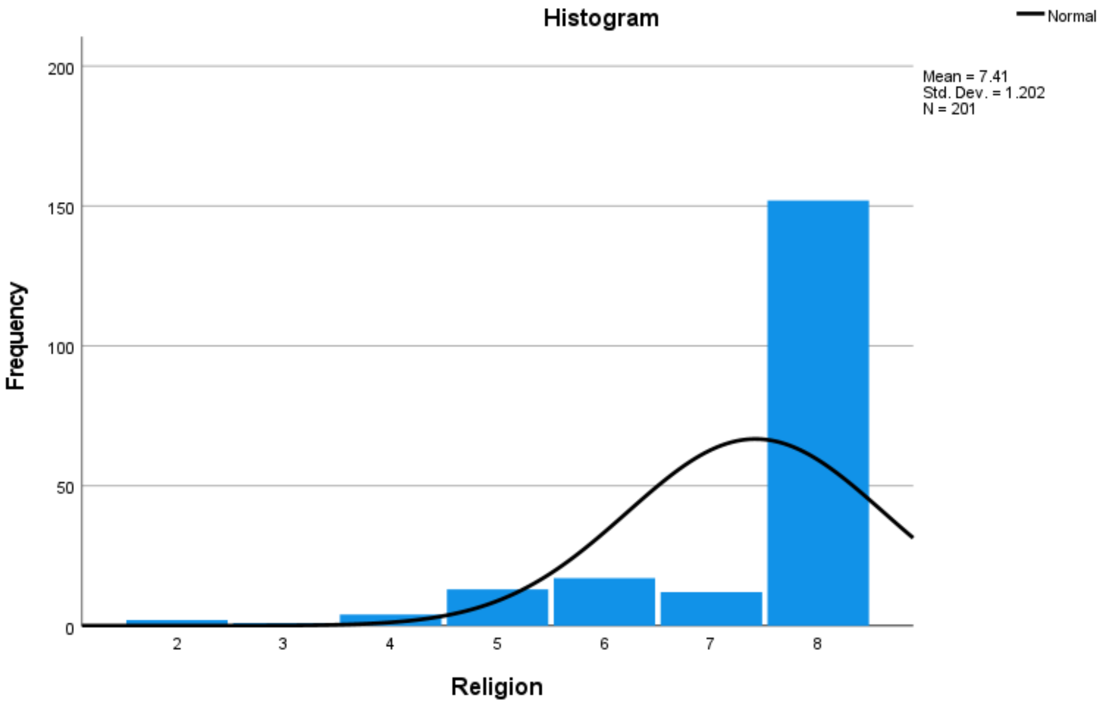


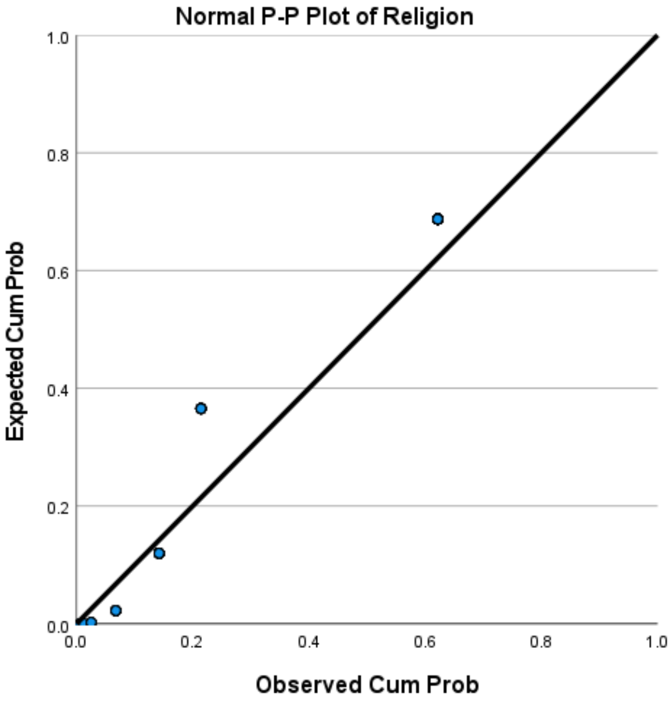
Appendix T: Histogram and P-P plot of the Acceptance subscale (Brief-COPE)



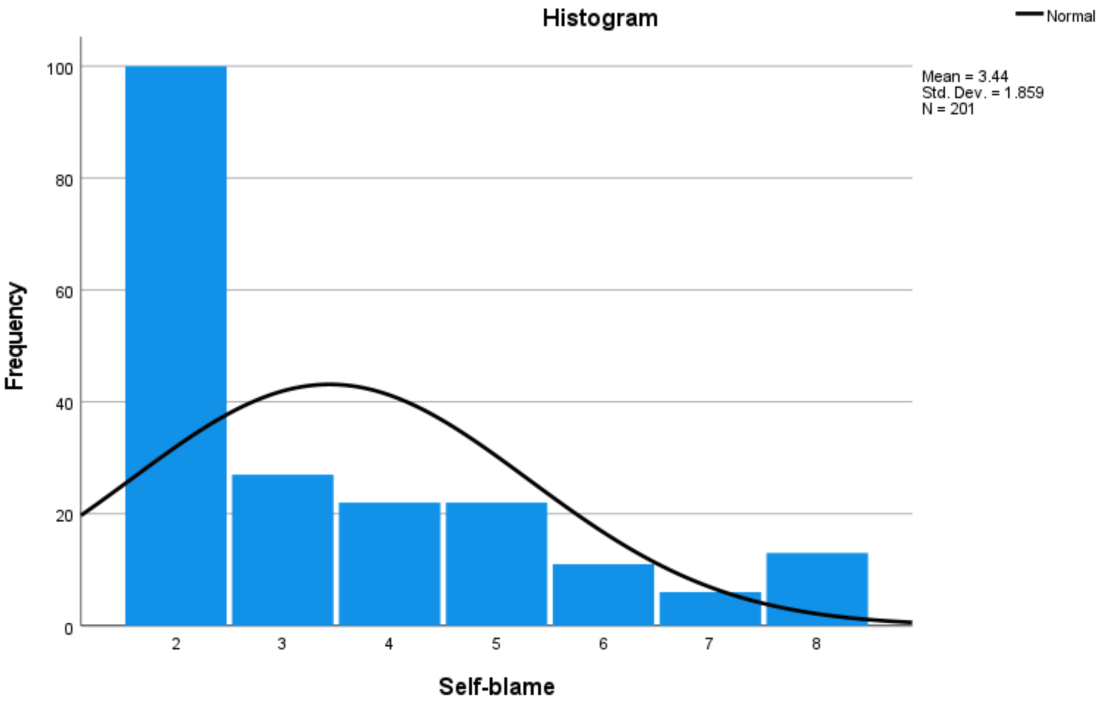


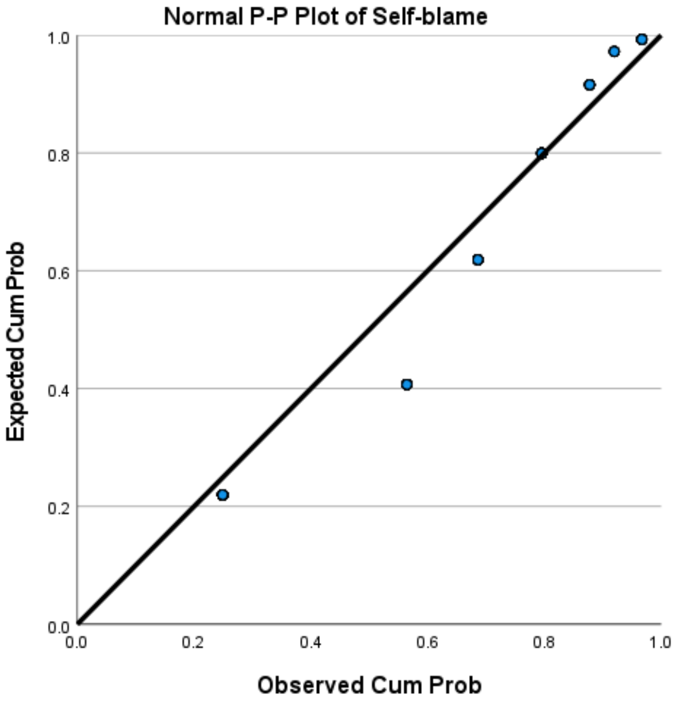
Appendix U: Histogram and P-P plot of the Religion subscale (Brief-COPE)





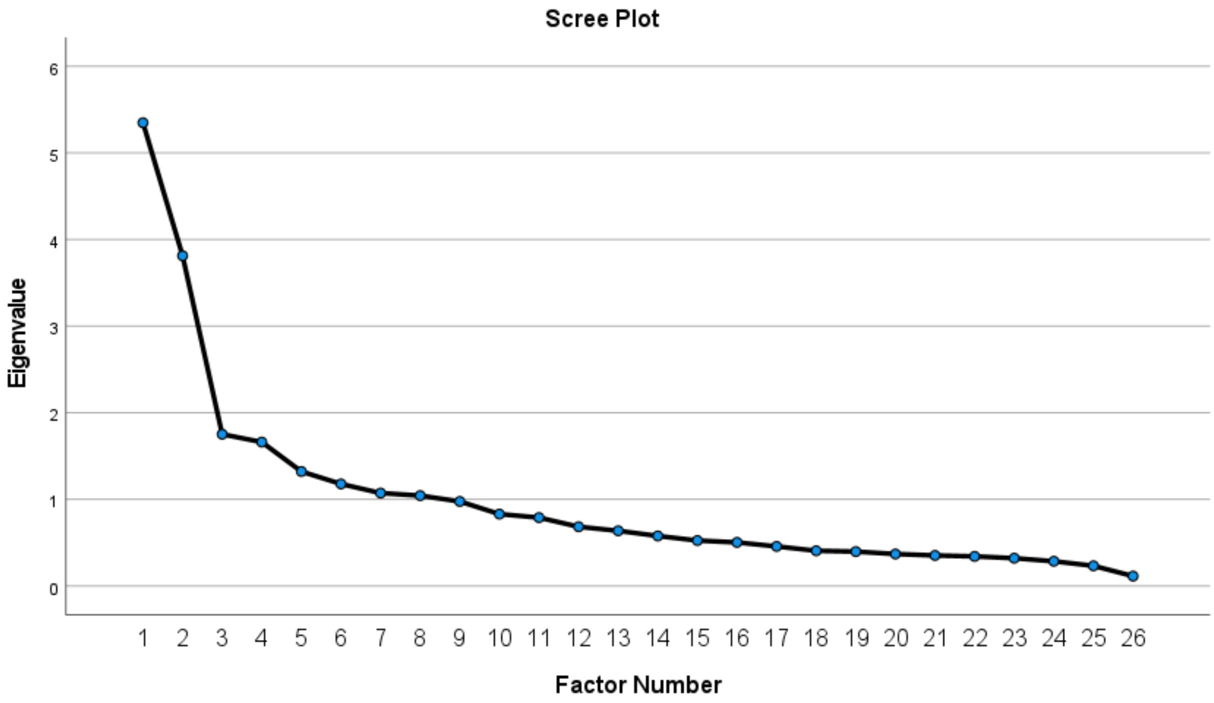
Appendix V: Histogram and P-P plot of the Self-blame subscale (Brief-COPE)



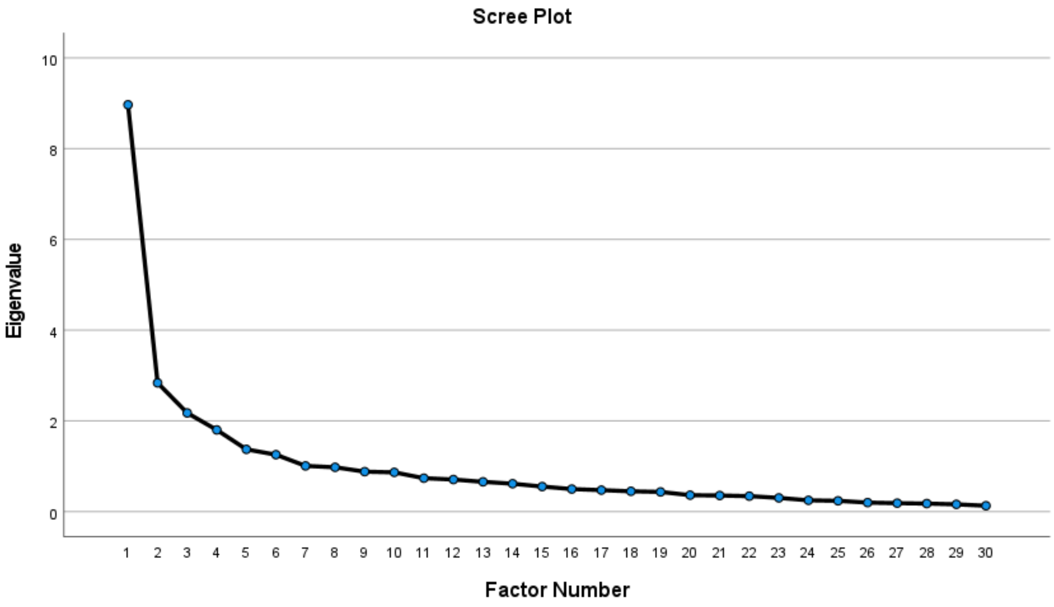


Appendix W: Scree plots of the Brief-COPE and the FACT-B

Brief-COPE



FACT-B

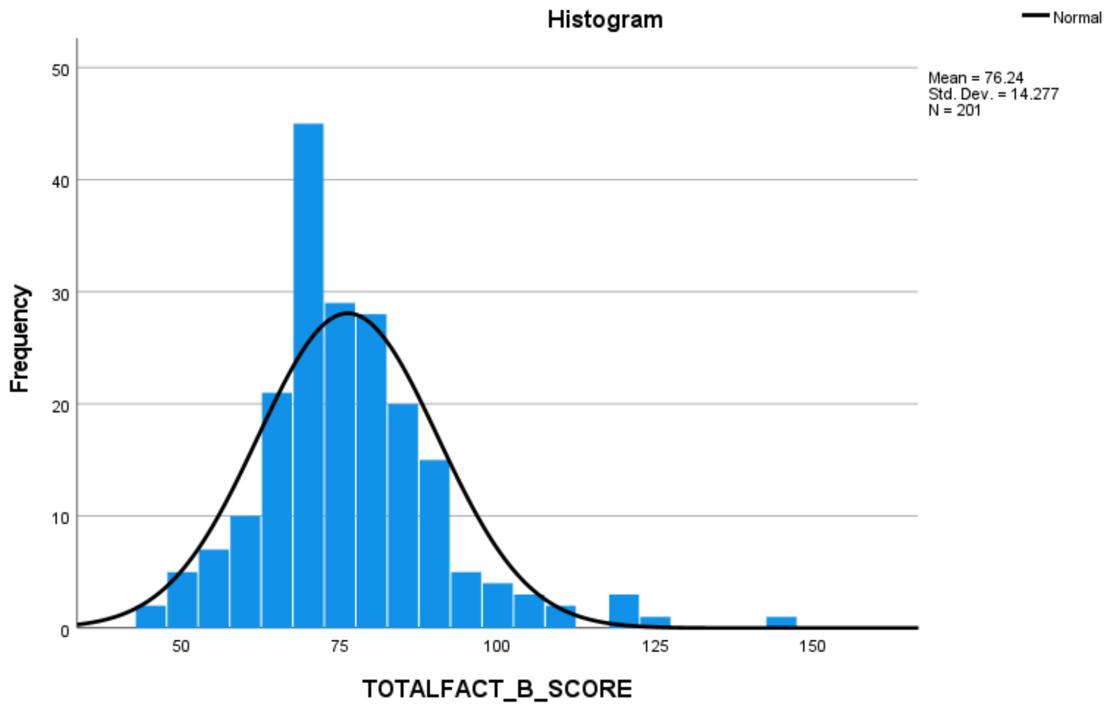


Appendix X: Total variance explained for first 26 factors of the Brief-COPE

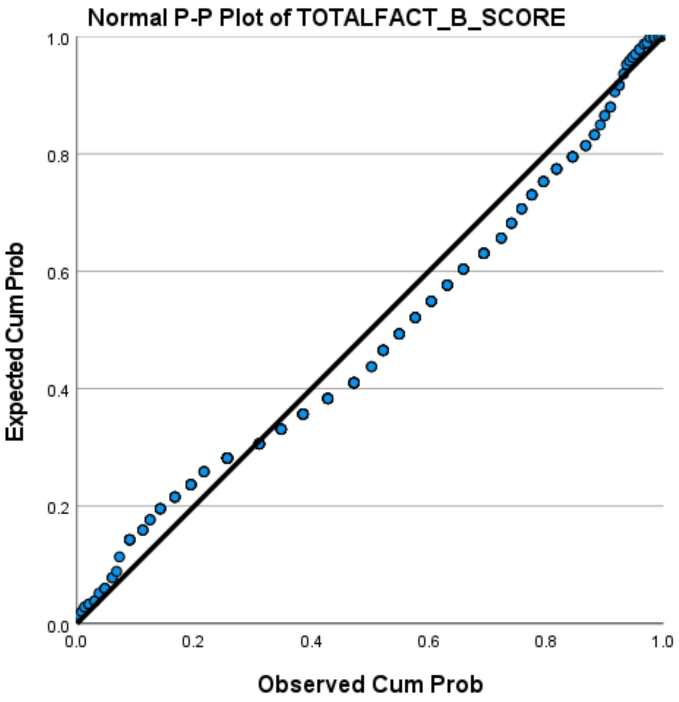
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.348	20.570	20.570	2.492	9.585	9.585	2.604	10.015	10.015
2	3.813	14.665	35.236	1.853	7.126	16.710	2.334	8.977	18.992
3	1.752	6.740	41.975	4.439	17.072	33.783	1.821	7.002	25.994
4	1.662	6.391	48.366	1.883	7.242	41.025	1.695	6.518	32.513
5	1.322	5.085	53.451	1.116	4.293	45.318	1.676	6.446	38.958
6	1.178	4.532	57.983	.736	2.832	48.150	1.516	5.830	44.788
7	1.073	4.127	62.110	.684	2.629	50.779	1.136	4.370	49.158
8	1.044	4.015	66.125	.641	2.465	53.245	1.063	4.087	53.245
9	.976	3.755	69.880						
10	.831	3.195	73.075						
11	.790	3.038	76.113						
12	.684	2.632	78.745						
13	.638	2.453	81.198						
14	.578	2.223	83.421						
15	.525	2.020	85.441						
16	.504	1.937	87.378						
17	.457	1.759	89.137						
18	.407	1.566	90.702						
19	.397	1.529	92.231						
20	.370	1.422	93.653						
21	.353	1.358	95.011						
22	.342	1.316	96.327						
23	.321	1.236	97.563						
24	.286	1.099	98.662						
25	.233	.898	99.560						
26	.114	.440	100.000						

Appendix Y: Histogram and P-P plot of the FACT-B

Histogram: FACT-B



P-P plot: FACT B



Appendix Z: Total variance explained for first 24 factors of the FACT-B

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.001	30.003	30.003	3.658	12.193	12.193	3.903	13.011	13.011
2	2.817	9.392	39.395	6.204	20.681	32.873	3.547	11.824	24.834
3	2.176	7.253	46.648	2.243	7.478	40.351	3.437	11.457	36.292
4	1.799	5.996	52.644	1.556	5.187	45.538	2.174	7.246	43.538
5	1.325	4.416	57.060	1.400	4.666	50.204	1.649	5.496	49.034
6	1.229	4.098	61.158	.762	2.539	52.743	1.103	3.678	52.712
7	1.093	3.644	64.802	.773	2.578	55.320	.783	2.608	55.320
8	.969	3.230	68.032						
9	.932	3.108	71.139						
10	.832	2.773	73.912						
11	.717	2.389	76.301						
12	.701	2.336	78.637						
13	.669	2.230	80.867						
14	.615	2.049	82.917						
15	.553	1.843	84.760						
16	.496	1.654	86.414						
17	.475	1.583	87.997						
18	.449	1.498	89.495						
19	.445	1.482	90.977						
20	.359	1.198	92.175						
21	.359	1.196	93.371						
22	.339	1.129	94.499						
23	.310	1.033	95.533						
24	.250	.835	96.367						
25	.246	.819	97.187						
26	.191	.636	97.822						
27	.185	.616	98.438						
28	.178	.595	99.033						
29	.158	.526	99.559						
30	.132	.441	100.000						