THE BIOPSYCHOSOCIAL EFFECTS OF A PROSTHESIS AND THE ROLES OF PROSTHETISTS IN IMPROVING THE QUALITY OF LIFE OF TRANSTIBIAL AMPUTEES

Submitted in fulfilment of the requirements of the degree of Master of Health Sciences in the Faculty of Health Sciences at the Durban University of Technology

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ABSTRACT

Background: A myriad of physical, psychosocial, and environmental sequelae is associated with the loss of a limb. The prosthesis plays a significant role in restoring the individual's prior level of mobility and functional independence whilst the prosthetist is well-positioned to provide support and improve the amputee's physical health and psychosocial well-being. There is a paucity of South African data focusing on these aspects relating to the quality of life with a prosthesis and the contribution of prosthetists. This study sought to bridge these gaps.

Aim: This study thus aimed to explore the biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees.

Methodology: A qualitative inquiry guided this study. Data were collected using one-on-one in-depth interviews with 14 unilateral transtibial amputees (sample 1) and a focus group discussion with 16 medical prosthetists (sample 2). Participants were recruited from a medical facility under the KwaZulu-Natal Department of Health. Data were thematically analysed.

Findings: Six broad themes and 18 sub-themes emerged from the data. Findings indicated that amputee participants encountered an array of biopsychosocial obstacles ranging from phantom limb pain and guilt to body image anxiety and fear of the future. Resilience, optimism, and strong support networks were facilitators of the adjustment process. Spirituality characterised by praying, reading the holy book, and receiving support from religious organisations were identified as key coping mechanisms by several amputees. Regaining mobility and functional independence were reported as factors that motivated amputees to obtain a prosthesis. The use of the prosthesis improved functional independence, decreased energy expenditure during ambulation, reduced anxiety associated with body image, and enhanced performance of daily activities. The data highlighted that uneven terrains, financial constraints, and high travel costs are potential environmental barriers. Findings indicated that the prosthetist participants encouraged amputees to exercise to improve their physical health, however they lacked sufficient expertise to improve the amputees' psychosocial well-being. Moreover, the prosthetist participants reported that factors such as language

barriers, rotational systems, confined consultation spaces, and unrealistic expectations impeded the efficacy of their services.

Conclusion: The findings suggest that the prosthesis ameliorates several negative physical and psychosocial effects of the amputation. The data emphasizes the areas that require attention regarding the components of a transtibial prosthesis, and interdisciplinary relationships. It is recommended that prosthetists should acquire professional psychology expertise, which will enable them to provide psychosocial support, thereby improving the patient's psychological health. The salience of spirituality and support networks was also brought to the fore. Furthermore, integrating spiritual care in prosthetic services is highly recommended as it has potential to facilitate adjustment to the amputation.

DECLARATION

I, Riyona Chetty, do hereby declare that the information reported in this dissertation entitled: *The biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees* is a record of authentic research carried out by me, under the supervision of Prof. Raisuyah Bhagwan and Dr. Nalini Govender. All sources used or cited have been explicitly acknowledged in the text and reference list provided. No part of this dissertation has been presented previously for the award of any degree qualification, or other purposes at the Durban University of Technology or any other institution.

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DEDICATION

To my angels in Heaven,

Geeva Pillay

26/02/1967 – 10/07/2021

and

Pepper Pillay

05/02/2018 – 28/03/2021

Though you did not get to see this to completion,

you’re in every page

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All Glory to *God* in the Highest.

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As iron sharpens iron, so one person sharpens another. – Proverbs 27: 17

ACRONYMS

CEO	Chief Executive Officer
COVID-19	Coronavirus Disease 2019
DS	Direct Socket
DUT	Durban University of Technology
HOD	Head of Department
HPCSA	Health Professionals Council of South Africa
ICD	International Classification of Diseases
ICF	International Classification of Functioning, Disability and Health
IREC	Institutional Research Ethics Committee
PTB	Patella-Tendon-Bearing
PTSD	Post-Traumatic Stress Disorder
SACH	Solid-Ankle Cushion-Heel
TSB	Total-Surface-Bearing
WHO	World Health Organization
WHOQOL	World Health Organization Quality of Life
WIL	Work-Integrated Learning

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GLOSSARY

Acquired limb absence	An amputation resulting from trauma, malignancy, infection, disease or a neurological disorder.
Activities of daily living	Tasks related to personal care, namely showering or bathing, getting dressed, getting in/out of bed, toilet hygiene, walking, personal hygiene, climbing stairs and eating.
Ambulate	Walk/ move about.
Amputation	The surgical removal of an entire limb, or part of a limb.
Amputee	An individual whose limb has been amputated.
Artificial limb	See *prosthesis*.
Assistive devices	Technology that are manufactured to help disabled and/or elderly individuals perform specific tasks. Examples of assistive devices are mobility aids, prosthetic devices, visual aids, and hearing aids.
Bilateral	Relating to or affecting both sides. In the context of this study, a bilateral amputee is an individual whose both lower limbs or both upper limbs have been amputated.
Biological limb	In humans, the arms and legs naturally attached to the skeleton of the body.

Biopsychosocial	Relating to biological (physical health, disability), psychological (emotions, mental health), and social factors (interpersonal relationships, environment).
Componentry/ components	Elements or parts of something larger. In the context of this study, the components are the different parts that make up the prosthesis such as the socket, interface, pylon, and the prosthetic ankle and foot system.
Congenital	A medical condition present at or before birth.
Contracture	A shortening and stiffening of soft tissue. In the context of this study, a contracture can occur in the soft tissue closest to the point of amputation. Contractures affect joint motion and thus, general mobility.
Diabetes mellitus	A condition in which the pancreas does not produce enough insulin and as a result, sugar levels in the blood are high.
Diabetic neuropathy	A type of nerve damage that can occur in individuals with diabetes mellitus.
Disability	Any condition of the mind or body, present at birth or later in life, that makes it difficult for the individual with the condition to perform certain activities and interact with the world around them.
Dysvascularity	Relating to vascular (blood) disease. In the context of this study, a dysvascular amputation is an

	amputation that resulted from poor blood supply to the limb.
Functional independence	The ability to perform daily tasks and activities without help.
Gait	An individual's pattern of walking.
Gangrene	The death of tissue due to infection or loss of blood supply. Tissue death can occur in the fingers, toes, limbs, organs, and muscles.
Holy book	The sacred book belonging to a certain religious community such as the Bible in Christianity, the Qur'an in Islam, the Torah in Judaism, and the Vedas in Hinduism.
Insulin-dependent diabetes mellitus	Also known as type 1 diabetes. A chronic condition in which the pancreas produces little or no insulin.
Interdisciplinary relationship	The collaborative effort of the members of the multidisciplinary team working together to achieve common goals for the benefit of the patient they are treating.
Leisure activities	Activities, unrelated to occupation, that individuals participate in during their free time such as hiking, swimming, golfing, gardening, shopping.
Limb absence	When the part of a limb or the entire limb is missing as a result of amputation or congenital abnormalities.
Limb loss	See *amputation*.

Lower extremity	See *lower limb*.
Lower limb	All the parts of the body from the hip to the toes, including the thigh, knee, leg, ankle and foot.
Malignancy	Referring to cancer that is spreading.
Mobility aids	Devices designed to assist individuals who have problems moving around, to enjoy a greater level of independence and freedom. Mobility aids include crutches, canes, walking frames, scooters, and wheelchairs.
Multidisciplinary team	A group of healthcare professionals who belong to different medical disciplines and provide specific services to a patient. Members of the team may include prosthetists, physiotherapists, doctors, occupational therapists, social workers, psychologists
Osteomyelitis	An infection in a bone of the body.
Peripheral arterial disease	A type of *peripheral vascular disease* in which the arteries of the lower limbs are narrowed and thus, reduce blood flow from the heart to the legs.
Peripheral vascular disease	An umbrella term for circulation disorders where blood flow to the limbs is reduced.
Poliomyelitis	An infectious viral disease.
Prosthesis abandonment	When the prosthesis-user no longer makes use of the artificial limb.

Prosthesis-user	An individual with limb loss who uses an artificial limb.
Prosthesis	An artificial device that replaces a limb or part of a limb that has been amputated.
Prosthetic device	See *prosthesis*.
Prosthesis-use	The use of an artificial limb.
Prosthetist	A trained healthcare professional treating individuals with amputations by manufacturing prosthetic devices.
Recreational activities	Similar to *leisure activities*. Some of the goals of performing recreational activities are enjoyment, restoration, and to improve well-being. Examples include dancing, exercising, walking, and birdwatching.
Religious organisations	Groupings of believers whose identity derives from a specific spiritual tradition or religion. Examples of religious organizations include temples, synagogues, churches, and mosques.
Residual limb	The part of the limb remaining after an amputation.
Unilateral	Relating to or affecting one side. In the context of this study, a unilateral amputee is an individual whose one lower limb or one upper limb, or a part of one of these limbs has been amputated.

CHAPTER ONE
OVERVIEW OF THE STUDY

1.1. Introduction

The ability to stand, ambulate and run upright on two lower extremities is one of humanity's defining physical characteristics (Farris *et al.* 2019: 1645). Humans are primarily dependent on this ability to navigate their environment (Handford 2018: 1). When a segment of the lower extremity is removed as an unavoidable result of a traumatic event or debilitating disease (Day, Wadey and Strike 2019: 2435; Uytman 2014: 7), the individual's mobility and functional independence is significantly compromised (Boyd 2020: 1; Handford 2018: 1; McDonald 2017: 6).

Lower extremity amputation is a highly impactful, life-changing experience which challenges individuals across the globe (Day, Wadey and Strike 2019: 2435; Washington and Williams 2016: 44). The amputation of the lower limb is a prevalent surgical procedure (Hawkins *et al.* 2014: 763). It accounts for an estimated 31.7 percent of all traumatic amputations worldwide (McDonald *et al.* 2020: 4). Diabetic neuropathy, poliomyelitis, osteomyelitis, dysvascularity, malignancy, motor vehicle accidents, work-related traumas, and infections are the various common indications for lower extremity amputations (Khan *et al.* 2020: 1437; Matos, Naves and Araujo 2020: 2; Grzebień *et al.* 2017: 57; Knežević *et al.* 2015: 103).

Irrespective of the cause, amputation of the lower extremity triggers salient psychological, environmental, vocational, physical, and social sequelae, which may negatively affect the individual's quality of life (McDonald 2017: 6; Gonçalves Jnr., Knabben and da Luz 2017: 98; Knežević *et al.* 2015: 103). Despite the range of challenges associated with adjusting to an amputation, there is potential for psychosocial growth (Flinn 2016: 11; Jefferies 2015: 29; Godlwana and Stewart 2013: 48). A well-designed, patient-specific rehabilitation programme combined with the knowledge, skills and expertise of the multidisciplinary team can help mitigate these challenges (Magnusson 2014: 31; Lusardi, Jorge and Nielsen 2013: 387). An important goal of the rehabilitation process is to restore mobility and balance, which will allow the

individual to adapt to the use of a prosthesis (Karaali *et al.* 2020: 411; Bragaru *et al.* 2011: 722).

While replacing the amputated physical structures, the prosthesis also aids in the restoration of mobility, functionality, and independence and promotion of social integration (Naidoo and Ennion 2019: 95; McDonald 2017: 7). Prostheses are aimed at improving patient satisfaction with regards to mobility, function, control, and comfort which ensures consistency in use and reduces the risk of prosthesis rejection (Al-Adwan *et al.* 2017: 144). In a study conducted in Mumbai, the participants experienced more functional satisfaction while using a prosthesis compared to mobility aids, namely crutches and canes (Sinha, van den Heuvel and Arokiasamy 2014: 119). Moreover, the participants who utilised the prosthesis daily, appeared to be more socially adjusted than those who did not (Sinha, van den Heuvel and Arokiasamy 2014: 119).

To enhance the amputee's adaptation to the prosthesis, the prosthetist who is the healthcare professional primarily responsible for the manufacturing and delivery of the prosthesis to the amputee, plays a critical role (Mackenzie *et al.* 2020: 10). Their assistance during rehabilitation supports positive readjustment after amputation surgery (Uytman 2014: 204). In a recent Australian study, 299 healthcare professionals were surveyed including prosthetic clients, regarding the roles of prosthetists (Mackenzie *et al.* 2020: 13). The data suggests that the prosthetist should be able to discern when a referral to mental health services is necessary, arrange sessions with experienced healthcare professionals to communicate with individuals prior to amputation surgery where possible, and to directly refer to a psychologist if an amputee is struggling to cope post-surgery (Mackenzie *et al.* 2020: 13). Adequate support referrals ensure that amputees receive the necessary services they require to positively adjust to the amputation (Manickum, Ramklass and Madiba 2019: 44).

In an earlier Scottish study, the 13 prosthetists who were interviewed confirmed that their roles include fabricating and delivering the prosthesis, and providing empathetic support for effective communication (Uytman 2014: 158-159). Literature suggests that amputees should be actively involved with their prosthetist in decision-making regarding their prosthesis design (Murray 2013: 520). Understanding the importance of the integration process of the prosthesis in the amputee's life, enhances the rehabilitation process. Extant literature on the role of prosthetists in promoting the

adjustment process of the amputation and prosthesis is limited and warrants further investigation (Uytman 2014: 8).

To date, there is a paucity of literature on the quality of life following limb loss, the advantages and encumbrances of prosthesis-use, and the nature of the patient-prosthetist relationship. There is a growing consensus that these are the research gaps in South African literature (Godlwana and Stewart 2013: 49). From the vantage point of amputees and their prosthetists, this research study sought to understand how the use of a prosthesis and the contribution of prosthetists improve the quality of life of transtibial amputees. The findings are directed towards potentially offering motivation to current and future amputees, heightening the success rates of prosthesis-use, and highlighting the role of the prosthetist in the amputee's life.

This brief introduction outlines the key facets of this study. A discussion of the context, significance and theoretical framework guiding this research study follows. In addition, an overview of the aim, objectives, methodology used, and structure of the dissertation is provided.

1.2. Background of the study

The term "amputation" originated in horticulture, deriving from the Latin translation *amputare*, "to cut away" and from *putare*, "to prune" (Mishra 2014: 1). In ancient times, civilians would use the term "dismembering" until the 17th century when amputation was used equitably in the horticultural and medical fields (Neighbors 2017: 12). This infrequent term became widely popular following the invention of gunpowder (Lawrence 2008: 1065). War became the bolster for modern surgical experience and the management of amputated limbs, followed by industrial and traffic injuries. By the early 1900s, amputation became the primary choice of treatment for several disorders (Lawrence 2008: 1065). To restore mobility and a sense of autonomy, a custom-made prosthetic device can be manufactured, thereby improving the individual's quality of life (Jefferies 2015: 8). A French military surgeon, Ambroise Paré, augmented the use of prosthetics in the early 16th century by surgically creating more functional stumps and designing reasonably sophisticated prosthetic devices (Mishra 2014: 1). The prosthetic profession was established from leather and metal trades as an apprenticeship form of education in Australia and transitioned into a tertiary education

model in the 1960s. Thereafter, the education level progressed from a diploma to a bachelor's and finally to a master's degree. The industry continues to develop and advance with the increasing professional expectations of prosthetists (Mackenzie *et al.* 2020: 10).

An Iranian study found that traumatic injury was the leading cause of amputations (Sarvestani and Azam 2013: 126). Similarly in Malang, trauma was reported as the main cause of lower extremity amputation (Isma *et al.* 2020: 1123). A study done in Kolkata, India found that below-knee amputations were the most prevalent type, with trauma as the dominant causative factor (Ghosh Das and Lahiri 2013: 37). In Germany, diabetes mellitus combined with peripheral arterial disease was reported as the primary cause of amputation (Spoden, Nimptsch and Mansky 2019: 4). In England, approximately 90 percent of the 5000 annual lower extremity amputations performed, were attributed to arterial disease (Ahmed 2014: 483). Rasmussen and colleagues (2016: 123) found that in Denmark, during 1996-2011, 884 lower limb amputations were performed with 50 percent attributed to poorly controlled diabetes mellitus. In recent South Africa literature, complications arising from poorly controlled diabetes mellitus were the primary cause of amputation, followed by atherosclerosis and traumatic events, with transtibial as the most prevalent amputation level (Khan *et al.* 2020: 1437; Manickum, Ramklass and Madiba 2019: 44; Olotu and Anderson 2019: 10).

Globally, diabetes mellitus is a public health concern, with approximately 415 million people affected, as of 2015 (Manickum, Ramklass and Madiba 2019: 41). By 2040, this statistic is expected to reach 642 million. In Africa, approximately 14.2 million individuals were living with diabetes mellitus in 2015. This is expected to project to 34.2 million by 2040 (Manickum, Ramklass and Madiba 2019: 41; Ogurtsova *et al.* 2017: 40). Against this background, amputations may continue to rise. Therefore, it is essential to offer amputees quality service and care to ensure an improved quality of life.

According to the World Health Organization (WHO) (The WHOQOL Group 1998: 1572), quality of life can be defined as one's subjective view of one's own life in the context of the value systems and culture in which they live (Knežević *et al.* 2015: 103). Additionally, the degree to which one is comfortable, healthy, and able to participate in

or enjoy life events also contributes to one's of quality of life. This ambiguous phrase is multipronged, encompassing physical, psychological, spiritual, social, and environmental domains (The WHOQOL Group 1998: 1572). Further, each domain consists of facets that overlap, each contributing to one's comprehensive quality of life.

Research provided evidence on the distinct elements of amputation (Peirano and Franz 2012: 48). Studies in England (Washington and Williams 2016: 44), Serbia (Knežević *et al.* 2015: 106), and India (Srivastava and Chaudhury 2014: 4) reported that amputees experienced feelings of depression, anxiety and having to embrace an altered body image. Social discomfort was identified as another key experience in Manchester (Washington and Williams 2016: 49) and Edinburgh (Uytman 2014: 15). Participants in London (Trevelyan, Turner and Robinson 2016: 70), India (Bhutani *et al.* 2016: 10), and Vojvodina (Knežević *et al.* 2015: 106) reported that phantom limb pain was one of the most prevalent challenges after an amputation.

Further, environmental barriers, financial burdens and poor access to healthcare services were also identified among the factors contributing to altering the amputee's quality of life, particularly in Iran (Abdi *et al.* 2015: 1481) and Vojvodina (Knežević *et al.* 2015: 104). Activity restrictions, loss of independence and unemployment were further challenges faced by the amputees in studies conducted in India (Bhutani *et al.* 2016: 10) and Ireland (Coffey *et al.* 2009: 1066). Similar findings were reported in studies conducted in South Africa, particularly in the Eastern Cape (Manig 2018: 79), KwaZulu-Natal (Ramkisson, Pillay and Sartorius 2016: 4), Western Cape (Yu and Ennion 2019: 3; Ennion and Rhoda 2016: 565; Wing 2017: 84; Maart and Jelsma 2014: 1491), and Gauteng (Godlwana 2015: 133; Godlwana and Stewart 2013: 51; Godlwana 2009: 82).

1.3. The South African context

In a study conducted in Durban, KwaZulu-Natal, approximately 767 lower extremity amputations were performed over a period of five years, with diabetes mellitus being the leading cause (Manickum, Ramklass and Madiba 2019: 41). Notably, only 17.4 percent of the cohort were subsequently referred to physiotherapy for rehabilitation, of which 81.9 percent attended same. Eight percent completed their rehabilitation therapy exploring the use of a prosthesis and crutches (Manickum, Ramklass and Madiba

2019: 41-43). There is a dearth of recent studies on lower limb amputations in South Africa.

In addition, there is a paucity of South African literature focusing on the specific domains of the quality of life of lower extremity amputees who utilise a prosthesis and their satisfaction with the device (Godlwana and Stewart 2013: 48; Godlwana, Stewart and Musenge 2012: 17; Godlwana 2009: 3). According to Amputee Coalition (2020: para 1 line 5), several amputees present with depressive symptomatology but do not receive psychological intervention. The prosthetist is essential in preparing the amputee to deal with the emotional and social effects of amputation as well as to guide them to receive suitable care (Mackenzie *et al.* 2020: 15; Manickum, Ramklass and Madiba 2019: 44). Various programmes must be designed and implemented to assist prosthetists to be proactive in improving their patients' psychological and social health (Amputee Coalition 2020: para. 2 line 4).

An amputation is not solely the loss of a limb; it may also be accompanied by unemployment, exorbitant medical bills, and unbearable pain (Abdi *et al.* 2015: 1481; Godlwana, Nadasan and Puckree 2008: 8), coupled with the loss of independence (Boyd 2020: 1). In Section 27 of The Constitution of the Republic of South Africa (South Africa, Department of Justice 1996: 11), the right to access healthcare services is assured. However, due to poor access to healthcare services, inconsistencies in resource provision remain (Naidoo and Ennion 2019: 102), leading to several individuals not receiving the prosthetic services they are entitled to. Environmental barriers comprise lengthy travelling distances especially from rural areas, exorbitant travel costs (Harris *et al.* 2011: S103), costly healthcare service fees, and long queues (Naidoo and Ennion 2019: 98; Schneider *et al.* 2010: 141). Many civilians, specifically uninsured individuals and rural citizens, are unable to afford the healthcare they require or are entitled to (Naidoo and Ennion 2019: 96). Poor healthcare access amongst amputees results in poor work performance and a reduced lifespan (Shakespeare and Officer 2014: 1). This is also accompanied by limited provision of assistive devices to amputees residing in rural areas and the subsequent lack of assistive devices being adapted to rural environments. The use of assistive devices allows individuals with limb loss to actively participate in society (Naidoo and Ennion 2019: 100).

It is against this background that the researcher sought to explore the experiences of prosthesis-users. Exploring and understanding the difficulties and facilitators of prosthesis-use and the patient-prosthetist relationship, enabled the researcher to contribute to the body of knowledge, make recommendations that may help to improve amputees' quality of life, and offer some solutions to existing problems. Indeed, it is only when we have performed some kind of "diagnosis" that we can offer realistic solutions to the problems in question. In the case of transtibial amputees in KwaZulu-Natal Province, who are regularly utilising their prosthesis, understanding their experiences as well as identifying the key elements of a strong patient-prosthetist relationship are the very first steps in addressing the problem.

1.4. Problem statement

Global and local literature provide evidence of a diversity of physical, environmental, social, and psychological circumstances attached to losing a limb (Hafner *et al.* 2021: 1; Karaali *et al.* 2020: 411; Naidoo and Ennion 2019: 98; Yu and Ennion 2019: 3; Davie-Smith *et al.* 2017: 545; Washington and Williams 2016: 44; Flinn 2016: 11; Trevelyan, Turner and Robinson 2016: 70; Knežević *et al.* 2015:105; Uytman 2014: 7; Godlwana 2009: 3). Individuals with limb loss require care and patience from both the multidisciplinary team and their personal support system. The changes associated with this adjustment affect the amputee's quality of life and the successful use of a prosthesis (Jeffries 2015: 24; Godlwana and Stewart 2013: 48).

A plethora of international research studies have highlighted the psychological and physical effects of amputation (Washington and Williams 2016: 44; Trevelyan, Turner and Robinson 2016: 70; Uytman 2014: 7; Kalra 2013: 376; Unwin, Kacperek and Clarke 2009: 1044; Desmond and MacLachlan 2002: 19). Further, an exploration of environmental barriers and facilitators, the role of spirituality, vocational return, and social integration post-amputation and with the prosthesis is lacking in recent global literature. These are also the research gaps in South African literature (Godlwana and Stewart 2013: 49). In addition, there is a dearth of evidence concentrating on the motivations to choose a prosthesis and the successful use of it thereof, and the pivotal role a prosthetist can play to help understand and diminish the psychological and physical challenges faced by amputees.

This study concentrated on providing a deep understanding of the quality of an amputee's life that rely on the prosthesis by critically exploring the several domains encompassing it from the vantage point of individuals with limb loss. The primary intention of this study was to explore the effects of a prosthesis on the quality of life of amputees and to provide pertinent recommendations for prosthetists that will enable them to provide quality care to their patients. This may subsequently enhance patient adherence to prosthesis-use and improve quality of life.

1.5. Aim of the study

This study aimed to explore the biopsychosocial effects of a prosthesis and the contribution of prosthetists in improving the quality of life of transtibial amputees.

1.6. Objectives of the study

The objectives of this study were as follows:

1. To explore the biopsychosocial and spiritual effects of an amputation on individuals post-surgery.
2. To understand what motivated amputees to consider the use of a prosthesis.
3. To explore the challenges and benefits transtibial prosthetic users experience in their daily lives.
4. To explore the ways in which the prosthetist may be able to improve the holistic well-being of the amputee.

1.7. Research questions

The research questions for this study were as follows:

1. What are the biopsychosocial and spiritual effects of an amputation on individuals post-surgery?
2. What factors motivated amputees to consider the use of a prosthesis?
3. What are the challenges and benefits that transtibial prosthetic users experience in their daily lives?

4. What are the ways in which the prosthetist is able to improve the holistic well-being of the amputee?

1.8. Significance of the study

Quality of life comprises several domains, namely physical, psychological, environmental, social, and spiritual. The physical and psychological impediments of a lower limb amputation have been widely researched (Roșca et al. 2021: 2; Zhu *et al*. 2020: 3; Varga and Gallagher 2020: 187; Paul 2018: 2; Amoah et al. 2018: 2; Godlwana and Stewart 2013: 50; Unwin, Kacperek and Clarke 2009: 1044). However, there is a paucity of local and international data regarding the environmental and social effects, as well as the role of spirituality post-amputation. This study seeks to close the gaps in literature by exploring how amputation is affected by each domain and how the prosthesis and prosthetist assist in mitigating the impediments to enhance the individual's quality of life.

An exploration of the reasons surrounding prosthesis dissatisfaction or abandonment of same will illuminate the core areas necessitating improvement with the use of a prosthesis, thereby enriching patient satisfaction and warranting successful prosthesis-use. By exploring the factors that encourage amputees to choose and frequently use a prosthesis, healthcare professionals will be able to use these factors to motivate and inform current non-prosthetic wearers and future amputees. From the angle of the individual with limb loss, evidence of these factors in the literature is notably under-explored.

Several studies indicate the dire need of effective communication between the patient and prosthetist (Murray 2013: 516; Pezzin *et al.* 2004: 728; Uytman 2014: 158). Gaining an understanding of the constituents attached to limb loss and successful integration of the prosthesis from the vantage point of the amputee. Further, it will assist prosthetists in the dissemination of relevant information pre- and post-operatively regarding the prosthesis, the patient's expectations and goals, as well as any other aspect of vital concern to the patient. Furthermore, this comprehensive understanding will assist the prosthetist to acknowledge the importance of referrals (Manickum, Ramklass and Madiba 2019: 44), to efficaciously provide quality patient care to individual's with limb loss and to improve accessibility of their services in rural

areas (Ennion, Johannesson and Rhoda 2017: 460; Ennion and Rhoda 2016: 565). Each of the aforementioned factors will contribute to the quality of life of amputees and assist prosthetists in improving their clinical expertise, thereby allowing prosthetists to establish a good rapport with patients.

1.9. Definition of concepts

The key concepts of this study were a transtibial amputation, the prosthetist, a prosthesis, quality of life, and spirituality. The following are definitions of these concepts:

1.9.1. Transtibial amputation

A transtibial or below-knee amputation involves the surgical removal of the entire ankle joint and foot, the distal tibia and fibula with associated soft tissue structures (Pezzin *et al.* 2004: 724). Intraoperatively, these two major lower extremity bones are surgically divided and only a healthy knee joint is preserved (Grzebień *et al.* 2017: 58). The benefits of knee preservation include aid in balance, pushing forward, slowing down, and maintaining the ability to lift and lower oneself when utilising the prosthesis (Brown and Attinger 2013: 30; Robbs 2010: 164).

A transtibial amputation accounts for approximately half of all lower extremity amputations. The main indications for this amputation level are trauma and significant infections with the risk of sepsis and systemic infection (O'Keeffe and Rout 2019: 134; Flinn 2016: 10). Other indications include congenital conditions, malignant tumours, peripheral vascular disease (Khan *et al.* 2020: 1437; Davie-Smith *et al.* 2017: 537), non-healing ulcers, and chronic pain (Grzebień *et al.* 2017: 58).

1.9.2. Prosthetist

A prosthetist can be defined as the primary allied healthcare professional (Mackenzie *et al.* 2020: 10; Mduzana *et al.* 2020: 2), that has completed an official teaching and training course (Magnusson 2014: 3). Furthermore, a prosthetist is accredited by an appropriate national authority to clinically assess patients (Mduzana *et al.* 2020: 2),

and design, manufacture and fit an artificial limb, which is known as a prosthesis. A prosthetist is capable of providing services independently as a private practitioner or practising as a clinician, expanding and managing a clinic or laboratory (Mduzana *et al.* 2020: 2). The prosthetist, therefore, becomes the central figure for an amputee in their further physical rehabilitation (Össur 2017: 13), where they set realistic goals and create rehabilitation plans inclusive of prosthetic or orthotic services and clinical outcome measures (Mduzana *et al.* 2020: 2).

1.9.3. Prosthesis

A prosthesis (plural: prostheses) is an enabling and adaptive entity (Jefferies 2015: 4) manufactured to reduce impairment, rehabilitate, provide optimum comfort (Magnusson 2014: 15), reduce weight, and enable increased function, usage and appearance for the user (Brunelli *et al.* 2020: 2) by taking the place of a segment of or the entire biological limb/s (Padi, Mukundan, and Subramani 2017: 20; Jefferies 2015: 8). The prosthesis may be used to restore function or provide function if the aetiology for limb absence is acquired or congenital, respectively (Jefferies 2015: 8). Primarily, a prosthesis is designed to imitate prior muscle and joint function of that which has been amputated (Flinn 2016: 8). Prostheses may even enhance performance to exceed prior abilities. A prosthesis can either be a tool to improve life or be a corporeal object (Flinn 2016: 8).

1.9.4. Quality of life

As defined by the World Health Organization (1996: 3), quality of life reflects “individuals’ perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.” This subjective definition can be used to explore the effects of conditions, diseases, or health interventions on an individual’s quality of life. Terms equated with quality of life include health status, well-being, mental state, lifestyle, and life satisfaction. Quality of life is multidimensional because it encompasses numerous domains, namely physical health, psychological health, social relationships, the environment, and spirituality.

1.9.5. Spirituality

Despite the efforts by several writers and theorists to create a definition of spirituality, it remains elusive in medical literature (Memaryan, Rassouli and Mehrabi 2016: 1). A proposed definition is that spirituality is a cognitive approach which endeavours to "give meaning to life, to set values, and sometimes to seek transcendence, resulting in a spiritual identity" (Agli *et al.* 2018: 268). Pargament and Mahoney (2005: 185) stated that spirituality is the search for a higher power, God, or manifestations of God imbued with divine-like characteristics, namely ultimacy, transcendence, immanence, and boundlessness. Furthermore, it is connecting with oneself, other individuals, nature, music, art, literature and/or a higher power which enables one to experience and incorporate purpose and significance in life (Gardner, Tan and Rumbold 2018: 198-200).

1.10. The conceptual framework

If a researcher considers that a research problem cannot be substantially described using a single theory or concepts within a single theory, several related concepts can be synthesized to clarify or predict an event or provide a critical understanding of a phenomenon or research problem (Imenda 2014: 189). This essentially defines a model or conceptual framework. A conceptual framework provides the visual representation of how ideas, key factors or concepts relate to each other with respect to the phenomenon being studied (Grant and Osanloo 2014: 17). The perspective which the researcher decides to inquire into, interpret or expound events or behaviours of the participants or events s/he is studying, constitutes a theoretical or conceptual framework (Imenda 2014: 188).

The quality of life of the prosthesis-user was positioned at the core of this study. Therefore, the facets of each domain of quality of life played a crucial role in determining the most accurate conceptual model to guide this study. The facets incorporated in each domain of quality of life are illustrated in Figure 1.1.

Figure 1.1: The different facets incorporated in each domain of quality of life, as described by the World Health Organization (1996: 5) (adapted from The WHOQOL Group 1998: 1572)

1.10.1. The International Classification of Functioning, Disability and Health

This research study was guided by The International Classification of Functioning, Disability and Health (ICF), which is a universal language and conceptual foundation for the description and measurement of disability. The WHO developed the ICF in 2001 and significantly improved it, over the years until 2013, after critical consideration of research studies and experiences. The ICF is a multidimensional model which can be used as a powerful tool for research in the health sector, among other various purposes and uses in several different sectors (World Health Organization 2013: 1).

The ICF is a “bio-psycho-social synthesis” since it was developed by the integration of the two main disability models: the medical model and social model (World Health Organization 2013: 5). The framework can be used to arrange and document material on disability and functioning. The ICF conceptualises functioning, in the context of health, as a dynamic relationship between an individual’s health condition, environmental factors and personal factors. The ICF definitions and categories are worded objectively to allow for both positive and negative aspects of functioning to be recorded (World Health Organization 2013: 5).

The ICF model (Figure 1.2) is structured in two parts, which are further sectionalised (World Health Organization 2013: 7):

Part 1- Functioning and Disability:

- Body functions and body structures
- Activities and participation

Part 2- Contextual Factors:

- Environmental factors
- Personal factors

It is critical to note that the data respective to the above-mentioned entities must be collected independently and then explored for relationships between them (World Health Organization 2013: 7).

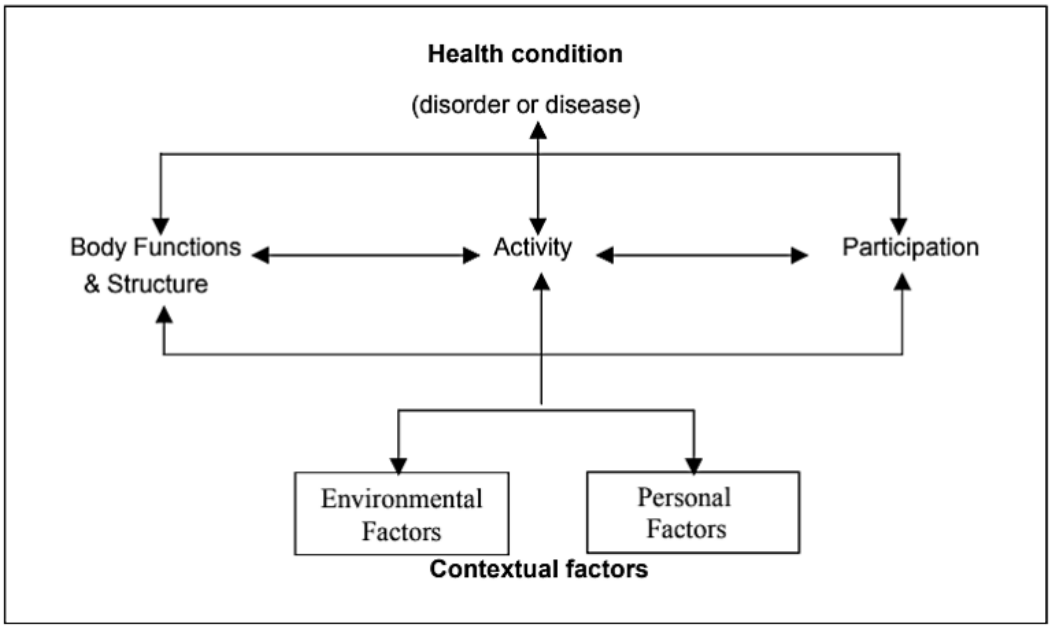

Figure 1.2: The International Classification of Functioning, Disability and Health model: Interaction between the components (World Health Organization 2002: 9)

The ICF model, as illustrated in Figure 1.2, was adopted as it provides a systematic, effective basis for explaining, understanding, and examining health and health-related states, effects, and causal factors (World Health Organization 2013: 6). The ICF was only employed as a conceptual model for this study; the domains and dimensions were used to describe functioning without the utilisation of the particular ICF codes or categories. The domains can be assumed as important sets of body functions, tasks, actions, or areas of life which capture a specific phenomenon or the experiences of an individual (World Health Organization 2013: 23). The dimensions are discussed below with adaptation to the key concepts of this research study, essentially encapsulating quality of life.

1.10.1.1. Health condition

The World Health Organization (2013: 6) stated that 'health condition' is an umbrella phrase encompassing disease, injury, disorder, or related states classified in the International Classification of Diseases (ICD). Impairments cover a wider, and more inclusive range than diseases or disorders (World Health Organization 2001: 13). The impairment at the core of this study was acquired limb absence specifically transtibial amputation. Limb loss is not a disorder or disease but rather an impairment to the body structure amputated. The health condition is the indication for the amputation *viz.* diabetic neuropathy, poliomyelitis, osteomyelitis, dysvascularity, malignancy, traumatic injury, and infection (Khan *et al.* 2020: 1437; Matos, Naves and Araujo 2020: 2; Grzebień *et al.* 2017: 57; Jefferies 2015: 4; Knežević *et al.* 2015: 103).

1.10.1.2. Body function and structure

Body functions are the physiological aspect of the body's systems (World Health Organization 2013: 8), including sensory, mental, and cognitive functions (Gutenbrunner, Ward and Chamberlain 2007: 298; World Health Organization 2002: 16). Body structure pertains to the anatomical body parts such as extremities, organs, and their relative components (World Health Organization 2013: 8). Any abnormalities in the body functions or structures are termed impairments. Impairment may be described as an anomaly, significant deviation, or loss (e.g., deformity) of functions (e.g., decreased range of motion, pain, fatigue, insomnia, and muscle weakness)

and/or structures (e.g., joints and bones) (World Health Organization 2013: 8; Gutenbrunner, Ward and Chamberlain 2007: 298). Further, emotional functions, which are related to the feeling and affective elements of the processes of the mind including anxiety, self-assuredness, insecurity, worry, irritability, anger, fear, and happiness are included in this component (World Health Organization 2001: 57).

1.10.1.3. Activities

Activities are any tasks or actions executed by the individual. These entail basic actions and tasks *viz.* mobility level, walking and standing (World Health Organization 2013: 8). Activities of daily living such as handling of objects, self-care (dressing, toileting, consuming food and beverages, bathing), shopping, hobbies, and domestic life (preparation of meals, caring for other individuals, housework) are also classified as activities (Gutenbrunner, Ward and Chamberlain 2007: 298; World Health Organization 2002: 16; World Health Organization 2001: 43). A key feature of domestic life is the maintenance (i.e., caring for and repairing) of assistive devices such as a prosthesis, walkers, canes, or wheelchairs (World Health Organization 2001: 162). Limitations such as difficulty climbing stairs, ambulating for long periods of time or ambulating specific distances may be encountered (Gutenbrunner, Ward and Chamberlain 2007: 298).

1.10.1.4. Participation

Participation can be defined as involvement in life situations (World Health Organization 2013: 8). It covers more socially collaborative and complex situations which may include participation in one's community, social or school life, interacting with other individuals, and interpersonal relationships (formal, family, informal social, and intimate relationships) (World Health Organization 2013: 35; World Health Organization 2002: 16). Further, participation in religious and/or spiritual activities, vocational performance, activities of leisure and recreation, and interacting with strangers describe this component. Limitations in this component are referred to as participation restrictions, manifesting in community or social life, and leisure and recreational activities (Gutenbrunner, Ward and Chamberlain 2007: 299).

1.10.1.5. Environmental factors

Environmental elements form the individual's entire life and living situation in the physical, attitudinal, and social environment. Such elements include social and legal structures, social attitudes, and architectural characteristics. Furthermore, transportation and housing facilities, climate, fauna and flora, domesticated animals, health services, insurance, occupational and home terrain, and products and technology (World Health Organization 2002: 10). The latter includes assistive products and technology which are specifically designed or adapted for personal assistance in daily life. In this research study, the product and technology offering assistance was a prosthesis; its respective influence on the individual's quality of life was explored. These elements may exhibit a negative or positive influence in the individual's performance capabilities, representing a barrier or facilitator, respectively (Gutenbrunner, Ward and Chamberlain 2007: 299), namely a wheelchair ramp in a taxi, tarred home environment, and well-built footpaths and roads (World Health Organization 2013: 39). This component of the ICF model is inclusive of health professional services and their attitudes. In this study, the roles and contributions of the prosthetist were highlighted.

1.10.1.6. Personal factors

Personal factors represent features that are not classified in the ICF model but are present in the model to display its involvement which may have an influence on the result of various interventions (World Health Organization 2001: 17). Personal aspects constitute age, gender, race, education, social background, occupation, employment status, fitness, individual characteristics, other health conditions, lifestyle, personal habits, past and current experiences (past life and concurrent events), and overall behavioural patterns (World Health Organization 2013: 64; World Health Organization 2002: 10). Clarity in the range of personal factors is principally lacking. Risk factors are linked to the onset and further interrelate with the disabling process at each stage (Gutenbrunner, Ward and Chamberlain 2007: 299).

1.11. Research methodology: An overview

A qualitative inquiry was adopted in this study. In exploratory studies, where the intention of the study is to find out if an issue exists in an inexpensive and quick way, non-probability sampling is particularly useful. Hence, non-probability sampling methods, specifically purposive sampling, was utilised in this study. Firstly, 14 unilateral transtibial amputees (sample 1) and secondly, 16 prosthetists (sample 2) were recruited from a public health hospital in KwaZulu-Natal, South Africa.

Data were collected using semi-structured in-depth interviews and a focus group discussion with amputees and prosthetists, respectively. These methods were selected as the researcher sought to gain an in-depth understanding of individuals' quality of life when using a prosthesis. To make sense of the data, thematic analysis was used to analyse the data obtained from both samples. The data obtained potentially provides information that will enable prosthetists to work more holistically with and provide quality care to their patients.

1.12. Structure of the dissertation

Chapter One: Overview of the study

This introductory chapter provides a brief outline of the research problem, reflects on the study rationale, aim and objectives, including a concise description of key concepts relative to transtibial amputation. Furthermore, the theoretical framework and the significance of undertaking this research study are explained. The last two aspects are an overview of the methodology used and structure of the dissertation.

Chapter Two: Literature Review

The researcher provided a critical presentation and engagement with existing international and national literature in relation to the aim and objectives of this study. Additionally, the paucity of literature on the patient-prosthetist relationship, and the motivation to opt for a prosthesis were addressed in this chapter.

Chapter Three: Research Methodology

A clear description and justification of the research design, participants, sampling techniques, data collection procedures and ethical considerations is provided. The specific samples needed and the setting in which the research interviews and focus group discussion were undertaken are also discussed.

Chapter Four: Analysis and Discussion of Findings

The chapter consists of a qualitative presentation, and analysis of the findings from the amputees and prosthetists using thematic analysis. An integrated discussion, and interpretation of the qualitative findings drawing on the existing body of literature of the topic under study is presented in this chapter.

Chapter Five: Conclusion and Recommendations

An overview of the findings is presented relative to the study's objectives, and recommendations for future studies are included.

References:

A list of literature sources consulted during compilation of the dissertation.

Appendices:

Evidence of formal documents, interview and focus group guides mentioned in the dissertation are provided.

1.13. Conclusion

This introductory chapter outlined the objectives of the research study. The problem statement and research questions were presented along with the study's potential contribution to the field of prosthetic research. The theoretical framework directing this research study was explained. With the study objectives as the focal point, the chapter that follows provides a review of relevant literature.

CHAPTER TWO
LITERATURE REVIEW

"Out of suffering have emerged the strongest souls; the most massive characters are seared with scars." – Khalil Gibran

2.1. Introduction

A literature review is a common feature of all dissertations and theses irrespective of the subject matter or discipline. It entails reading and reviewing, engaging with and discussing the literature, determining contradictions and collating dissimilarities in articles, connecting similar ideas from a wide range of articles, and establishing one's own reasoning and analysis, incorporating supporting evidence in the literature (Kaouache 2019-2020: 32; Di Gregorio 2000: 2). The review of literature is an integral part of any study as it allows the researcher to acquire an understanding of the topic under investigation, what research has already been undertaken on the topic and exploring the core issues. A review of the literature situates the research objectives within the context of the review (Kaouache 2019-2020: 32). It demonstrates the researcher's understanding of previous literature surrounding the topic, which will subsequently be an essential part of his/her academic development (Hart 1998: 2).

A literature review is an amalgamation of what has been published on the topic by accredited researchers and academics, and it is not a merely lengthened annotated bibliography or summary of the research articles and journals linked to the topic (Kaouache 2019-2020: 32; Hart 1998: 2). The review should offer sufficient extensiveness and profundity, clarity and conciseness, rigour and uniformity, and effective analysis and synthesis of the literature. Alternatively stated, it is the utilisation of ideas in the literature to validate the specific approach to the research topic, justification of the methods selected, and evidence that the study contributes something original (Hart 1998: 2). The literature review, if conducted with attention to detail, will provide the premise for a significant dissertation (Kaouache 2019-2020: 32).

This literature review was structured using articles, reports, theses, and dissertations originally sourced from the following highly respected academic and professional

databases: DUT Summon, Journal of Prosthetics and Orthotics (JPO), Taylor & Francis, Google Scholar, Elsevier, ResearchGate, National Center for Biotechnology Information (NCBI), African Journals OnLine (AJOL), PubMed, ProQuest, Embase, Prosthetics and Orthotics International, SAGE Publications, Academia, and Springer. Hardcopy publications were also valuable to this review, and these were sourced from the Alan Pittendrigh Library at the Durban University of Technology. All the literature acquired from prior research has been listed in the reference section of this dissertation. A combination of the following key words was used to locate the relevant literature required to compose this review: amputation, transtibial, quality of life, prosthetist, biopsychosocial, functional, physical, mobility, psychological, environmental, spiritual care, spirituality, vocational return, rehabilitation, multidisciplinary team, trauma, benefits and challenges of a prosthesis, and motivation for prosthesis-use.

This chapter presents a synoptic review of the multifaceted experience of limb loss. It is reviewed in accordance with the study's research objectives, commencing with a brief overview and description of amputation and its indications thereof. The researcher identified the fundamental role of the prosthetist, and the integration and use of a prosthetic device, as two additional yet critical aspects which may potentially affect the quality of life of the individual living with limb loss. The former illuminates the significance of the patient-prosthetist relationship with potential suggestions on improvement of the patient's quality of life, while the latter is further explored regarding the motivation to acquire a prosthetic device. The biopsychosocial effects of an amputation and prosthesis-use are presented and discussed. Furthermore, the vocational, environmental, and spiritual factors are considered and examined. These are crucial elements that constitute an individual's quality of life. The surplus or dearth of literature available with respect to each objective is addressed. By appraising the physical, psychological, environmental, social effects of limb absence post-operatively and with prosthesis-use, along with the role of spirituality, and a comprehensive understanding of the amputation experience may be achieved.

2.2. Lower limb amputation

An amputation of the lower extremity can be defined as a surgical method by which a complete or partial ablation of the lower limb occurs (Matos, Naves and Araujo 2020: 2; Olotu and Anderson 2019: 9; Knežević *et al.* 2015: 103), in either the frontal (distal to the subtalar joint) or transverse plane (proximal to and including the subtalar joint) (Dhankar and Bele 2020: 394; Godlwana 2009: 6). Consequently, the distribution of body mass changes, there is a loss of the limb's respective function, such that balance and co-ordination are affected, and psychological disorders may be prevalent (Knežević *et al.* 2015: 105; Srivastava and Chaudhury 2014: 1; Unwin, Kacperek and Clarke 2009: 1044).

The major goal of amputation surgery is to preserve as much of the body segment as possible (Manickum, Ramklass and Madiba 2019: 44; Grzebień *et al.* 2017: 58). Amputations are categorised either as minor or major. The latter involves surgically amputating proximal to or through the tarsometatarsal joint (Mpezeni 2018: 1). A minor amputation is one made distal to the tarsometatarsal joint (Godlwana 2009: 7). Usually, the amputation level is named according to the location of the major bone or joint through which the amputation has been made (Lusardi, Jorge and Nielsen 2013: 458). There are various levels of lower limb amputations, namely transfemoral (long, standard, short), knee disarticulation, transtibial amputation (long, standard, short), Syme, and transmetatarsal amputation (Össur 2017: 5; Jefferies 2015: 7; Lusardi, Jorge and Nielsen 2013: 458). Post-surgery, the remaining body segment is termed the residual limb and colloquially referred to as the stump (Össur 2017: 4). The common lower limb amputation levels are illustrated in Figure 2.1.

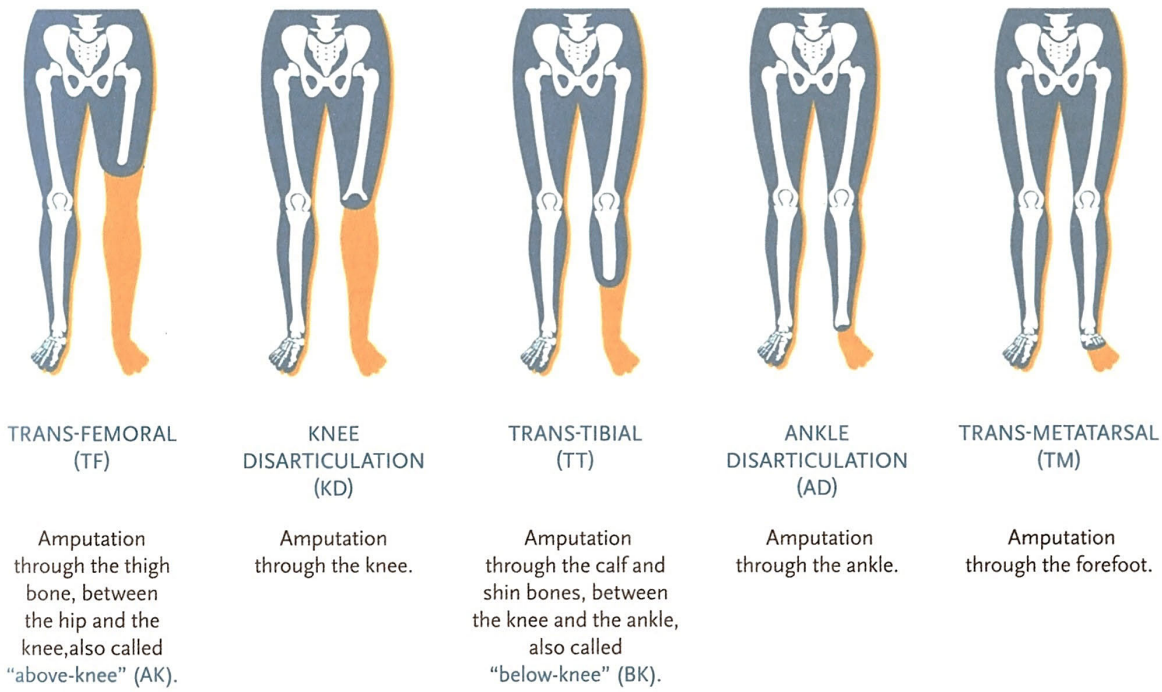

Figure 2.1: Common lower limb amputation levels (adapted from Össur 2017: 5)

2.2.1. Epidemiology

Limb absence can be described as either congenital or acquired. Acquired entails a limb being lost as a consequence of trauma (self-injury, work related incident, warfare injuries or motor vehicle accident), infection (gangrene), malignancy, dysvascularity (diabetes mellitus or cardiovascular disease), or neurological disorders (diabetic neuropathy or poliomyelitis) (Khan *et al.* 2020: 1437; Matos, Naves and Araujo 2020: 2; Grzebień *et al.* 2017: 57; Jefferies 2015: 4; Knežević *et al.* 2015: 103). In several of the aforementioned indications, amputation is indispensable. Congenital limb loss may be as a result of complications that occurred during pregnancy such as amniotic band syndrome or ingestion of teratogenic agents such as Thalidomide. Additionally, congenital limb absence may be ascribed to a lack of limb development due to genetic variation or teratogenic agents. Individuals with either form of limb absence are referred to as amputees (Grzebień *et al.* 2017: 57; Jefferies 2015: 4).

Diabetes mellitus is a global epidemic, expecting to affect approximately 550 million individuals by 2030. Significant disability results from complications of diabetes mellitus including amputation and peripheral vascular disease (Quigley, Dillon and Duke 2016:

467). In a Nigerian study conducted by Lasebikan *et al.* (2019: 301) comprising 50 amputees, the main cause of amputation was gangrene as a consequence of poorly controlled diabetes mellitus (39 percent), followed by traumatic events (24.1 percent). In Bangladesh, Al Imam *et al.*'s (2020: 1995) study of 332 participants found that the leading cause of lower limb amputation was attributable to trauma as a result of road traffic accidents, followed by peripheral vascular disease, and being hit with sharp objects. A study conducted by Seering and Punia (2020: 2) in the United States of America, found that peripheral vascular disease (82 percent) was the main indication for amputation, followed by trauma (16.4 percent).

In a study conducted in South Africa, Khan and colleagues (2020: 1437) reported that 53.2 percent of the 348 participants were primarily amputated due to complications of diabetes mellitus, followed by atherosclerosis and trauma. In a five-year audit of lower limb amputations in Durban, diabetic foot disease was reported as the chief cause of amputation with transtibial as the prime amputation level (Manickum, Ramklass and Madiba 2019: 44). A study conducted by Olotu and Anderson (2019: 10) at R. K. Khan Hospital reported that below-knee amputations accounted for 56 percent of the amputations performed, with diabetes mellitus being the primary indication of amputation in 65 percent of the 63 participants.

2.3. The prosthetist

The prosthetist is the healthcare professional qualified to assess, evaluate, create a prosthetic prescription, manufacture, and treat the individual with limb loss (Kumar 2020: 17; Mduzana *et al.* 2020: 2). The prosthetist is an integral part of an amputee's life; improving physical well-being by restoring mobility and functional independence with the prosthesis. Focusing on available literature, this section offers pertinent information surrounding the roles of the prosthetist in the prosthetic industry as well as the factors that limit the provision of quality care. In addition, the importance of foregrounding spirituality in healthcare settings is highlighted.

2.3.1. Roles of the prosthetist

2.3.1.1. Preparing the residual limb for the prosthesis

Saravanan and Menold (2021: 122) stated that the health of the residual limb is dependent on skin quality, infection, tissue degradation, and geometry of the residual limb. Magnusson (2014: 29) asserted that under the direction of the prosthetist, the amputee's residual limb needs to be prepared for a prosthesis. This is a pivotal phase in the rehabilitation process. Once the wound has healed, pre-prosthetic physical therapy can begin (Pascale and Potter 2014: 242). This entails strengthening the upper body and lower limbs to maintain strength in the leg muscles and good range of motion in the knees and hips (Dhankar and Bele 2020: 395; O'Keeffe and Rout 2019: 138). Early physiotherapy is essential to prevent the formation of contractures. Applying an elastic shrinker stocking over the residual limb helps to reduce oedema and shape the residual limb for the prosthesis (O'Keeffe and Rout 2019: 138; Pascale and Potter 2014: 242). Desensitisation is essential in aiding the residual limb to develop a tolerance to forces that it was not previously subjected to (Lusardi, Jorge and Nielsen 2013: 561). The individual's physical health, mobility, and condition of the residual limb will determine if the amputee is an eligible candidate for a prosthesis (Uytman 2014: 28).

2.3.1.2. Fabrication and maintenance of the prosthesis

Approximately six to eight weeks post-operatively, the surgical wound would have healed adequately for prosthetic fitting to commence (O'Keeffe and Rout 2019: 140). Considering the physical goals and financial status of the amputee, the prosthetist will manufacture and fabricate a unique prosthesis specific to the needs of the individual (Mduzana *et al.* 2020: 2; O'Keeffe and Rout 2019: 140; Össur 2017: 13). During first fitting of the prosthesis, pinching, poking, pressure or irritation sensations on the skin, and inadequate fit need to be communicated to the prosthetist (Pascale and Potter 2014: 242). The necessary adjustments or modifications can then be made to curtail discomfort and skin breakdown (Lusardi, Jorge and Nielsen 2013: 466), and to prevent potential abandonment of the prosthesis (Grzebień *et al.* 2017: 59). Brunelli *et al.* (2020: 2) wrote that prosthetists need to ensure an intimate fit of the prosthesis to

enhance independence, satisfaction, and activity level, and guarantee maximal prosthesis-use to execute daily activities and ambulate without pain.

It is the responsibility of the prosthetist to elucidate all the necessary information to the amputee regarding prosthesis donning and doffing techniques, residual limb and prosthesis hygiene, wearing time, pain management, and home modifications for wheelchair users (Barr and Howe 2018: 5; Highsmith *et al.* 2016: 121). Prosthetists also provide information on contracture prevention, and compression wrapping techniques if the patient presents with oedema in the residual limb (O'Keeffe and Rout 2019: 138; Pascale and Potter 2014: 242). Fall prevention strategies, mobility training with or without the prosthesis, and community transfers (public toilets and transportation) are of paramount importance to discuss with the patient (Ramstrand and Ramstrand 2018: 391).

2.3.1.3. Creating an environment for effective communication

While communication is critical for individuals' survival and existence, literature in relation to communication in a professional healthcare environment, is scant (Van Netten *et al.* 2020: 408). Following the amputation and progressing to the use of a prosthesis, presents with unique challenges including feelings of having insufficient knowledge and experience to communicate one's needs (Murray 2013: 513). Norlyk *et al.* (2016: 1) highlighted that the prosthetic prescription process is an integral element of the rehabilitation programme for individuals with limb loss. Hence, Murray (2013: 513) asserted that effective communication with the prosthetist during this process is essential to meet patients' needs and goals.

With the objective of exploring the communication issues between individuals with limb loss and prosthetists, Murray (2013: 514) conducted a study using three online discussion groups for lower limb amputees. Findings revealed that amputees were not actively involved in the design process of their prosthesis, which resulted in an ill-fitting prosthesis and one not up to the amputee's standards. Murray (2013: 516) reported that prosthetists need to communicate prosthetic terminology in understandable terms, increase the amount of information shared, and provide opportunities for the individual's input in the prosthetic prescription process (Sherwood, Brinkmann and Fatone 2018: 5). Murray (2013: 516) emphasised that good communication between

the prosthetist and patient will result in a well-fitting and comfortable socket, providing the patient with a variety of physical benefits. It is essential for the patient to remain the central focus during discussion of a prosthetic prescription, and to be actively involved in the process (Shepherd *et al.* 2018: 2). With the skills and expertise of the prosthetist and the invaluable contribution of the patient, favourable outcomes can be achieved, and a solid prosthetist-patient relationship can be established (Murray 2013: 516). This study highlights the need to strengthen the patient-prosthetist alliance through effective communication in order to ensure prosthesis satisfaction and successful prosthesis-use.

Writing within the discipline of prosthetics, Van Netten and colleagues (2020: 408) clinically reviewed qualitative and questionnaire-based studies surrounding the salience of communication over the past 50 years, to create a comprehensive toolkit to advance the progress of professional communication. The toolkit comprises links to research articles focusing on communication in medical care, courses offered worldwide on improving communication skills, language guidelines on appropriate words to use in various clinical settings, and frameworks of communication to improve one's practice (Van Netten *et al.* 2020: 412). The authors suggested undertaking investigations on strategies to enhance professional communication skills and its subsequent efficacy on clinical outcomes. The authors offered valuable recommendations with relation to interventions, by proposing the use of visual aids and other communication tools (Van Netten *et al.* 2020: 413).

Sherwood, Brinkmann and Fatone (2018: 6) undertook a literature review of 17 articles on the benefits of effective communication between medical practitioners and patients, in an effort to motivate prosthetists to improve professional communication with their patients. The results reflected that healthcare providers who used effective communication established trust with the patient, gathered more information from the patient to resolve issues effectively and make efficient use of appointment time, enhanced patient outcomes as they were adhering to treatment guidelines, had greater patient satisfaction, and increased referrals (Sherwood, Brinkmann and Fatone 2018: 6). Evidently, effective communication was rewarding for both the practitioner and the patient. Hence, prosthetists need to continually identify ways to develop their

communication skills and employ them in clinical practice, primarily for the benefit of the amputee.

For individuals with lower limb loss, rehabilitation is quite a complex process, and it requires various healthcare professionals (Mduzana *et al.* 2020: 1-2; Highsmith *et al.* 2016: 116). Some of the professionals comprising the multidisciplinary team are orthopaedic surgeons, physiotherapists, occupational therapists, prosthetists, psychologists and social workers (Manickum, Ramklass and Madiba 2019: 44; Highsmith *et al.* 2016: 116). Effective communication between members of the multidisciplinary team is imperative as it enhances the quality of patient care and assists in the rehabilitation process (Lusardi, Jorge and Nielsen 2013: 533). Some participants of the online study conducted by Murray (2013: 513) raised concern about being the intermediary between the members of the multidisciplinary team as a result of poor communication between the medical professionals. It is crucial for prosthetists to refer amputees to other members of the multidisciplinary team, depending on the services they require, to facilitate adjustment to the amputation (Srivastava and Chaudhury 2014: 5). Depending on their field of expertise, each healthcare professional is instrumental in improving the different aspects of an amputee's quality of life.

A central feature of the findings from the aforementioned studies is that these communication difficulties have been overlooked or given minimal attention in the South African curriculum. From the vantage point of the clinician and patient, the current study aims to bridge the gap in local literature by identifying the barriers and facilitators of effective communication between the prosthetist and the individual with limb loss.

2.3.2. Limitations of quality care from the prosthetist

While prosthetists provide quality services to their patients, there are some limitations that affect the efficacy of the care they can provide. These limitations are discussed below.

2.3.2.1. Poor access to prosthetic services

In order to meet the requirements of service delivery, at least five to ten clinical prosthetists and orthotists are required per population of a million in a country (Mduzana *et al.* 2020: 2; Kumar 2020: 17). A recent estimation by the WHO indicated that only one in ten individuals had access to prosthetic or orthotic services while there were 35-40 million individuals requiring such services (World Health Organization 2017: xxvi). Along with the significant underservicing of prosthetic and/or orthotic treatment, the rate at which lower limb amputations are being performed as a consequence of poorly controlled Insulin-Dependent Diabetes Mellitus is proliferating (Mduzana *et al.* 2020: 2). This highlights the urgency for improved access to prosthetic rehabilitation services to avert poor physical outcomes amongst individuals with limb loss (Mduzana *et al.* 2020: 2).

A prosthesis needs to be maintained and adjusted occasionally (Ramstrand and Ramstrand 2018: 391), making it essential for the amputee to choose a facility that will be unproblematic to visit when necessary (Lusardi, Jorge and Nielsen 2013: 466). In a local study by Mduzana and colleagues (2020: 8), it was observed that the provinces of Gauteng, Western Cape, and KwaZulu-Natal had a lower prevalence of disability, but a higher density of prosthetists. On the contrary, the Free Sate, Eastern Cape, and North West provinces indicated a higher prevalence of disability, but a lower density of prosthetists. In a global analysis, the same trend is observed; the countries inhabiting the lowest supply of skilled rehabilitation workers are those that are populated with the highest burden of non-communicable diseases (Gupta, Castillo-Laborde and Landry 2011: 276).

The accessibility of prosthetic services by individuals in rural areas is especially limited, compelling amputees to travel far distances in need of prosthetic treatment (Naidoo and Ennion 2019: 98; Ennion and Rhoda 2016: 570). Unfortunately, the lack of transport and financial constraints impede many amputees from receiving the prosthetic treatment they require (Mduzana *et al.* 2020: 8). This may exacerbate the effects of their disability and subsequently reduce their quality of life (van der Stelt *et al.* 2021: 2). Kumar (2020: 17) asserted that the need for prosthetic services is crucial for individuals with limb loss to achieve functional independence and mobility, as well as to be awarded equal opportunity as other individuals in society and enjoy their basic

human rights (van der Stelt *et al.* 2021: 2). Furthermore, poor access to prosthetic services compromises the amputees' dignity, and national productivity (Kumar 2020: 17).

Considering the burden of exorbitant travel costs and lengthy travelling distances, Saravanan and Menold (2021: 122) conducted a study to develop a decision-support system to facilitate the prosthetic prescription process. A rigorous review of 54 articles and a survey of 10 expert healthcare professionals in the amputee rehabilitation, podiatry, and prosthetic fields highlighted the factors that prosthetists considered in the prosthetic prescription process for individuals with limb loss, namely medical health history, psychosocial factors, amputation level and prosthesis design, activity level, condition of the residual limb, and financial status (Saravanan and Menold 2021: 122; Pascale and Potter 2014: 242). After an investigation of the decision-making strategies employed by expert prosthetists, findings revealed that experts spent more time focusing on the condition of the residual limb and personal details while simultaneously considering activity level (Saravanan and Menold 2021: 123). In addition, gait analysis was found to be an important patient-specific factor involved in prosthetic prescription (Dhankar and Bele 2020: 395). Their findings highlighted the critical factors considered in the prosthetic prescription process (Saravanan and Menold 2021: 124). While the findings offered salient factors to enhance prosthetic prescription, the efficacy of the decision-support system can only be determined after employing it in clinical practice settings.

2.3.2.2. Inadequate professional psychology expertise

Post-operatively, the principal focus is on the patient's physical adjustment and the factors facilitating and impeding the adjustment process. However, little attention is afforded to the patient's psychological and social health (Srivastava and Chaudhury 2014: 1). Prosthetists are not obligated to have an in-depth knowledge of psychological disorders and the elements pertaining to it, but when working with amputees, prosthetists should be aware of the psychological issues their patients may be facing. Hence, a critical requirement for the prosthetist is the referral to psychology services when applicable (Mackenzie *et al.* 2020: 13). This may also include amputee sports groups, emotional recovery counsellors, and support groups to improve the amputee's well-being (Grzebień *et al.* 2017: 59; Lusardi, Jorge and Nielsen 2013: 798).

Addressing psychological issues post-amputation, will facilitate physical rehabilitation and ensure positive adjustment to the amputation (Srivastava and Chaudhury 2014: 5).

In Australia, Mackenzie *et al.* (2020: 10) reviewed the Organisational Role Theory, which is a framework established to consider the behaviours and expectations of healthcare professionals on the subject of their roles. The framework can serve as a guide for health professional education and abate interprofessional and interpersonal conflict. The responses from the cross-sectional survey with 299 healthcare professionals, indicated that the expectations of the prosthetist have evolved substantially from merely designing, manufacturing, and producing a prosthesis to possessing the necessary skill set to help patients manage and eventually overcome their psychosocial and emotional obstacles. Although there were mixed feelings regarding this contribution from the prosthetist, the prosthetist-patient relationship is ongoing and may produce unexpected outcomes with respect to the patient's well-being (Mackenzie *et al.* 2020: 12).

Globally, there are minimal effective programmes available to help improve the emotional well-being of amputees (Amputee Coalition 2020: para. 2 line 8). The prosthetist's relationship with the amputee is long term, therefore they are in a pivotal position to educate the amputee regarding the psychosocial distress signs. Instilling strong feelings of hope in the patient can produce positive emotions and play an integral role in their successful adjustment to limb loss (Unwin, Kacperek and Clarke 2009: 1046). Literature providing comprehensive insight into the use of a prosthesis and the patient-prosthetist relationship is particularly limited. In a review of prior studies, it is proving important that prosthetists be able to assess the patient's contentment with life, rehabilitation goals, and depressive symptomology. Programmes should be established to equip prosthetists with the necessary skills and knowledge to improve the psychological and social well-being of their patients, thus ensuring acceptance of the amputation and regular prosthesis-use.

2.3.3. Integrating spiritual care in health settings

Nisa (2004: 33) posited that a spiritual vacuum has created psychological insecurities among several individuals and subsequently, affected their physical and psychological health. As a result, health care professionals have begun integrating spiritual factors with medical care in an attempt to provide treatment to improve the physical, social, emotional, and spiritual well-being of individuals (Puchalski *et al.* 2019: 11; Nisa 2004: 33). Spiritual care may be provided by instilling hope, being a source of comfort, and asking about spiritual matters (Yang *et al.* 2017: 2). Fisher, Francis and Collins (2018: 207) proposed that prosthetists should improve their awareness of the spiritual factors that influence the well-being of amputees and be confident to engage with amputees regarding the role that spirituality may play in an amputee's life.

In Singapore, Yang and colleagues (2017: 1) hypothesised that training palliative care medical professionals (nurses, medical practitioners, or medical social workers) may improve the quality of life of individuals with terminal illness. The study comprised seven clinical teams; three who received spiritual care training and four who served as controls. From the 144 cancer participants, 70 belonged to the intervention group while 74 the control group (Yang *et al.* 2017: 4). The findings revealed that cancer patients of the intervention group displayed an improved quality of life after receiving spiritual care from the trained medical professionals. However, the effect on spiritual well-being is not as apparent (Yang *et al.* 2017: 9). Even with a relatively small sample size, the influence of a spiritual care training programme reflects significant findings. However, future studies involving larger samples may provide more definitive results.

In Melbourne, Tan and colleagues (2020: 114) investigated the views of 32 healthcare professionals of various disciplines on spiritual care and its provision in public hospitals. The findings revealed that spiritual care was considered an integral aspect of whole person care as it provided patients with a sense of purpose, reassurance, positively influenced physical healing (Puchalski *et al.* 2019: 10; Jones *et al.* 2018: 5), and an opportunity to openly communicate issues they may have struggled to discuss with family members (Tan *et al.* 2020: 117-118). Some participants felt that spiritual care was more important in settings where patients were enduring terminal illness or extreme distress. The roles of professional spiritual care staff should include counselling, offering solace, listening with empathy, meeting spiritual and religious

needs, and only providing spiritual care to patients who want it (Tan *et al.* 2020: 117-118). These findings bring to the fore the importance of professionals that specialise in spiritual care in medical facilities. Furthermore, the views of healthcare professionals from around the globe, should be explored to identify medical professionals that are willing to integrate the provision of spiritual care in their services. This could catapult the development of discipline-specific spiritual care training programmes for healthcare professionals.

While Tan *et al.* (2020: 114) investigated the views of medical professionals on integrating spiritual care in practice, Gardner, Tan and Rumbold (2018: 195) investigated the views of patients on the same aspect. With 24 patients and 10 family members in Australia, the researchers documented the value of spiritual care in health settings. Through semi-structured interviews, participants described the factors that contributed to their spiritual well-being at the medical facility: conversing about things that mattered, being treated as an individual rather than an illness, being reminded of one's capabilities through encouragement (Gardner, Tan and Rumbold 2018: 198-200), practicing religious traditions, being in nature and outdoors, maintaining communication with support networks, participating in activities with other patients, and listening to spiritual music (Puchalski *et al.* 2019: 2; Best, Butow and Olver 2015: 1321). The study offered insight into the importance of respecting spiritual diversity, acknowledging that individuals experience renewal and nurture differently. Most of the study's participants were Catholic, thus research with culturally different patients may reveal additional factors that contribute to one's spiritual well-being.

Adopting a quantitative inquiry, Chandramohan (2013: 68) surveyed 385 nursing practitioners in KwaZulu-Natal, South Africa. The findings revealed that spirituality was viewed as seeking purpose and meaning in illness, having faith and believing in God, praying, the inclusion of friendships and relationships, and not only attending places of worship (Chandramohan 2013: 95). The author stressed the need to actively listen to patients to ascertain their spiritual needs, given that consensus prevailed among the participants that spiritual care was the joint responsibility of patients, family members, friends, nurses, and spiritual leads (Chandramohan 2013: 95). Literature has shown that the care of patients requires a complex, multidisciplinary team approach with a

focus not only on physical, psychological, and social needs, but also on their spiritual needs (Gant 2016: 14; Adegbola 2011: 3).

Further, Adegbola (2011: 2) asserted that spirituality and self-efficacy were essential factors that contributed to the management of chronic illnesses and quality of life. Individuals who reported high levels of spirituality and self-efficacy, also reported high levels of quality of life (Gant 2016: 14; Adegbola 2011: 3). In an Iranian study, Eilami and colleagues (2019: 449) reiterated the essence of the aforementioned findings that the execution of supportive spiritual intervention improved the quality of health and increased the life expectancy of their cancer participants. Jones *et al.* (2018: 1) asserted that spirituality has been linked to resilience, improved life satisfaction, and reduced levels of depression. These findings may contribute to social change by guiding training strategies to meet organisational goals for broadening prosthetists' knowledge of and skills in spiritual care delivery for amputees.

Tan and colleagues (2020: 120) contended that allied healthcare professionals should possess the appropriate skills and knowledge to incorporate spiritual care in their services and be able to recognise patients' spiritual needs to make the requisite referrals to spiritual care professionals. Exploring the relationship between spirituality and quality of life is a step forward in terms of allowing prosthetists to help amputees cope with the amputation (Best, Butow and Olver 2015: 1326). Training prosthetists to incorporate spirituality into patient care may assist in identifying, valuing, and enhancing their own spirituality. Prosthetists will be competent in providing amputees with quality holistic care that comprises the support of spirituality (Subrata 2020: S26; Gant 2016: 41). In addition, it was envisaged that prosthetists would be able to refocus and establish environments focused on caring and serving other individuals (Peirano 2010: 207).

2.4. The prosthesis

Prosthetic devices have become increasingly common in the fields of medicine and engineering. Almost every body part has a prosthetic counterpart (Mota 2017: 1). For individuals with limb loss, the prosthesis affords the opportunity to perform the function of the biological limb that was amputated (Brack and Amalu 2021: 88). Therefore, it assists in restoring mobility, stability, and functional independence to achieve quality

life (Brack and Amalu 2021: 88; Mota 2017: 1). This section provides evidence of the technological advances made in the prosthetic industry, details of the transtibial prosthesis, benefits and challenges attached to the use of the prosthesis, and factors resulting in abandonment of the prosthesis.

2.4.1. The transtibial prosthesis

A transtibial prosthesis is an assistive device that is manufactured for individuals with a transtibial amputation. As illustrated in Figure 2.2, the typical components of a transtibial prosthesis include a socket, liner, dynamic pylons, and prosthetic ankle and foot system (Lusardi, Jorge and Nielsen 2013: 624). Padi, Mukundan and Subramani (2017: 20) contended that each component is instrumental in imitating complex mechanisms of the biological lower extremity. To firmly hold the prosthesis onto the residual limb, required is a specific method of suspension. Fastened around the waist with leather straps, the Silesian system is commonly used in public health settings. The socket, which the residual limb fits into, should be lightweight and comfortable (O'Keeffe and Rout 2019: 138; Padi, Mukundan and Subramani 2017: 20). The removable socket liner is the flexible interface between the residual limb and socket to prevent skin abrasion. Fabricated from silicone gel and foam materials, the liner provides comfort and protection to the amputee, which increases usage time with the prosthesis (O'Keeffe and Rout 2019: 138).

The pylon/ shin tube is the connecting constituent between the socket and the prosthetic foot (Padi, Mukundan and Subramani 2017: 22). It is usually fabricated from lightweight materials such as titanium and aluminium alloys, to provide rigidity and high tensile strength (Mota 2017: 3). Manufactured to resemble the physical appearance of the biological lower limb, a cosmetic foam cover conceals the pylon and part of the socket. The prosthetic foot typically offers shock absorption and cushioning. Various prosthetic foot and ankle systems are available, each offering different ranges of mobility and flexibility. The most basic is the conventional Solid-Ankle Cushion-Heel (SACH) foot, commonly supplied in public health settings due to its low-cost (Padi, Mukundan and Subramani 2017: 23). The patella-tendon-bearing (PTB) socket and total surface-bearing (TSB) socket are the two main prosthetic sockets designed for transtibial amputees (Lusardi, Jorge and Nielsen 2013: 625). However, the most common type of prosthesis used by transtibial amputees is the patella-tendon-bearing

prosthesis (Dhankar and Bele 2020: 394). Range of motion, stiffness and shock absorption comprise the mechanical properties of a transtibial prosthesis (Flinn 2016: 10).

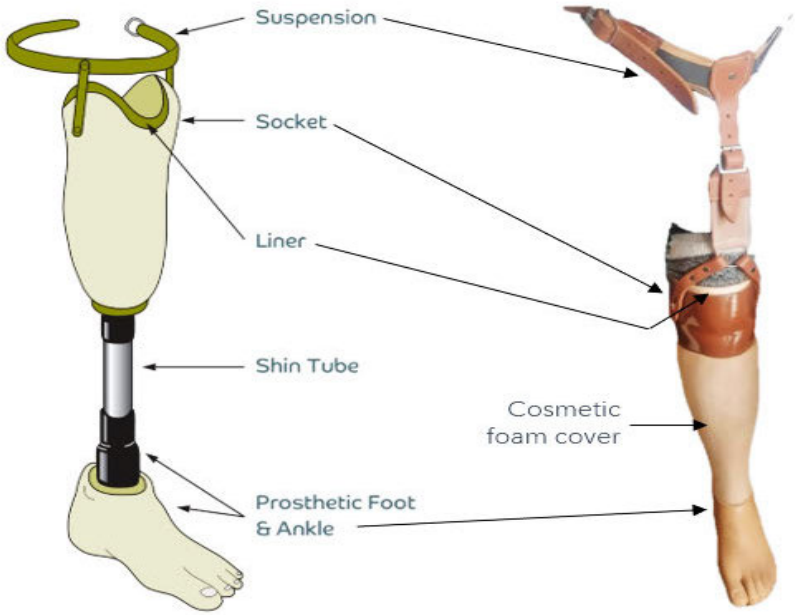

Figure 2.2: Componentry of a transtibial prosthesis (adapted from Blatchford Limited 2022)

2.4.2. Motivations for prosthetic intervention

A prosthesis has the capability to comprise the whole gamut of ancillaries ranging from non-mechanical to mechanical in their nature and from resembling to not resembling a biological limb (Jefferies 2015: 8). Major technological advances have been made in the prosthetic industry within the last the few years (O'Keeffe and Rout 2019: 134; Padi, Mukundan and Subramani 2017: 23). Prostheses can now be designed and manufactured with metal alloys and carbon fibre. These materials can withstand harsh environments, they are more durable, water-resistant, and lightweight which entails decreased energy expenditure and exertion from the user (O'Keeffe and Rout 2019: 138-139; Mota 2017: 1; Jefferies 2015: 10). The shape and form of prostheses has also significantly developed as it is now possible to manufacture and fabricate cosmeses for the extremities that are almost impossible to distinguish from their biological counterparts with personalised additions such as respective skin tone, veins, hairs, skin textures, nails, and tattoos (Jefferies 2015: 10).

The researcher is interested in the reasons for successful prosthesis-use amongst individuals with limb loss. Although little has been published in this area, Ennion and Manig (2018: 14) drew attention to the positive effects the prosthesis has on independence, function and participation in society. Findings from their qualitative study of nine lower limb amputees in Mpumalanga, revealed that participants exhibited greater mobility with the prosthesis as they were capable of ambulating long distances, acclimating to slopes and uneven terrains, and standing for prolonged periods of time (Ennion and Manig 2018: 10). One participant optimistically expressed being able to climb trees while using the prosthesis. Ambulating in the community allowed many of the amputees to be active members in their society, with one participant reporting attending disability forums (Ennion and Manig 2018: 10- 11).

More recently, van der Stelt and colleagues (2021: 2) provided invaluable insight into how the prosthesis can enhance quality of life in rural regions. Pioneering their cost-effective 3D-printed transtibial prosthesis, the authors investigated its use and satisfaction with eight participants in Sierra Leone. Six weeks upon receiving the prosthesis, findings revealed that all participants were using the prosthesis regularly and most reached their mobility goals during rehabilitation. A notable achievement that enhanced the participants' well-being, was their ability to use the prosthesis independent of crutches (van der Stelt *et al.* 2021: 5). Further research into the use and satisfaction of the participants after a lengthier period of time with the prosthesis, would indicate the success rate of the 3D-printed prosthesis and allow amputated individuals in low-income areas to experience enhanced functional mobility with advanced technology (van der Stelt *et al.* 2021: 8). The results not only prove crucial and beneficial to this study but also offer motivation to prosthetists and researchers.

With respect to the study's objective of exploring the various motivations to opt for a prosthesis, the literature can be described as underexplored. The current study aims to offer motivation to current and future amputees by exploring the various reasons prosthesis-users opted to obtain a prosthesis, and the ways in which the prosthesis mitigates the challenges faced in their daily life.

2.4.3. Barriers in prosthetic services

In developing countries, the implications for limited financial resources are such that many individuals will receive a prosthesis of basic standards while some may not have access to prosthetic services entirely (van der Stelt *et al.* 2021: 2; Jefferies 2015: 10). In other countries, there are restrictions on funding for prosthetic limbs by the individual's occupational compensation, healthcare plans or third-party insurers, implying that only a part of the cost may be covered, which limits the options available to the patient (Jefferies 2015: 11; Biddiss *et al.* 2011: 216; Swartz and MacLachlan 2009: 150). Moreover, O'Keeffe and Rout (2019: 140) contended that a prosthesis is scarcely associated with a single cost but rather with constant modifications, replacements, repairs, and other maintenance costs that may be required (Jefferies 2015: 11). In the same vein, Safari and Meier (2015: 503) pointed out that depending on the quality and type of materials used in the prosthesis socket and liner, skin irritation, odour, perspiration, sores, and staining may occur.

A study conducted by Ennion, Johannesson and Rhoda (2017: 455) in a rural district in KwaZulu-Natal, provided a possible solution to the accessibility and financial issues that were highlighted. The researchers utilised Össur's Direct Socket (DS) system, with which the eight participants reported enhanced functionality, independence, and ability to perform daily activities. Since the DS prosthesis is manufactured, fit, and delivered in one visit, it alleviates the amputee's burden of travelling, finance, delivery time, and multiple visits. The environmental barriers were reduced but not removed entirely as participants described challenges relating to public transport (Ennion and Rhoda 2016: 565), and uneven terrains (Magnusson 2014: 84). Furthermore, the DS prosthesis was criticised for the silicone liner and aesthetic appeal (Ennion, Johannesson and Rhoda 2017: 461). Future research should investigate methods to improve and adapt the componentry of the DS prosthesis to accommodate the environmental demands of rural areas.

Recent literature reported that approximately 49 percent-95 percent of lower extremity amputees use a prosthesis (Jefferies 2015: 12; Raichle *et al.* 2008: 961). According to Jefferies (2015: 13), successful fitting of a lower limb prosthesis can be attributed to a younger age, marriage, a more distal level of amputation, and residing with family members. However, being successfully fit with a prosthesis does not ensure regular

prosthesis-use (Jefferies 2015: 13). Grzebień and colleagues (2017: 58) asserted that the patient's drive, commitment, and willingness also impact the efficacy of prosthesis-use. Setting too high or low expectations can demotivate the amputee and lead to disappointment. O'Keeffe and Rout (2019: 136) indicated that it is imperative to inform the amputee of what can be expected during prosthetic rehabilitation, prosthesis options, and clinical outcomes. Murray and Forshaw (2014: 170) argued that the positive representations of prosthesis-users in advertisements from prosthetic companies may cultivate unrealistic expectations in individuals with limb loss. O'Keeffe and Rout (2019: 136) suggested that prosthetists should use peer interactions and videos displaying realistic outcomes to help the patient, family members, and care givers to foster realistic expectations before the patient can receive the prosthesis.

Evidence suggests that some of the reasons for prosthesis rejection involve ill-fitting sockets, noises in the prosthesis, weight discomforts, poor balance, and dissatisfaction with the appearance and comfort (van der Stelt *et al.* 2021: 6; Dunne *et al.* 2015: 563; Jefferies 2015: 14) Abandonment of the prosthesis can be attributed to factors such as the presence of comorbidities (diabetes mellitus, cardiovascular disease, and peripheral vascular disease), simultaneous use with other assistive devices (i.e., wheelchairs, crutches, and canes), unemployment, and the prevalence of phantom limb pain (Sugawara *et al.* 2018: 4; Dunne *et al.* 2015: 563; Jefferies 2015: 14). A shorter time frame between the amputation surgery and fitting of the prosthesis may be associated with patient satisfaction of prosthesis design and fit, as well as regular prosthesis-use (Pezzin *et al.* 2004: 728). For the patient, Highsmith and colleagues (2016: 116) noted that there are several consequences attached to prosthesis-disuse, namely increased risk of falling, weight gain, reduced flexibility, decreased ability to ambulate, difficulty in executing daily and occupational tasks, financial challenges, limited functionality, and reduced physical activity.

2.5. Quality of life

Amputation is a highly impactful life experience significantly affecting one's quality of life (Knežević *et al.* 2015: 105). Several individuals do not receive appropriate psychosocial intervention and hence, still suffer with various issues whilst being fit with the prosthesis (Jeffries 2015: 17). The following section provides evidence of the physical, psychological, social, and environmental effects attached to amputation and

prosthesis-use. In addition, attention is given to the role of spirituality as a coping mechanism.

2.5.1. The physical effects of amputation

2.5.1.1. Pain

A widely recognised physical consequence after the amputation surgery is pain. This may include phantom limb pain, phantom sensations, or residual limb pain, which must be relieved during rehabilitation, with occupational therapy and physiotherapy (Brunelli *et al.* 2020: 2; Grzebień *et al.* 2017: 58). Phantom limb pain has been described as cramping, burning, stabbing, hammering, and shock-shooting feelings in the part of the limb that has been surgically removed (Pascale and Potter 2014: 243). Grzebień *et al.* (2017: 58) found that phantom limb pain had a strong impact on amputees' emotional well-being. The excruciating pain is a distressing issue for amputees and only a few find it bearable (Godlwana 2009: 14). While there is no cure for phantom limb pain, there is a surplus of effective strategies to help control the pain, namely mirror therapy (Yildirim and Kanan 2016: 129), virtual reality therapy (Herrador Colmenero *et al.* 2018: 297), residual limb massage (Saker 2016: 132), central nervous system stimulation (García-Pallero *et al.* 2022: 63), acupuncture, transcutaneous nerve stimulation, and biofeedback (Kaur and Guan 2018: 367-368; Stockburger, Sadhir and Omar 2016: 162). With respect to pharmacotherapy, Kaur and Guan (2018: 367) and Stockburger, Sadhir and Omar (2016: 162) highlighted that tricyclic antidepressants are common and effective medications used in the relief of neuropathic pain.

Phantom sensations have been described as tickling, numbness, pressure in the absent limb and itching (Saker 2016: 127; Pascale and Potter 2014: 242). These non-painful sensations are easier to tolerate than phantom limb pain but remain an overwhelming experience for the amputees (Lusardi, Jorge and Nielsen 2013: 539). Residual limb pain is natural discomfort in the residual limb itself (García-Pallero *et al.* 2022: 59), caused by osseous growth, soft tissue complications, or neuroma formation (Pascale and Potter 2014: 243). In addition to pain, comorbidities and infections can further impede mobility and complicate rehabilitation (Knežević *et al.* 2015: 104).

2.5.1.2. Regaining mobility and functional independence after amputation

In Durban, Manickum, Ramklass and Madiba (2019: 42) audited referrals made to physiotherapy and adherence to same. The study, comprising 667 individuals with lower limb amputations, found that only 17.4 percent were referred for physiotherapy of whom only 81.9 percent attended (Manickum, Ramklass and Madiba 2019: 43). This indicated that referral to physiotherapy is not widely practised and needs to be improved by the medical professionals who make them. The authors postulate that social, functional and disability barriers, and financial constraints affect poor compliance to rehabilitation (Igwesi-Chidobe 2012: 5). After receiving two weeks of physiotherapy, the participants in a study by van der Stelt *et al.* (2021: 6) in Tonkolili District, Sierra Leone learnt how to ambulate with the prosthesis, displayed improved confidence levels during ambulation, and reported fewer backpain issues. Physiotherapy is a key facet of the rehabilitation programme for amputees to improve mobility and performance in daily activities, with or without assistive devices (Manickum, Ramklass and Madiba 2019: 44).

In Johannesburg, Godlwana and Stewart (2013: 50) conducted a study with 12 lower limb amputees, and found that the participants experienced instability issues, which led to debilitating falls. Some participants had fallen as a result of phantom limb sensations (Godlwana and Stewart 2013: 50). These findings were supported by evidence in Yu and Ennion's (2019: 2) study in the Western Cape, where the amputee participants experienced reduced levels of mobility either temporarily or permanently, as a result of physical impairments in proprioception and balance, or a lack of access to prosthetic treatment. The fear of falling, poor cardiorespiratory fitness, which restricts walking distance, poor balance, and difficulty standing for lengthy periods of time formed the several reasons for mobility impediments (Yu and Ennion 2019: 4). These participants voiced that their inept mobility skills were attributed to their short period of rehabilitation therapy post-surgery.

Godlwana (2009: 10) found that individuals who were amputated at a young age in South Africa were more likely to ambulate, gain independence in their daily activities, and opt to use a prosthesis. Through a review of articles published between 2000 and 2019, Brunelli *et al.* (2020: 2) confirmed that amputation performed at a young age is associated with a higher quality of life. In contrast, Desmond and MacLachlan (2002:

21) in an international study, found that for some young individuals, the loss of a limb and its respective function limits and eliminates several life opportunities. For elderly individuals with peripheral vascular disease, limb loss could offer increased mobility and even ease their physical agony (Desmond and MacLachlan 2002: 20).

A qualitative study of nine lower limb amputees in Mpumalanga province, South Africa found that the prosthesis was essential in the independent performance of daily activities, maintenance of homes, and active participation in society (Ennion and Manig 2018: 12). A shortcoming in the study was the participants' demographics as the positive reports may be attributed to the cohort comprising younger amputees (Ennion and Manig 2018: 13). A broader spectrum of age groups may have resulted in unbiased reports. In the same vein, Godlwana and Stewart's (2013: 50) qualitative study in Gauteng, revealed that the prosthesis increased functionality, efficiency, and enhanced quality of life.

2.5.2. The psychological effects of amputation

An integral domain influencing one's quality of life is psychological health. After the loss of a limb, the physical and practical needs of the individual are the focal points of rehabilitation, which often lead to the neglect of emotional and mental issues (Madsen *et al.* 2016: 1; Norlyk, Martinsen and Kjaer-Petersen 2013: 8). Psychological issues encompass several crucial facets ranging from anxiety and depression to body image disturbances and reduced self-esteem (Holzer *et al.* 2014: 1). Seminal contributions have been made by international authors regarding such issues (Butler *et al.* 2019: 487; Yarwood-Ross 2019: 170; Knežević *et al.* 2015: 106; Srivastava and Chaudhury 2014: 5; Uytman 2014: 13; Godlwana and Stewart 2013: 50).

In Denmark, Madsen and colleagues (2016: 1) established a theory of 'pendulating' to illustrate how amputees swung emotionally and cognitively throughout the three-phase process post-amputation. The first phase, *losing control*, comprised feelings of being overwhelmed, losing independence, hope for a prosthesis, and uncertainty of the future (Butler *et al.* 2019: 487; Yarwood-Ross 2019: 170). The second phase is *digesting the shock,* which is characterised by adjustment to the life-changing event whilst experiencing feelings of relief, frustration, courage, and stress. At this stage, 'pendulating' described how amputees were swiftly accepting their amputation while

mentally and emotionally swinging from one side to the other (Madsen *et al.* 2016: 6). In *regaining control*, managing the consequences in daily tasks helped amputees to slowly regain control. Many faced challenges of compromising, downscaling, and adjusting to situations. Self-motivation and generating feelings of hope allowed amputees to positively adjust and adapt to their new life which subsequently, promoted and improved their emotional well-being (Torbjörnsson *et al.* 2020: 5; Madsen *et al.* 2016: 8).

2.5.2.1. Anxiety and depression

After the amputation surgery, uncertainty of the future, employment status, physical limitations, and impact on independence placed heavy burdens on amputees which stirred up feelings of anxiety, hopelessness, difficulty in adjusting psychologically, depression, and doubt (Butler *et al.* 2019: 487; Yarwood-Ross 2019: 170; Godlwana and Stewart 2013: 49). A large body of research confirms that depression and anxiety are common amongst amputees post-surgery (Srivastava and Chaudhury 2014: 1; Uytman 2014: 12; Norlyk, Martinsen and Kjaer-Petersen 2013: 1; Godlwana and Stewart 2013: 48; Unwin, Kacperek and Clarke 2009: 1044). Ample evidence reflects that body image, the outcomes of social integration, and functional, social and activity limitations correlate with anxiety and depression (Uytman 2014: 13; Unwin, Kacperek and Clarke 2009: 1045). Depressive symptomology was linked to social discomfort and dependence on family members and friends (Senra *et al.* 2012: 184), while the unexpected nature of the amputation engendered feelings of shock and anger. Research providing a refined understanding of the root of the amputees' emotions will provide greater insight in comparison to studies focusing on the projections of outcomes (Uytman 2014: 13).

2.5.2.2. Grief

Coupled with anxious and depressive symptomology are feelings of anger, grief, sadness, guilt, isolation, shock, and vulnerability (Knežević *et al.* 2015: 106; Srivastava and Chaudhury 2014: 1). Amputees grieve the loss of their limb as well as its anticipated function, and fear how their community will view their new body image (Unwin, Kacperek and Clarke 2009: 1044). Every individual is unique and in the same way, the psychological response to an amputation is specific to the amputee.

Amputees should grieve the loss of their limb, as it will be beneficial to their psychological health (Össur 2017: 7). Individuals who undergo amputations due to trauma would not have any psychological preparation for such an invasive surgery compared to those who have amputations as a result of non-traumatic events (Lusardi, Jorge and Nielsen 2013: 534; Godlwana 2009: 11). Researching the characteristics of individuals who have achieved positive psychological outcomes would prove beneficial and invaluable to rehabilitation services that promote positive adjustment amongst amputees (Unwin, Kacperek and Clarke 2009: 1045).

2.5.2.3. Altered body image

Uytman (2014: 14) argued that as a result of amputation, individuals experience several body image changes; self-image pre- and post-operatively, their image with and without a prosthetic device, and their own ideal self-image. Failing to adjust to these appearance changes may elicit additional prosthesis and psychosocial issues, namely dissatisfaction with prosthesis, reduced quality of life, and lack of confidence (Coffey *et al.* 2009: 1064). According to Unwin, Kacperek and Clarke (2009: 1044), several patients interpret their amputation as an altered self-image. The findings from a study conducted in Austria revealed that the lower limb amputees possessed lower levels of quality of life, body image perception, and self-esteem compared to the control group of able-bodied participants (Holzer *et al.* 2014: 6).

There is extensive global literature confirming the previously mentioned psychological challenges following an amputation (Roșca *et al.* 2021: 4; Zhu *et al.* 2020: 3; Järnhammer *et al.* 2017: 1430; Madsen *et al.* 2016: 1; Knežević *et al.* 2015: 103; Uytman 2014: 14) but limited in local findings. Godlwana and Stewart (2013: 50) reported that some participants felt conscious of their new body image specifically when they were in public spaces, as they felt that they were being viewed in a different light. Holzer *et al.* (2014: 7) suggested that psychological interventions can be used to improve body image anxiety, increase self-esteem levels, enhance quality of life and reduce the impact of limb loss on amputees. Furthermore, focusing on the treatment and prevention of phantom limb pain may improve self-esteem levels.

Despite the numerous negative implications, researchers assert that there is potential for psychosocial growth in the individuals enduring limb loss (Flinn 2016: 11; Jefferies

2015: 29; Godlwana and Stewart 2013: 48). The rehabilitation process along with the knowledge, skills and expertise of the multidisciplinary team can help mitigate the psychological challenges associated with amputation (Magnusson 2014: 31; Lusardi, Jorge and Nielsen 2013: 387). Discussing emotional feelings with supportive friends and family, receiving counselling individually or with family members (Desmond and MacLachlan 2002: 19), having a healthy diet, getting a sufficient amount of sleep, and attending amputee support groups are effective and valuable ways to slowly restore and maintain emotional and mental health (Lusardi, Jorge and Nielsen 2013: 798).

2.5.3. The social effects of amputation

2.5.3.1. Relationships

Some individuals have great support systems, while others are rejected by their families who believe that the individual is somehow at fault for their amputation. The patient's ability to pursue rehabilitation post-surgery is significantly impacted by their support system as well as their socioeconomic status. Following the amputation, group counselling is especially beneficial for family members (Edelstein and Moroz 2011: 11). It is important that the amputee should receive professional services as well as family support to help them adjust to life with their new body (Godlwana 2009: 13). Some amputees consider the use of a prosthesis as a 'restoration' of their functional and social status. Edelstein and Moroz (2011: 12) stated that for such amputees, obtaining a prosthesis may occur very early in the post-operative stage. In this time of vulnerability and grief, spiritual beliefs and the support of family and friends can positively contribute to the healing process (Godlwana and Stewart 2013: 48; Senra *et al.* 2012: 181; Unwin, Kacperek and Clarke 2009: 1044). Abu Shawish *et al.* (2021: 531) suggested that conversing with an individual who has been through a similar experience can be comforting for the amputee.

Tan (2015: 25-26) found that many amputee participants received the support they needed during their daily activities, were in frequent contact with their support systems, received adequate support when making important life decisions, and had someone to talk to when they felt depressed. Tan (2015: 40) and Gallant (2003: 194) found that having a strong support network when faced with practical and emotional challenges positively affects the quality of life of individuals with chronic conditions. These findings

corroborated evidence from a study in Denmark, where participants reported feeling worthy when relatives visited, called, or offered assistance without being asked to (Madsen *et al.* 2016: 7). In contrast, one participant reported making a painful compromise as they had to sleep in a separate room to their partner (Madsen *et al.* 2016: 7). Contrary to international findings, amputee participants in a Johannesburg study, reported feelings of resentment, rejection and neglect from family (Godlwana 2009: 23). Some exhibited feelings of fear pre-operatively and were ambivalent about the surgery as they felt their spouses may leave them. Future concerns surrounded losing the respect of their children, sexual relationships, and not being able to find a spouse. One participant voiced that he was only accepted by his family after his repulsive foot odour ceased (Godlwana 2009: 14). These findings reiterate the importance of foregrounding family counselling post-amputation.

2.5.3.2. Participation in society

According to Tan (2015: 23), many amputees did not participate in common social activities due to difficulties with physical access, sickness, old age, affordability, and not having company for social activities. These were cited as the core reasons. Fears of vandalism or burglary, or being personally attacked, and lack of transport prevented the participants from living an active social life (Tan 2015: 23). Other reasons reported were depression, feeling uncomfortable in crowds, fear of falling, self-consciousness, mobility, and low confidence levels (Tan 2015: 23-24). Withdrawal from social events is an indication of feelings of anxiety, depression, and worry (Lusardi, Jorge and Nielsen 2013:557). Hence, it is imperative to increase mobility levels in amputees to facilitate social integration (Tan 2015: 40).

Participants in a study in the Western Cape, South Africa communicated the struggle of participating in recreational activities without the assistance of friends or family members (Yu and Ennion 2019: 3). Positive integration into society could include the individual actively engaging in community activities such as attending church (Yu and Ennion 2019: 4). Conversely, some individuals are apprehensive about re-establishing themselves in their communities as concerns of inferiority, rejection and lack of pride overwhelm them. Furthermore, the participants received crutches without guidance on proper ambulation with these mobility aids. Subsequently, a participation barrier arose

as the individuals lacked the knowledge and experience to handle mobility difficulties in their home and social settings (Yu and Ennion 2019: 4).

The significance regarding the reactions and consciousness of others is proposed as being integral to the development of a new self-perception. Social support, social discomfort, and perceived health status have been found to be the strongest contributors of depression (Uytman 2014: 15). Some individuals, who are satisfied with their physical appearance, conceal their amputation in social milieus in fear of the public being perturbed or upset by it (Uytman 2014: 15). Some select a prosthesis to mask the amputation, and to regain a 'normal' appearance (Godlwana and Stewart 2013: 50). In contrast, some participants in Uytman's (2014: 15) study felt compelled to purposefully display their prosthesis by opting to customise and elaborately decorate the device.

2.5.4. Environmental barriers to individuals with limb loss

2.5.4.1. Access to healthcare services and transport

In the Action Plan for improved provision of healthcare services to persons with disability, the World Health Organization (WHO) argued that such individuals have the same healthcare needs as any other individual and therefore, require access to conventional, affordable, acceptable, and timely healthcare services and programmes of suitable quality (World Health Organization 2015: 6; Abdi *et al.* 2015: 1477). The WHO identified two central barriers in the environment regarding access to healthcare services, which can restrict participation; a physical impairment that was not effectively addressed through rehabilitation, and a lack of disability-friendly facilities (Yu and Ennion 2019: 2; World Health Organization 2015: 3). Good health promotes participation in a diverse range of activities, including employment and education (World Health Organization 2015: 6).

According to the World Health Organization (2015: 6), individuals with disability are at increased risk of experiencing violence, injury from burns, falls, or road traffic accidents, and more vulnerable to comorbidities, secondary health conditions, and age-related conditions. The healthcare systems repeatedly fail to provide appropriate services and quality care to individuals with disability in response to their general and

specific healthcare needs (Ennion, Johannesson and Rhoda 2017: 455; World Health Organization 2015: 6). Factors impeding access to healthcare services for individuals with disability include healthcare professionals' lack of sufficient and appropriate knowledge and skills, healthcare financing, and communication barriers (Ennion and Rhoda 2016: 565). Further, the factors include insufficient knowledge of their rights to healthcare services, physical barriers related to medical equipment, the architectural design of medical facilities, and the lack of access to modes of transportation by people living with disability (World Health Organization 2015: 7; Magnusson 2014: 87).

Karaali *et al.* (2020: 411) and Bragaru *et al.* (2011: 722) stated that the physical ability to balance is a significant predictor of the individual's ability to ambulate and successfully utilise a prosthesis. Restoration of the independent walking ability and physical impairments are achieved during rehabilitation (Karaali *et al.* 2020: 410). Hence, limited access to prosthetic services may decrease mobility levels (Yu and Ennion 2019: 2). In an Iranian study comprising 21 participants, Abdi *et al.* (2015: 1476) drew attention to the difficulties endured by amputees in accessing rehabilitation centres, which were absent in remote and low-income areas. The participants in Abdi *et al.*'s (2015: 1476) study were compelled to arrange for transportation to distant healthcare facilities. Travelling far distances to access medical facilities brought on an additional burden of finance as they did not have adequate funds to cover the cost for both travelling and the healthcare services they required (Naidoo and Ennion 2019: 98). As a result, the individuals were frequently unable to access rehabilitation services (Abdi *et al.* 2015: 1481; Maart and Jelsma 2014: 1491). The inaccessibility of prosthetic healthcare services prevents individuals from regaining independence, mobility and their functional status, which subsequently diminishes their chance of successfully utilising a prosthesis (Karaali *et al.* 2020: 410).

Abdi *et al.*'s (2015: 1476) findings concur with local findings, where the participants reported the following factors impeding their access to rehabilitation: lack of transportation, long distance travelling and financial constraints (Naidoo and Ennion 2019: 98; Ennion and Rhoda 2016: 570). Such environmental factors prevent individuals with disabilities from receiving the comprehensive healthcare services and quality care required for their specific needs. With South Africa's limited access to prosthetic technology and healthcare services, environmental challenges and mobility

impairments hamper the individual's participation in society (Ennion, Johannesson and Rhoda 2017: 460; Ennion and Rhoda 2016: 565). These results were supported by evidence in a study conducted in Mpumalanga, where participants reported a lack of prosthetic supplies at their respective medical facilities and the endurance of lengthy travel times to access prosthetic services (Ennion and Manig 2018: 9).

2.5.4.2. Terrains

Individuals with amputation may encounter numerous challenges when interacting with and/or reintegrating into the environment (Yu and Ennion 2019: 1). The amputee may encounter environmental challenges such as ambulating in confined spaces, on different slopes, and various terrains (Karaali *et al.* 2020: 410) and adapting to public transport and their surroundings (Lusardi, Jorge and Nielsen 2013: 277). Challenges in the home environment include transferring in and out of the shower/bath, to and from the toilet, and getting up from the floor after a fall. Moving in and out of public transportation vehicles, ambulating on rough and smooth terrains, managing stairs, escalators and elevators are some difficulties encountered by amputees in the outside environment (Knežević *et al.* 2015: 105). The patient may require an assistive device or mobility aid if there is difficulty experienced when manoeuvring at home and during their daily activities. In some instances, the rehabilitation professional may require the family to install a wheelchair ramp for the amputee to increase safety, reduce effort of the amputee, and ease entering and exiting the house (Lusardi, Jorge and Nielsen 2013: 553).

Researchers have recommended that there needs to be an increase in the establishment of government-owned sport facilities appropriate for individuals with physical disabilities (Sarigöz and Yaşartürk 2020: 297). Disability-friendly facilities are crucial elements that need to be implemented in medical facilities, roads, public transport and several public buildings, facilities, and tourist attractions. To successfully eradicate environmental barriers and improve access to healthcare services, the input from individuals with disability is necessary (World Health Organization 2015: 8).

2.5.4.3. Vocation

Vocational rehabilitation describes the multidisciplinary effort of assisting an individual, with mental or physical disabilities, to obtain or return to employment (Yu and Ennion 2019: 2; Escorpizo *et al.* 2011: 126). In a review of 25 global articles pertaining to the vocational return of amputees, it was found that a decreased rate of vocational return may be a prospective consequence of a diminished ambulatory ability and physical capacity after an amputation (Darter *et al.* 2018: 657). Results vary with the rate of civilian vocational return; ranging from 48 percent-89 percent (Burger and Marinček 2009: 1323), while 10 percent-16 percent of military service members returned to military duty (Penn-Barwell 2011: 1475). The possibility of returning to employment decreased with age (Postema *et al.* 2016: 65; MacKenzie 2006: 688). This could be attributed to physical limitations, the reduced healing rate, and recovery time in elderly individuals (Darter *et al.* 2018: 662). A cross-sectional study conducted in Mumbai found that a positive psychological adjustment to amputation saw greater employment rates (Sinha *et al.* 2014: 77). Individuals who displayed low self-efficacy were less likely to pursue employment or be motivated in their current occupation (Darter *et al.* 2018: 662; MacKenzie 2006: 688). The review captured numerous salient points from various articles world-wide (Yu and Ennion 2019: 2; Darter *et al.* 2018: 662; Postema *et al.* 2016: 65; Sinha *et al.* 2014: 77). However, the bulk of the literature under review was not recent.

There is a paucity of South African literature on the vocational needs and rehabilitation of amputees. Godlwana (2009: 64) however, conducted a study in South Africa with 40 lower extremity amputees and found that 40 percent were unemployed, 30 percent were still employed, 10 percent were receiving a disability grant, 17 percent were on an old-age pension fund, and 2.5 percent were receiving a private pension. Individuals in the industry of carpentry, computer skills, motor mechanics and the manufacturing of prosthetics and orthotics reported requiring vocational training after their lower extremity amputation. Several amputees desire funding via disability grants as this is usually the primary source of income for lower extremity amputees (Godlwana 2009: 29; Amosun, Mutimura and Frantz 2005: 842).

The soaring unemployment rate in South Africa is a consequence of a plethora of environmental barriers. These included poor access to transportation and healthcare

facilities, low-income wages among disabled individuals, lack of knowledge and skills, and poor access to training and employment opportunities as a result of social isolation by disabled individuals (Gretschel, Visagie and Inglis 2017: 6; Schneider and I'Papi'Nkoli 2011: 90). Godlwana and Stewart (2013: 51) found that amputee participants in Gauteng reported facing financial challenges post-operatively as they were unable to work and support their families. Further, they could not apply for disability grants as they were unable to afford transportation to the clinics, did not want to burden their children who were low-income earners, and were concerned about the financial implications attached to rehabilitation (Godlwana and Stewart 2013: 51).

Individuals who lost their limb as a consequence of a motor vehicle accident reported unsuccessful results in obtaining financial compensation. Godlwana (2009: 29) stated that in South Africa, individuals who sustained an amputation as a result of a traumatic event, displayed the highest rates of unemployment. Amputees who returned to their preoperative work environment, tended to display a decreased work capacity while others had to change their roles and responsibilities (Darter *et al.* 2018: 662; Bosmans *et al.* 2007: 5). Similarly in the Western Cape, Gretschel, Visagie and Inglis (2017: 6) found that unemployment may carry a heavier weight on individuals in the 19–49-year age group as these are the economically active years of careers being built, compared to the older individuals who may be preparing for retirement.

South Africa's competitive job market makes employment opportunities extremely scarce and even more challenging to individuals with limb absence. In Yu and Ennion's (2019: 4) study in the Western Cape, the participants voiced that it would be quite beneficial if their rehabilitation programmes concentrated on improving access to the labour market. Furthermore, healthcare professionals should advocate for more job opportunities, and adequately rehabilitate amputees to have a decent chance to access the job market (Yu and Ennion 2019: 5). Further research is required to understand the vocational return of individuals with limb loss, particularly those within the 19-49-years of age as they would be furthest from retirement and most economically active.

2.5.5. Spirituality

According to the WHOQOL Group (1998: 1572), one of the five dimensions in the definition of health is spirituality. Spirituality is interweaved with and may influence the environmental, social, psychological, and physical dimensions (Peirano 2010: 53; Puchalski 2008: 39; The WHOQOL Group 1998: 1572), yet it seems to be the dimension receiving the least attention in comparison to the rest (Puchalski 2008: 36). Spirituality is an integral aspect of human nature because it is vital in the health status of patients and it helps the individual to achieve purpose and meaning in life (Eilami *et al.* 2019: 445; Ross *et al.* 2018: 65). Spirituality is an essential aspect of human development, and parallels the pursuit of significance and purpose during a period in one's life when prior sources of significance and purpose may be dwindling. Therefore, spirituality can bring serenity and tranquillity when one is experiencing the difficulties of life (Agli *et al.* 2018: 268). One may be at risk of depression, loneliness, and loss of meaning in life if one's spiritual health is compromised (Eilami *et al.* 2019: 445).

2.5.5.1. A powerful coping mechanism

In KwaZulu-Natal, Ramanand (2016: 155) used qualitative research methodology to focus on the childbirth experiences and the spiritual practices of 22 postnatal women. The participants explained that commitment to God and prayer were powerful coping tools that allowed them to manage the positive and negative aspects attached to the childbirth experience, and further strengthened their spirituality and religious faith (Ramanand 2016: 155). The author emphasised that it is crucial for healthcare professionals to be respectful and aware of patients' spiritual backgrounds and create spaces where patients can engage in their spiritual practices (Ramanand 2016: 157). These findings mirror earlier evidence in North America, where pregnant participants stated that chanting, praying, and reciting verses from the scriptures provided a great deal of confidence, blessings, guidance, and strength during the childbirth experience (Lydon-Lam 2012: 21; Adams and Bianchi 2008: 109).

Spirituality serves as an influential coping mechanism in the various issues precipitated by aging and disease (Dewi and Hamzah 2019: 147), owing to the development of positive feelings and thoughts, and enhanced hopefulness (Chaves and Gil 2015: 3650). The individuals with dementia, who sought beauty in nature and desired to find

the meaning of their lives through spirituality, exhibited an improved quality of life (Agli *et al.* 2018: 274). Imeni *et al.* (2018: 322) asserted that an effective method of relaxation is meditation, which provides relief of pain and augments the ability to manage psychological and physical issues. In an all-female study by Albertson, Neff and Dill-Shackleford (2014: 444), findings reflected that improved body image, and reduced feelings of shame and dissatisfaction with physical appearance were achieved through meditation.

The findings from the aforementioned studies, with respect to spirituality as a positive coping strategy concur with evidence from around the globe. In a systemic review of 11 international studies, which concentrated on the spirituality of individuals with Alzheimer's disease and Dementia, results indicated that one who believed that one's life is sustained by something or someone Higher i.e., God, experienced increased levels of comfort, relief, confidence, and adjusted better to their situation (Chaves and Gil 2015: 3646; Agli, Bailly and Ferrand 2014: 8; Dalby, Sperlinger and Boddington 2012: 4). Whilst enduring the challenges attached to cognitive impairment, it was found that spiritual practices such as holding onto faith, engaging in church activities, and prayer, enhanced the individuals' levels of positivity (Eilami *et al.* 2019: 445; Dewi and Hamzah 2019: 146; Iranmehr and Kadkani 2017: 32; Reis and Menezes 2017: 764). Spirituality seemed to play an integral role in the lives of the older adult population as it positively influenced the way they maintained their health and recovered from illness (Biccheri, Roussiau and Mambet-Doué 2016: 1196).

2.5.5.2. Trauma and spirituality

A qualitative study in Saudi Arabia with 13 lower limb amputees, found that spirituality was one of the crucial elements identified in their support system in adjusting to amputation (Abouammoh, Aldebeya and Abuzaid 2021: 411). The participants' spiritual beliefs facilitated their ability to cope, enhanced their spirituality, provided significance for their experience with disability and generated stability in their lives. Some participants believed that the amputation was a punishment from God for their sins (Abouammoh, Aldebeya and Abuzaid 2021: 411), while the participants in another Saudi Arabian study believed that illness was a test from God (Al-Mutair *et al.* 2014: 4). The participants who searched for meaning and purpose in life, chose to live with appreciation and happiness irrespective of their physical, social, and psychological

challenges associated with disability (Abouammoh, Aldebeya and Abuzaid 2021: 411; Treolar 2002: 599).

The results of an Iranian clinical trial conducted with 26 diabetic amputees by Imeni *et al.* (2018: 325), indicated that prayer and meditation as a coping strategy improved the physical and psychological well-being of the individuals who were concerned about their new body image post-amputation (Subrata 2020: S24). Spirituality offers support to individuals with amputation by enhancing their ability to accept the changes in their physical appearance and better adapt to new conditions emanating from amputation (Imeni *et al.* 2018: 323; Kalra *et al.* 2013: 389). Significantly, studies completed in the late 20th century saw individuals who belonged to religious and spiritual groups, exhibited increased levels of harmony, and purpose in life in comparison to non-spiritual groups (Riley *et al.* 1998: 258).

In Australia, Jones *et al.* (2018: 1) used focus groups to explore the role of spirituality in spinal cord injury rehabilitation. The healthcare professionals reported that prayer and meditation assisted patients in the adjustment process and offered them comfort. Faith, hope and purpose were significant sources of strength that helped patients to cope with the injury (Jones *et al.* 2018: 3). There is, however, a lack of local literature focusing on the spiritual domain in amputees' lives. Imeni *et al.* (2018: 322) found that an individual's ability to manage the amputation is an integral determinant of quality of life. Being spiritually inclined attenuated the sense of uncertainty on psychological adjustment in amputees (Eilami *et al.* 2019: 445; Matheis, Tulsky and Matheis 2006: 265). Spirituality as a coping mechanism instilled hope, meaning and purpose in life, confidence in problem-solving, acceptance, and reduced inclination to anger (Iranmehr and Kadkani 2017: 32).

Spirituality aids in replacing feelings of anxiety, stress, and despair with the aforementioned characteristics (Peirano 2010: 55). In a qualitative descriptive study conducted in Australia, Jones *et al.* (2018: 5) identified the following barriers to integrating spiritual care in health settings: time constraints, confusing spirituality with religion, insufficient expertise in addressing issues of spirituality, the belief that spirituality is a private matter. While these may be potential barriers to addressing the spiritual needs of patients and integrating spiritual care in practice, literature is rich with the efficacy of spirituality as a powerful coping mechanism (Subrata 2020: S24; Eilami

et al. 2019: 445; Dewi and Hamzah 2019: 146; Jones *et al.* 2018: 3; Iranmehr and Kadkani 2017: 32; Kalra *et al.* 2013: 389). Integrating spiritual care in prosthetic health settings would not only improve the spiritual well-being of amputees but also prove invaluable to their physical and psychological health. For these reasons, it is postulated that spiritual care should be woven into the services provided by prosthetists. This necessitates the need to devise trial spiritual care programmes to be subsumed specifically in prosthetic health settings. Upon establishing an effective programme offering promising results, new elective courses can be designed and introduced for prosthetists.

2.6. Conclusion

The literature review explored the various biopsychosocial factors affecting the quality of life of individuals post-amputation and with the prosthesis. In addition, an overview of the professional roles of the prosthetist was provided. The next chapter provides a synopsis of the research design, methods, and techniques that guided the research study. A description of the study sample, data collection procedures and ethical procedures are discussed.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Introduction

Research can be described as the way one goes about discovering answers to questions (Neuman 1997: 1). Research is a method or process of inquiry that adds to the body of knowledge on a specific activity or field of practice, which is presently unknown (Swain 2017: 5). There are different research techniques used by researchers in various fields to generate knowledge and solve problems, given that the search for answers to important questions is likely to always continue (Johnson and Christensen 2012: 3). According to Kothari (2004: 8), research methodology is a manner to "systemically solve the research problem," which comprises the different steps undertaken by the researcher in studying the research problem, in conjunction with the rationale behind it.

This chapter provides a detailed justification of the research design, sampling strategies, and data collection techniques used to identify the research participants, sampling procedures, methods of data collection, and the data collection instruments. Furthermore, the ethical considerations and limitations of the study are described.

3.2. Research design

There are three primary approaches a researcher may adopt towards their research study, namely a qualitative, quantitative, or mixed methods approach (Kothari 2004: 5; Neuman 1997: 30). Mixed research involves the combination of qualitative and quantitative approaches, methods or concepts in either a single research study or a set of linked studies (Johnson and Christensen 2012: 51). A quantitative research style is characterised by a value-free inquiry framework (Denzin and Lincoln 1994: 4), engaging with numerous subjects and cases with the researcher detached from the study (Neuman 1997: 14). Thus, a quantitative approach was not appropriate as the researcher intended to elicit rich information based on participants' experiences in accordance with the objectives outlined.

For the purpose of this study, a qualitative research approach was adopted as it was considered the most appropriate to explore the effects of the prosthesis and ways in which the prosthetist may potentially contribute to the quality of life of transtibial amputees. A qualitative study does not seek facts, but is used rather to understand, explore, and describe feelings and experiences (Kothari 2004: 3). Qualitative research involves an interpretive naturalistic approach to its subject matter (Denzin and Lincoln 1994: 2). This study was interested in the contextualisation and detailed interpretation of rich human experience with respect to the psychosocial, environmental, and physical challenges faced by amputees. The data collection methods for qualitative research approaches include, but are not limited to one-on-one interviews, direct observation, document analysis, focus group discussions, and personal experience (Denzin and Lincoln 1994: 14).

The study was exploratory in nature, as it was used to understand the amputation experience which is not clearly understood. It aimed to explore the depths of the research topic by focusing on each domain of quality of life both post-operatively and with the prosthesis. In addition, the study explored the services provided by prosthetists to improve the physical and psychosocial well-being of amputees. This type of design was also used to help provide a deeper understanding of the existing issues associated with prosthesis-use. Exploratory research also answers questions such as why, what, and how (Stebbins 2001: 2).

3.3. Study setting

This study was conducted at one of the Department of Health's facilities in the greater eThekwini Metropolitan Municipality, KwaZulu-Natal Province. This district facility services several catchment areas including Jacobs, Montclair, Wentworth, Merebank, Bluff, Cato Manor, Umbilo, and Yellowwood Park. The medical facility in question has several departments that provide quality care and service to patients, namely dietetics, psychology, physiotherapy, mental health (psychiatry clinic), prosthetics and orthotics, family medicine, and social work. Also located at the facility is a sectioned-off institute established by the Durban University of Technology offering a Work Integrated Learning (WIL) programme for medical orthotic and prosthetic students.

3.4. Study population

The large pool of cases or elements under study is referred to as the population, and it plays an integral role during sampling (Neuman 1997: 202). The population that was selected was based on a specialised set of characteristics that they possessed. To select the most relevant population, the researcher needs to consider and determine which group of individuals he/she wants to describe, explore, or define with respect to experiences and feelings. Researchers usually aim to compare the views and opinions of different groups, so that the population that will be studied must include the various groups of interest (Weisberg, Krosnick and Bowen 2016: 32).

This study used two samples, namely medical prosthetists and transtibial amputees from the orthopaedic department at the respective medical facility. The medical prosthetists were drawn from the Department of Health's working staff of 40 prosthetists, whilst the transtibial amputees were accessed from the large database of approximately 400 transtibial amputees (during August and September 2021). About 150-200 transtibial amputees visit the hospital per month, which translates to an estimated 2,200 per year.

3.5. Sampling strategy

3.5.1. Sampling

Sampling involves systematically choosing or selecting cases that meet the inclusion criteria of the research study (Neuman 1997: 201). The sample is a subset of the target population. This study comprised two sample groups that were sourced from the aforesaid populations.

Qualitative research studies focus on securing information richness from participants with regards to their experiences. A qualitative research approach seeks to gain an in-depth understanding and give meaning to human experiences and their situations (Vivar *et al.* 2007: 64). For this reason, a smaller sample was selected to attain information richness with regards to exploring the biopsychosocial and spiritual effects of an amputation experienced by individuals with limb loss. The sample size is dependent on several factors such as the nature of the topic, the scope of the research

study, study design, sampling method, the amount of useful information obtained from the participants, and the quality of data (Dworkin 2012: 1319).

3.6. Sampling process

Non-probability sampling approaches are generally used in qualitative studies (Bloor and Wood 2006: 153). Non-probability sampling focuses on selection-based reason (Weisberg, Krosnick and Bowen 2016: 40). Researchers are interested in the intricacies of the sample being studied. Hence, in exploratory studies, where the intention of a study is to find out if an issue exists in an inexpensive and quick way, non-probability sampling is particularly useful (Wolf *et al.* 2016: 331).

The researcher used purposive sampling, which is a non-probability sampling strategy. The researcher chose the participants by relying on her judgement about who would be the most valuable (Bloor and Wood 2006: 154). Purposive sampling has a specific goal and focuses on certain types of participants with particular characteristics. Accordingly, the sample that will be investigated is usually relatively small (Wolf *et al.* 2016: 331). This sampling technique is effective, and the success of these studies is reliant on the careful selection of participants (Weisberg, Krosnick and Bowen 2016: 40). Purposive sampling is more affordable, time effective and enables researchers to draw a large amount of information from the data collected (Rai and Thapa 2015: 9-10; Acharya *et al.* 2013: 332).

There are two samples in this research study. The researcher used purposive sampling to recruit both samples. Participants for both samples were specifically recruited to meet the study's objectives, to ensure that the data being collected would help the researcher in drawing accurate conclusions to the research questions.

3.6.1. Data saturation

Data saturation is reached when there is sufficient data collected to replicate the study (Fusch and Ness 2015: 1408), and the data no longer discloses new properties of the researcher's core theoretical categories. If at this point not all the participants have been interviewed, they will still be interviewed for purposes of trustworthiness (Dworkin 2012: 1319). Although an initial sample of 10 participants was identified for sample 1,

data saturation was not achieved. Hence, more participants were interviewed to achieve saturation.

Considering the aforementioned factors, eventual sample sizes are discussed below.

3.6.2. Sample 1: Unilateral transtibial amputees

Sample 1 consisted of the unilateral transtibial amputees. Participants were drawn from a list of transtibial amputees scheduled for appointments at the respective medical facility between August and September 2021. The researcher aimed to start with a sample of 10 transtibial amputees. However, data collection continued until data saturation was reached at the 14th transtibial amputee participant.

A request was made for prosthetists to provide the contact details of patients who met the inclusion criteria and were willing to participate in the study. The prosthetists were also informed about a flyer (Appendices E1 [English version] and E2 [isiZulu translation]) in the waiting room that patients could be referred to, for them to be aware of the study.

3.6.3. Sample 2: Prosthetists

Sample 2 consisted of medical prosthetists. Participants were recruited from the Orthopaedic Department at the respective medical facility. An initial sample of 16 prosthetists was recruited. Data were collected until saturation was reached during the 16th interview.

The samples, along with their sizes and corresponding objectives, are shown in Table 3.1.

Table 3.1: The relationship between the samples and the objectives of the study

Sample	**Sample size**	**Objectives**
1. Unilateral transtibial amputees	n=14 Data were collected until saturation was reached.	1. To explore the biopsychosocial and spiritual effects of an amputation on individuals post-surgery. 2. To understand what motivated amputees to consider the use of a prosthesis. 3. To explore the challenges and benefits transtibial prosthetic users experience in their daily lives. 4. To explore the ways in which the prosthetist may be able to improve the holistic well-being of the amputee.
2: Prosthetists	n=16 Data were collected until saturation was reached.	3. To explore the challenges and benefits transtibial prosthetic users experience in their daily lives. 4. To explore the ways in which the prosthetist may be able to improve the holistic well-being of the amputee.

3.6.4. Inclusion and exclusion criteria

Inclusion criteria can be defined as the significant features of the target population that the researcher will use to answer the study's research questions (Patino and Ferreira 2018: 84). Whilst exclusion criteria can be described as those characteristics of the study's potential participants who meet the inclusion criteria but display additional features that could impede the success of the study or increase the risk for an adverse outcome (Patino and Ferreira 2018: 84).

3.6.4.1. Sample 1

The amputee participants were recruited based on the criteria shown in Table 3.2.

Table 3.2: Inclusion and exclusion criteria for sample 1

Inclusion criteria	➢ Unilateral transtibial amputee (long, standard or short) ➢ Ages between 25 and 75 years ➢ Amputation surgery was performed before January 2018 ➢ Regular use of the prosthesis over a period of one year ➢ No symptoms of Post-Traumatic Stress Disorder
Exclusion criteria	➢ Bilateral transtibial amputee ➢ Aged younger than 25 years or older than 75 years ➢ Amputation surgery was performed after January 2018 ➢ Inconsistent use of the prosthesis over a period one year ➢ Less than one year of successful use of prosthesis ➢ Symptoms of Post-Traumatic Stress Syndrome

All the patients consult with a psychologist prior to their referral to the prosthetist at the medical facility. Thus, any patient presenting with Post-Traumatic Stress Disorder (PTSD) or any other mental illness, have their details captured in their file that is forwarded to the prosthetist. This data was used to exclude any patient presenting with mental distress from participation, due to their vulnerability. If emotional distress was to be visible during interviews, the patient could be referred to the Counselling Division of the hospital. However, this did not occur during the interviews due to the researcher's careful selection of participants.

3.6.4.2. Sample 2

The prosthetist participants were recruited according to the criteria shown in Table 3.3.

Table 3.3: Inclusion and exclusion criteria for sample 2

Inclusion criteria	➢ Ages between 25 and 60 years ➢ More than three years of experience as a certified HPCSA Medical Orthotist and Prosthetist ➢ Have treated more than 20 transtibial amputees
Exclusion criteria	➢ Aged younger than 25 years and older than 60 years ➢ Less than three years of experience as a certified HPCSA Medical Orthotist and Prosthetist ➢ Have treated less than 20 transtibial amputees ➢ Not a certified HPCSA Medical Orthotist and Prosthetist

3.7. Data collection process

Data were collected using two methods, namely semi-structured in-depth interviews and a focus group discussion. In-depth interviews using an interview guide (Appendices D1 [English version] and D2 [isiZulu translation]) and a discussion using a focus group guide (Appendix D3) was utilised for sample 1 and sample 2, respectively.

3.7.1. Sample 1: Semi-structured in-depth interviews

Semi-structured interviews, with open-ended questions are generally used in qualitative studies (Whiting 2008: 35). The use of open-ended questions helps the researcher to collect rich data. Semi-structured interviews comprise several important predetermined questions that aid in describing and defining specific areas to be explored (Whiting 2008: 36). This method also allows the researcher to deviate to pursue a response or an idea. The questions were funnelled; they started off as broad,

flexible, and open-ended and were then narrowed down to predetermined questions. The flexibility of this approach allows the researcher to discover or elaborate on material that may not have previously been thought of by the researcher (Neuman 1997: 33). Hence, semi-structured interviews were chosen as an appropriate data collection technique for sample 1 because the intent was to understand the effects of amputation, the amputees' adaptation to the prosthesis, and their relationship with the prosthetist.

3.7.2. Sample 2: Focus group discussion

A focus group discussion was used to collect data from sample 2, namely the prosthetists. Focus group discussions have several mutual features with less-structured interviews. A focus group is typically a group discussion on a particular subject matter organised for research purposes (Wong 2008: 256). The discussion is guided, monitored, and recorded by the researcher, also titled facilitator/ moderator (Nyumba *et al.* 2018: 21). The questions are funnelled; they start off as general, flexible, and open-ended, and are then narrowed down to more specific questions (Casey and Krueger 1994: 77).

The focus group method was chosen as it allowed the researcher to generate data on collective views and opinions as well as the meanings and reasons behind them. This procedure is deemed useful in generating a rich understanding of participants' beliefs and experiences (Nyumba *et al.* 2018: 25; Wong 2008: 256). Focus groups offer the added element of interaction and communication between the members (Wong 2008: 256). The researcher ensures that due consideration is given to the group mix relative to age, sex, social views, or professional status (Nyumba *et al.* 2018: 22; Casey and Krueger 1994: 77). Hence, this data collection method was considered the most suitable to collect data from the prosthetists.

Both interview guides (Appendices D1, D2 [isiZulu translation], and D3) were pilot tested with similar samples and refined in accordance with suggested changes before data were collected. This is discussed in the subsection that follows.

3.8. Data collection instruments

The following research instruments were used during data collection, namely the researcher, an interview guide, and focus group discussion guide.

3.8.1. The researcher as key instrument

As opposed to the quantitative researcher, the qualitative researcher methodically observes individuals and experiences with the purpose of discerning and learning about behaviours and communications in natural settings. Such observation exemplifies the idea of the researcher as the key instrument of the qualitative inquiry. It entails going into specific settings and detailing and analysing what has been observed. This valuable method has been informative and insightful in health care settings (Mays and Pope 1995: 182). Since the researcher was the principal instrument, sufficient training, experience, and careful preparation were undertaken prior to data collection to ensure researcher credibility (Patton 1999: 1198).

3.8.2. Interview guide

An interview guide was used to collect data from sample 1 (unilateral transtibial amputees). The guide was formulated before the semi-structured in-depth interviews were conducted (Knight 2013: 1). It comprised a list of high-level topics and questions which the researcher could direct the conversation. These topics centred on the research questions. The guide assisted the researcher to focus, organise their line of thinking, and in what sequence to pose the questions (Kennedy 2006: 1). The length of the questions needs to be considered for the participant to have sufficient answering time without being hurried (Knight 2013: 1). The interview guide used for sample included an English (Appendices D1) and isiZulu translation version (Appendix D2). The guide included questions regarding pre- and post-operative activities, challenges faced while using the prosthesis, the patient-clinician relationship, and the quality of the prosthesis.

3.8.3. Focus group discussion guide

The focus group discussion guide, also referred to as a topic guide, was the instrument used in the focus group interview. It is termed a guide rather than a questionnaire because it is essentially supposed to serve as a guideline for the interview questions. The moderator may choose to deviate from the guide and shift the focus to different and interesting areas of discussion. It is imperative to formulate a well-designed guide that accounts for introductions, asking questions and the sample size to ensure that adequate answering time is allocated to each participant and that sufficient data has been collected (Wong 2008: 257). Used for sample 2, the focus group discussion guide (Appendix D3) comprised questions relative to the patient-clinician relationship, consulting and manufacturing experience, quality of the prosthesis, character of a prosthetist and willingness to further educate themselves for the benefit of the patients' well-being.

3.8.4. Reflexive diary

The researcher may choose to make extensive notes during or after the interviews. A reflexive diary or self-reflexive journal is a valuable research tool that can be defined as a written or verbal personal record transcribed by the researcher. A reflexive diary was used during the current study. Once a participant had been interviewed, the researcher logged her own refined understanding and observations of the participant's responses, feelings and experiences which enriched and provided context to the data collection methods (Janesick 1998: 3).

3.8.5. Audio recorder

The use of audio recorders is a common technique of recording interview data (Whiting 2008: 36). This simple and effective technique provides the researcher with a permanent record of the interview, which is a valuable reference when transcribing the interviews. The researcher is liberated from the distracting task of notetaking during the interview and can focus on interacting with the participant. An audio recording technique ensures a verbatim and accurate transcription of the interview (Whiting 2008: 37). Considering these benefits, a digital recorder was used during the one-on-

one interviews and the focus group discussion. The researcher obtained written consent from all the participants to audio record the interviews.

3.9. Procedure for data collection

This section details the procedures undertaken by the researcher to obtain ethical clearance from the Institutional Research Ethics Committee (IREC) at the Durban University of Technology (DUT), and to inform and receive consent from the amputee (sample 1) and prosthetist (sample 2) participants.

3.9.1. Obtaining ethical clearance from IREC

The procedure to obtain ethical clearance from the KwaZulu-Natal Department of Health was implemented in consultation with the Deputy Director of the Health Research and Knowledge Management Unit.

- Both, the CEO of the medical facility and the HOD of the Orthopaedic Department at the medical facility, were contacted to obtain provisional approval for the interviews to be conducted on the hospital premises. This was done as a preliminary step to obtain permission to conduct interviews with amputees and prosthetists at the hospital.

- Once provisional approval was obtained, the CEO's and HOD's letter of permission were attached to the proposal and sent to DUT IREC.

- The next step was to secure DUT IREC provisional approval with the study code. Once this was obtained, all necessary documents (i.e., the research proposal, provisional approval from IREC and the appendices) were uploaded onto the KwaZulu-Natal Department of Health website and the researcher awaited full approval.

- After full approval was granted by the KwaZulu-Natal Department of Health, the permission letter was sent to DUT IREC.

- After receiving full approval and an ethics clearance number from DUT IREC (119/20) in November 2020, the researcher was eligible to commence data collection.

3.9.2. Sample 1: Unilateral transtibial amputees

Once permission was secured from all respective gatekeepers, namely the medical facility's CEO, the HOD of the Orthopaedics Department and the KwaZulu-Natal Department of Health, a flyer (Appendices E1 [English version] and E2 [isiZulu translation]) was pinned to the notice board in the orthopaedics department at the medical facility. The flyer provided pertinent details such as the title of the research study, the inclusion criteria to participate, the two months in which the interviews would take place, the interview location, the duration of the interview, and the researcher's contact details. If the amputee wished to participate in the study, they contacted the researcher whose number was displayed on the flyer or informed their prosthetist. The prosthetists were also asked to inform patients of the study if they met the inclusion criteria. The names and contact details of willing participants were then provided to the researcher. Once the researcher had been contacted or had contacted the patient, an interview date was set.

Due to coronavirus disease 2019 (COVID-19), several patients chose not to attend their appointments at the medical facility, which negatively impacted the recruitment of participants. Hence, the secretary in the Orthopaedics Department at the medical facility assisted in recruitment by identifying patients in the amputee database based on the inclusion and exclusion criteria. Once the patients were selected, the secretary contacted them telephonically to inform them about the current research study. Patients willing to participate were required to provide verbal consent to allow the secretary to forward their contact details to the researcher. The researcher then telephonically contacted all consenting participants and arranged for a suitable interview date. All the participants were informed that the interview would take place either at their home or in a public setting, depending on their preference. In addition, if participants were unable to meet for a face-to-face interview, they were given the option of virtual interviews either through telephonic contact, a Microsoft Teams call or a WhatsApp videocall.

The researcher conducted in-depth interviews over a period of approximately two months. Data were collected until saturation was achieved. All 14 participants were interviewed face-to-face; ten were interviewed at the medical facility and four in the

participants' residences. Hence, no interviews were conducted via telephonic contact, a Microsoft Teams call or a WhatsApp videocall.

3.9.3. Sample 2: Prosthetists

The HOD of the Orthopaedics Department at the medical facility gathered his prosthetist staffing members together for a meeting, which was hosted by the researcher. The researcher informed the prosthetists about the study's aim, objectives, and the inclusion criteria. If they met the inclusion criteria and wished to participate in the study, they were notified of the upcoming date of the focus group discussion. A date was set on the basis of the prosthetists' availability for the focus group interviews. The focus group discussion was conducted face-to-face on one day.

3.10. Data collection process

3.10.1. Sample 1: Unilateral transtibial amputees

The contents of the Letter of Information (Appendices B1 [English version] and B2 [isiZulu translation]) were presented to and discussed with the transtibial amputee. The participant was then required to sign the consent from (Appendices C1 [English version] or C2 [isiZulu translation]) before the interview began, if they wished to participate.

Depending on the individual's preference, the Letter of Information (Appendices B1 [English version] or B2 [isiZulu translation]) was sent using electronic mail or WhatsApp, to the transtibial amputee and discussed telephonically if necessary. Participants who opted for at home interviews were informed of the study details at their home/ preferred meeting site and were required to sign the consent form (Appendices C3 [English version] or C4 [isiZulu translation]). Consent forms were emailed to those participants who wished to have virtual or telephonic interviews, or public setting interviews. All signed consent forms were required to be electronically sent to the researcher prior to the date of the interview.

Participants for sample 1 (unilateral transtibial amputees) were interviewed individually using the interview guide (Appendices D1 [English version] or D2 [isiZulu translation]). The interviews lasted approximately 45 minutes. The researcher used an audio-

recorder to record the interviews where permission was granted for same. Alternatively, field notes were taken. A reflexive diary was used during data collection.

3.10.2. Sample 2: Prosthetists

A Letter of Information (Appendix B3) was presented to and discussed with the prosthetists. If they were willing to participate in the study, the consent form (Appendix C1) was used for each prosthetist to receive signed consent before the commencement of the focus group discussion.

A focus group guide (Appendix D3) was used to direct the focus group discussion, which lasted for approximately 50-55 minutes. An audio recorder was used to record the discussion when permission was secured for same from all. Field notes were taken, and a reflexive diary was also used after the discussion.

3.10.3. COVID-19 regulations

The following protocols were implemented to ensure that the health and safety regulations linked to COVID-19 were observed.

Entering the Orthopaedic Department: The study was aligned to the medical facility's protocols, in which any persons entering the facility could only do so if they were wearing a protective mask covering their nose and mouth. A temperature screening process was completed by a security guard, which then allowed the participant access into the facility. Once they presented themselves to the Orthopaedic Department for commencement of the interview, their temperatures were verified. If the individual's temperature was at 38°C or above, the individual was then sent to the doctor at the facility for testing.

Preparation of the interview setting: The interview location was an available clinic room at the time of the interview, which the researcher had prearranged with the HOD (Orthopaedic Department) at the medical facility. The room door was closed to prevent outside noise, ensure privacy, and create a comfortable atmosphere for the interviewee. The researcher sanitised the table and chairs prior to the interview. Safe social distancing between the researcher and interviewee was always maintained. A minimum distance of approximately 1.5m-2m was implemented across the interview

table. If more than one interview took place on the same day, the table and chairs were sanitised before and after each interview. If only one interview was being conducted, the table and chairs were sanitised after completion of the interview. The researcher wore gloves at all times. Gloves were also made available for each participant. This was to ensure strict hygiene measures since there was a physical transfer between the researcher and the interviewee during signing of the consent form. Masks were available for each interviewee, although this was not necessary due to strict hospital protocols. A hand sanitiser was also available for use. To express gratitude for participation, a cooldrink was made available by the researcher for each participant.

For home and public setting interviews, strict COVID-19 protocols were followed. The interview date was only set if the interviewee had not attended any social gatherings within the past 14 days of the interview date. The researcher wore full personal protective equipment, and the interviewee was required to utilise their mask and any other protective gear they wished to wear. The interviewee's temperature was checked before the interview and if it was 38°C or above, the interview was cancelled. All the participants' temperatures were normal and therefore, no interviews were cancelled. Furthermore, the participant was required to seek medical attention. Safe social distancing between the researcher and interviewee was always maintained. A minimum distance of approximately 1.5m-2m was implemented across the interview table/ setting.

The translator: The translator also had their temperature checked before entering the hospital. They were sitting at an approximate distance of 1.5m-2m from the researcher and the interviewee. Further, the translator was also required to sign a confidentiality agreement (Appendix F) to keep all interviewee data strictly confidential. Hence, the translator was requested not to discuss any data received from the interviewees with anyone.

Preparation of the focus group setting: The focus group interview was held in the lecture room at the Orthopaedic Department. This allowed for a group of prosthetists to sit in the same room. In keeping with COVID-19 regulations, a distance of 1.5m was maintained between each prosthetist, thereby allowing a single seat to separate each prosthetist from the next. Only alternate rows were used.

Data storage: All physical (consent forms) and verbal (digital recorder) data collected during the interviews from the participants were safely kept by the researcher after the interviews, using specific storage systems.

3.11. Data capturing and analysis

This section provides an overview of the techniques used to capture data during the one-on-one interviews and focus discussion, and the method used to analyse the data collected.

3.11.1. Data capturing

For both samples, the interviews and focus group discussion were audio recorded using a digital recorder. Participants were notified prior to the study in the Letter of Information (Appendices B1 [English version], B2 [isiZulu translation], or B3) followed by retrieval of written consent (Appendices C1 [English version], C2 [isiZulu translation], C3, or C4 [isiZulu translation]). At the end of each interview, the audiotapes were specifically labelled using titles that were not easy to link to a particular participant. This ensured easy accessibility for the researcher whilst keeping it organised and confidential. The researcher also took field notes, which helped them to keep track of relevant information.

The audiotapes were electronically stored on the researcher's personal laptop using a password protected system and these will be permanently deleted by the researcher after five years. Any hardcopy materials were stored in the researcher's home cabinet and locked during and after the study. The researcher will be the only individual to have access to this cabinet. Five years after the study completion, the hardcopy data will be shredded by the researcher.

Transcribing each interview word-for-word was completed by the researcher as precisely and as soon as possible, because the researcher would be able to discern when saturation has been reached. Verbatim transcriptions were also completed for the focus group discussion. Once all the interviews had been transcribed, the researcher listened to each interview recording again to simultaneously examine it against the transcribed data. This ensured rigour and accuracy of the transcribed data.

Additionally, the researcher was by then familiar with the findings to get a holistic view of the richness of the data collected.

Data analysis began at the commencement of data collection, indicating that the researcher was able to form themes and notice patterns while the interviews and focus group discussion were being conducted. While each interview and focus group discussion was recorded using a digital recorder, field notes were taken during each session to further enrich the data collected. Following each session, the researcher manually transcribed the responses from all the participants. Manually transcribing the interviews allowed the researcher to become familiar with data, have an accurate and reliable record of the interviews, and to consider non-verbal information from the participants (Evers 2011: 20).

3.11.2. Data analysis

The data analysis technique that was utilised in this study was thematic analysis. It is the most common method for qualitative studies and focuses on identifying the recurring issues and main themes that emerge from the data obtained. The main themes should summarise all the views that the researcher has collected. Thematic analysis offers a particularly flexible approach, which can be modified according to the needs of a research study, thereby providing a thorough and rich yet intricate report of data (Nowell *et al.* 2017: 2). This flexible method was chosen because it is a truly comprehensive analysis and ensured that the analysis did not only concentrate on the atypical extracts of the data (Bricki and Green 2007: 25). Each interview with the amputees and the responses from each prosthetist during the focus group discussion were analysed individually, followed by analysis of each sample group and thereafter, between the two samples.

The key stages of thematic analysis

The following key stages were applied to the process of analysis:

Stage One: Familiarisation with the data

During this basic stage of the analysis procedure, preliminary observations were made. This was particularly useful with the first few transcripts where the researcher was still

trying to get a feel for the data. The transcripts were read and re-read. The researcher made notes and jotted down any impressions.

Stage Two: Generating initial codes

The next step entailed organising the data in a meaningful and systematic way. The researcher utilised open coding, which implied that there were no pre-set codes. This meant that the codes were developed and modified as the researcher worked through the coding process. Each segment of the transcript that was relevant or significant to or addressed the research question was coded.

Stage Three: Searching for themes

A theme is a pattern that captures something significant or interesting about the data and/or the research question. The codes were examined to identify common and recurring themes that were generated in the study. The themes were predominantly descriptive, which meant that the described patterns in the data were related to the research question. The codes were either associated to one particular theme or more than one depending on the data collected.

Stage Four: Reviewing the themes

During this stage, the preliminary themes were reviewed, modified, and developed. All the data relevant to each theme were gathered using Microsoft Excel. The researcher then considered whether the data associated with each theme supported it and then deliberated how the themes worked within a single interview and across all the interviews.

Stage Five: Defining the themes

This stage involved the final refinement of the themes, and the aim was to identify what each theme was about. The themes and sub-themes were under constant and intense scrutiny by the researcher. This deep level of total engrossment allowed the researcher to gain insight into the personal experiences of the participants by becoming thoroughly immersed in the data collected. Further perusal of the themes and sub-themes generated, allowed the researcher to check for correlation within them.

Stage Six: The write-up

Finally, the researcher had to write up the analysis of the findings made.

3.12. Trustworthiness of the study

In a qualitative research study, trustworthiness refers to the way in which the researcher develops strategies for the findings to be worth consideration by readers (Amankwaa 2016: 121). Guba (1981: 80) proposed the four major components involved in ensuring the establishment of trustworthiness in a qualitative research study, namely credibility (internal validity), confirmability (external validity/ generalisability), dependability (reliability), and transferability (objectivity) (Shenton 2004: 64). How these components were used to enhance trustworthiness in the current study is elucidated below.

3.12.1. Credibility

Credibility describes how confident the researcher is in the truthfulness of the qualitative study's findings. The researcher must depict how the findings are accurate and true. Credibility of the findings can be shown by using triangulation (Houghton *et al.* 2013: 13). Credibility was achieved through triangulation as a wide range of participants were interviewed; there were two data sources for this study. Furthermore, two methods were used to collect data (individual interviews and a focus group discussion). The researcher also ensured that all the participants' experiences, including divergent responses, were respected and reflected in the presentation and analysis.

In addition, credibility was achieved through member checking. According to Shenton (2004: 68), checking of data may take place at the end of the data collection or even at the end of each interview. Following the interview session, the participants and researcher listened to the audio recorded dialogue of the interview to allow the researcher to check that the participant's responses were clearly understood. Further, the participant will be able to consider whether their statements have been clearly and correctly communicated. This ensured that accurate transcriptions occurred. For the interviews with isiZulu speaking participants, the translator was present during member checking.

3.12.2. Confirmability

The degree of neutrality of the research findings can be described as confirmability. This implies that the findings are not based on personal motivations of the researcher but rather responses from the participants. Researcher bias must be monitored as this will skew the interpretation of what has been said by the participants to fit a specific narrative. An audit trail was kept to establish confirmability which showed that the participants' responses were accurately portrayed in the findings. This highlighted each step of data analysis that was performed in order for a rationale to be provided for the decisions made (Houghton *et al.* 2013: 14). In addition, confirmability was ensured through consistent maintenance and perusal of notes made in the reflexive diary.

3.12.3. Dependability

Dependability is defined as the extent to which the study can be repeated by other researchers and that the findings would be consistent. Essentially, this implies that if another researcher desires to repeat one's study, one's research report should contain adequate information for them to do so and obtain similar results as one's study did (Houghton *et al.* 2013: 14). Dependability can be established with inquiry audit which entails an outside individual (auditor) reviewing one's study to verify that results were consistent and authentic, and one's study can be repeated (Amankwaa 2016: 126; Houghton *et al.* 2013: 14). After data collection, the findings were presented to a prosthetist colleague to validate them.

3.12.4. Transferability

The degree to which the researcher demonstrates the applicability of the study findings to another similar setting, population or context, is known as transferability (Houghton *et al.* 2013: 16). The researcher is responsible for providing comprehensive descriptions to allow readers to make informed decisions about the transferability of the findings to their specific settings or contexts. It is imperative that the researcher creates 'thick descriptions' encompassing the research methods, explanations of the context and examples of raw data which enables readers to consider their interpretations (Amankwaa 2016: 125; Houghton *et al.* 2013: 16). Detailed and appropriate information pertaining to the study's context, research methods and

primary data was provided for the reader to evaluate the transferability of the findings. Verbatim quotes from the amputee and prosthetist participants were used to create a rich understanding of the context for the reader. To enhance transferability, a detailed presentation of the findings was produced.

3.13. Ethical considerations

Given that the objects of the inquiry were human subjects, ethical issues were considered to ensure the safety of all the participants. This guaranteed that their human rights were not violated. These practices also protect the researcher against any legal implications with regards to behaviour that may be deemed unethical.

3.13.1. Beneficence

Regarding the ethical dimension of the study, one of the main ethical considerations is beneficence. No psychological (humiliation, embarrassment, and emotional distress) or physical harm (physical discomfort) were inflicted on any participants in this study. If any participants were seen to display adverse reactions during the interviews or group discussion, they were permitted to elect to immediately withdraw from answering questions or participate in the study. Evidence suggests that participants openly discuss and disclose personal issues when the researcher is an active listener (Weisberg, Krosnick and Bowen 2016: 359). Given that sensitive topics were addressed in the interviews, participants who experienced any emotional discomfort could be referred to the psychology department at the medical facility. psychologist who was immediately made available for them. However, no participant in this study required the assistance of a psychologist.

3.13.2. Voluntary participation

Participants were made aware of two important facts, namely they could participate in the study on a voluntary basis and they could withdraw from the study at any point in time. This was important to avoid coercion as individuals should not be asked to participate in a study where they feel pressurised into participating (Swain 2017: 86). Consent forms (Appendices C1 [English version], C2 [isiZulu translation], C3 [English

version], or C4 [isiZulu translation]) were signed by each participant before the commencement of the interviews and the focus group discussion.

3.13.3. Informed consent

Informed consent for voluntary participation was obtained to guarantee that all the human subjects who chose to participate in the study, did so on their own accord. The participants needed to be fully competent and free from any coercion when making any decision concerning participation. Consent was obtained in a written format and signing of the form was imperative. Informed consent brings certainty to the participant on the exact procedures to take place during the study and any potential risks that may arise such as any physical or emotional discomfort, invasion of privacy or threat to dignity. This was obtained once the participant had been carefully informed about the study in a verbal discussion and written document (Appendices B1 [English version], B2 [isiZulu translation], or B3) (Weisberg, Krosnick and Bowen 2016: 357).

3.13.4. Anonymity, confidentiality, and privacy

The absolutist stance argues that the respect and maintenance of anonymity and confidentiality of the participants is imperative, which means that no information can be shared between the researcher and unauthorised personnel. Specific measures were implemented to protect the identity and data pertaining to the participants as well as the data collected. Hard copy data were locked in the researcher's home cabinet for the duration of the study. All the hard copy data will be shredded by the researcher after five years. Electronic data were stored on the researcher's laptop and encrypted. Further, the electronic data will be destroyed by the researcher after five years. This is in keeping with DUT research protocols.

3.13.5. Respect

The researcher was sensitive to the power they held. A trustworthy environment is important for the participants, and hence a respectable demeanour was adopted by the researcher. No friendship should arise between the researcher and the participants, and this requirement was observed. The researcher respected the

individual experiences, knowledge and expertise of all amputee and prosthetist participants in this study.

3.14. Limitations of the study

A limitation of the current study related to the COVID-19 pandemic:

- COVID-19 posed a threat to potential participants as patients felt apprehensive about leaving the safety of their homes to come into contact with any individuals, or even enter a hospital. This slowed down the data collection process because patients did not frequently come into the medical facility. To mitigate this challenge, the researcher conducted interviews at participants' residences.

3.15. Conclusion

In this chapter, the researcher described the study's methodology. A detailed account of the design, methods and techniques used to select participants, collect and process data, and present and analyse the findings was provided. The chapter was concluded by reflecting on the techniques used to achieve trustworthiness in the study, and ethical considerations that ensured participant safety and respect. The chapter that follows provides a critical analysis and an in-depth discussion of the research findings collected from the one-on-one interviews and a focus group discussion.

CHAPTER FOUR
ANALYSIS AND DISCUSSION OF FINDINGS

4.1. Introduction

The purpose of this chapter is to illuminate the findings on the amputation experience post-surgery and the use of a prosthesis. Clarke and Braun (2018: 3) articulated the idea of a theme as a "central organizing concept," while DeSantis and Ugarriza (2000: 357) described the term as "active creations of the researcher." Six themes and 18 detailed sub-themes emerged from the rich data that was obtained from the participants (amputees and prosthetists). The major themes derived from the findings encompass the objectives of the study, namely the effects of amputation following surgery, the role of spirituality, the impetus behind procuring a prosthesis, prosthesis-use, the patient-prosthetist relationship, and the contribution of the prosthetist. The combination of a comprehensive discussion and verbatim excerpts from the participants provides a heightened understanding of each theme.

4.2. Demographic profiles

4.2.1. Sample 1

The amputee participants were within the ages of 25 and 75, with the average age being 57 years. Of the 14 unilateral transtibial amputees recruited for sample 1, 10 were males and four were females. The predominant race was Black with eight participants, followed by five Indian participants and one White participant. The main indication for amputation amongst nine of the amputees was complications associated with diabetes, followed by trauma (four) and malignancy (one). Most of the participants for this sample had undergone an amputation within the last decade.

The demographic findings, irrespective of race, corroborate with that of Uytman's (2014: 45) study in Edinburgh, where amputation was more prevalent amongst males than females. The leading cause of amputation among the participants was vascular disease, as a result of diabetes (Uytman 2014: 45). Similarly in a local study by Godlwana (2015: 46), 60 percent of the participants were found to be male, and the primary cause of amputation reported was diabetes. According to Peek (2011: 1953),

the higher incidence of amputation observed in males may be associated with their increased risk of clinical conditions such as peripheral arterial disease, diabetic foot ulcers, sensory neuropathy, and smoking tobacco, which predisposes them to amputation surgeries. The length of peripheral nerves is reported to partially influence the onset of neuropathy due to their increased susceptibility to injury. Hence, men may be twice as likely of being diagnosed with neuropathy than women, largely due to their height, as well as hormonal factors (Godlwana 2015: 50; Peek 2011: 1953).

4.2.2. Sample 2

Sample 2 comprised 16 prosthetists, of which 10 were females and six were males. All the participants were employed at the medical facility from which the amputee participants were drawn. This was suggestive that the amputees interviewed, were treated by these prosthetists. The working experience among the prosthetists ranged between three to 13 years.

4.3. Data analysis

From the responses of the amputees and prosthetists, six main themes and 18 sub-themes were generated. A presentation of the findings can be found in Table 4.1.

Table 4.1: Emergent themes and sub-themes

Main themes	**Sub-themes**	**Participants**
1. The effects of amputation following surgery	1.1. Phantom limb pain 1.2. Psychological issues 1.3. Adaptation to daily activities 1.4. Familial obligations and responsibilities 1.5. Stereotyping in society	• Amputees: AP1- AP14
2. The role of spirituality	2.1. Enabling the amputation adjustment process 2.2. Spiritual practices as coping mechanisms 2.3. Support from religious organisations	• Amputees: AP1- AP14
3. The impetus behind procuring a prosthesis	3.1. A semblance of normality	• Amputees: AP1- AP14
4. Prosthesis-use	4.1. Quality of the prosthesis 4.2. Enhancing physical well-being 4.3. Enhancing psychosocial well-being 4.4. Environmental barriers	• Amputees: AP1- AP14
5. The patient-prosthetist relationship	5.1. The experiences of amputees 5.2. The experiences of prosthetists	• Amputees: AP1- AP14 • Prosthetists: PP1- PP16
6. Contribution of the prosthetist	6.1. Improving physical well-being 6.2. Improving psychosocial well-being 6.3. Factors impeding the efficacy of prosthetic services	• Prosthetists: PP1- PP16

Each of the aforementioned themes and sub-themes are discussed below, along with verbatim excerpts from the participants.

4.3.1. Theme 1: The effects of amputation following surgery

Lower limb amputation is a sizable occurrence laden with a range of challenges which can affect one's quality of life (Miller *et al.* 2020: 1026). During the period between the amputation surgery and prosthesis delivery, there are an array of physical, psychological, environmental, social, and spiritual factors that affect the well-being of amputees. Participant responses illuminating these effects are described under the following sub-themes: phantom limb pain, psychological trauma, adaptations to daily activities, familial obligations and responsibilities, and stereotyping in society.

Sub-theme 1: Phantom limb pain

One of the sub-themes derived from the findings was phantom limb pain. The amputees' differing experiences with phantom limb pain are indicated below:

> *"I have phantom limb pain all the time. It is so painful and I even cry. It feels like someone is cutting me with a knife. The medication is addictive so it can't help me"* (AP12).

> *"I still get phantom limb pain but not all the time. I splash cold water on the leg and it helps with the pain"* (AP7).

> *"I did have phantom limb pain. It would come and go. It was bearable"* (AP11).

The severity of the phantom limb pain experienced by one of the participants was so frequent and unbearable, that he often cried as a means to cope with the intensity of the phantom limb pain. His awareness that one of the side effects of the pain medication is addiction led him to abandon it. Hence, the pain may be exacerbated by feelings of frustration since the participant is yet to find a suitable method of pain relief. This avoidance of medication to manage pain was previously reported in a study conducted in Greenville, North Carolina where the participants stated that they no longer wanted or used their previously prescribed pain medications, which were more unpleasant than the phantom limb pain itself (Paul 2018: 11).

In contrast, other participants expressed that the phantom limb pain was occasional. One participant indicated that splashing water on the painful spot proved to be a beneficial remedy. It is obvious that pain tolerance levels and strategies for managing phantom limb pain varied from one participant to the other.

Extant literature reflects that phantom limb pain is a common consequence affecting most individuals after the amputation surgery (Münger *et al.* 2020: 581; Fuchs, Flor and Bekrater-Bodmann 2018: 1; Paul 2018: 11; Koleva, Ioshinov and Yoshinov 2017: 3; Crawford *et al.* 2016: 166). In Bucharest, five of the seven participants in a study by Roșca *et al.* (2021: 6) also experienced phantom pain, which impeded their capabilities in performing daily tasks. Paul (2018: 10) conducted a study with 11 participants in Greenville, North Carolina and found that many participants experienced phantom limb pain and believed that it was an unavoidable experience for amputees, with a deficit of treatment options available. Consequently, the participants elected not to discuss the pain with their healthcare providers but rather handle it on their own (Paul 2018: 10).

A myriad of studies that explored diverse treatment strategies in managing phantom limb pain produced encouraging results (Richardson and Kulkarni 2017: 1866; Stockburger, Sadhir and Omar 2016: 163; Yildirim and Kanan 2016: 133). However, the optimal pain relief technique remains unclear. Regular range of motion exercises focusing on the residual limb muscles together with residual limb massages is reported to significantly reduce the intensity of phantom limb pain (Saker 2016: 132). Saker (2016: 132) emphasized that even temporary relief can positively influence the psychological well-being of amputees.

Other participants described how external and internal factors affected their experience of phantom limb pain:

> *"I do not have phantom limb pain anymore but when the weather is cold and gloomy, I feel sensations and pain at the end of my stump. It feels like small insects and animals are tickling me under my leg"* (AP8).

> *"I did have phantom limb pain and it felt like a ghost. The pain lasted for three years. As a diabetic, the wounds took long to heal so the pain was quite bad"* (AP14).

External factors, such as low temperatures, are documented to trigger phantom sensations at the distal end of the residual limb, as indicated by one participant. This sensation is corroborated by Stockburger, Sadhir and Omar (2016: 161), who confirmed that colder temperatures reduce peripheral blood circulation, potentially precipitating pain in the residual limb. While phantom sensations do not appear to be painful (Luo and Anderson 2016: 121), massage therapy can improve blood circulation and provide relief to those affected (Munk *et al.* 2015: S112).

Spampinato *et al.* (2020: 3) and Patel *et al.* (2019: 11) pointed out that delayed wound healing is a common hindrance experienced by diabetic patients, as a result of hyperglycaemia, poor vascular circulation, neuropathy, and impaired immune response. Poor wound healing and the chronic occurrence of phantom limb pain was also reported by one participant, as a result of poorly managed diabetes. Andjić *et al.* (2021: 2) emphasised that proper wound management in diabetic individuals will significantly improve quality of life and reduce morbidity and mortality.

Sub-theme 2: Psychological issues

The second sub-theme derived from the data focused on psychological trauma, of which grief and a lack of independence were evident:

> *"I felt like a part of my body was lost. I was sad and fearful because I was worried about how I was going to do things for myself… Speaking to my friends and family really helped me to overcome those negative feelings of myself"* (AP3).

> *"I felt low to rely on someone else because I have never needed to rely on someone before. It was difficult for me even though my family was very supportive"* (AP1).

The loss of a limb is tantamount to the loss of a loved one (Össur 2017: 7). Ergo, the grief process is the same since unexpected and overwhelming feelings of disbelief, shock and anger set in. Varga and Gallagher (2020: 187) commented that the grief process is an essential coping mechanism in the adjustment process of amputation. These feelings were apparent when one participant described the amputation as a part of her body being lost, and further expressed her sadness and fearfulness towards her

concern regarding self-sufficiency. Feelings of grief were also expressed by the amputee participants of a qualitative study in Nepal (Järnhammer *et al.* 2017: 1430).

Moreover, the loss of a limb is associated with the lack of independence and consequently provokes feelings of anger, frustration, and depression. These emotions are evident from the responses of several participants, who reiterated feelings of despondency and worry in dealing with dependence on family members. Similar psychological distress was observed in Amoah and colleagues' (2018: 2) Ghanian study, which comprised 10 amputees. It highlighted the difficulties and frustrations experienced by the cohort. Similarly, the participants in a study conducted in Gauteng, vocalised feeling stressed and miserable, as they did not know what to expect in the adjustment process of amputation (Godlwana and Stewart 2013: 49).

In the current study, observable differences between two participants were the outcomes of the support received. One participant exhibited a pessimistic outlook towards the loss of independence, while the other managed to subdue such feelings with acceptance, optimism, and hopefulness. A possible reason behind this is the pre-amputation familial responsibilities of each participant. One participant (AP1) was the sole provider of the household whereas the other participant (AP3) was the non-earner in her household. Placing the additional responsibility of economic security on his family, may have evoked feelings of guilt and impotence which may have subsequently derailed the efficacy of support received.

Many amputees view themselves as a burden to their families and express significant levels of guilt, despite the economic position they have in their households (Järnhammer *et al.* 2017: 1432). Similar findings were reported in a qualitative study by Zhu *et al.* (2020: 3) in Singapore, in which several of the nine participants confirmed that limb loss limited their physical ability to fulfil familial roles, namely a spouse, parent, and/ or sole provider. Limitations such as this, result in feelings of despair, futility, and incompetence.

Body image anxiety, depression, and self-isolation were also highlighted as psychological issues by several participants:

> *"I did not look at myself the same and was doubtful of whether I'd walk again… I used to go for counselling. It helped me to accept the amputation"* (AP10).

"I was very depressed… I just wanted to be alone, and I didn't want anyone to see me because they will judge me and look at my amputation" (AP12).

A change in one's body affects one's perception of oneself. An amputation can disturb a person's body image, supposedly because individuals with limb loss no longer look the same as able-bodied individuals. This will either negatively or positively influence how amputees believe they will be perceived in the public domain. Consequently, self-esteem and participation in society correlates with their perceived body image. Montesinos-Magraner *et al.* (2016: 5) stated that body image disturbances and social restrictions are usually accompanied by anxiety and depression. One participant sought professional guidance to navigate the psychological challenges, which was beneficial in propelling him to successfully adjust to the amputation. Being uncertain about society's perception of an altered body image saw one amputee enduring depressive symptoms and isolating at home. Vulnerability, lack of confidence, and diminished self-esteem are pronounced from the responses of most participants. A sense of uneasiness of the future affected the minds of those that communicated their doubts of functional recovery, and the scope of their physical capabilities.

Findings from the current study are in line with those of international qualitative studies in Romania (Roșca *et al.* 2021: 4) and Singapore (Zhu *et al.* 2020: 4), in which alienation from society, feelings of depression, reduced self-esteem, insecurity, and fear of the future were reported by the amputee participants. In extreme cases, depression triggered suicidal thoughts in some amputees (Roșca *et al.* 2021: 7; Zhu *et al.* 2020: 4). Some participants were self-motivating and envisioning a normal future post-recovery, embracing the amputation (Zhu *et al.* 2020: 4). Roșca and colleagues (2021: 8), indicated that returning to pre-amputation activities and hobbies helped the participants to successfully adjust to the amputation and regain a sense of normality.

Several participants exhibited a positive mindset post-amputation:

"I was never embarrassed. Being strong-willed helped me a lot" (AP1).

"I was never self-conscious of my amputation because I was in a lot of pain. I did not have time to worry about how others were looking at me. It did not bother me either" (AP14).

Half of the amputee participants displayed incredible resilience in the face of adversity post-amputation which reflected great mental strength. One amputee was resolute, because he was unmoved by his physical appearance after the amputation. A positive mindset facilitates acceptance of the amputation. Another amputee was grateful to have undergone the amputation as it eliminated the pain in that extremity. Society's perception of an amputation was incapable of being compared to the desirable feeling of relief the participant experienced.

This mirrored responses in African studies where the amputation was favourable compared to the pre-operative wound (Amoah *et al.* 2018: 2; Godlwana and Stewart 2013: 50). After enduring the debilitating pain attached to diabetic foot ulcers, it was not surprising that some individuals did not see the amputation as a negative experience (Rybarczyk, Nicholas and Nyenhuis 1997 cited in Amoah *et al.* 2018: 4). Eradication of their pain was seen to enhance the quality of life.

Sub-theme 3: Adaptation to daily activities

This sub-theme highlights the adaptations and adjustments amputees had to make in order to execute daily activities and responsibilities. The amputee responses illuminating these adaptations are presented below:

> *"I have to shower while sitting on a chair… It is just different… I fell a lot in the bathroom and around the house, but I learnt to work slower and forget everything I knew before. You have to start fresh and adjust or adapt. If you get distracted, you may fall. I have learnt to even use my forehead against the wall to balance"* (AP1).

Many of the amputees lamented that they had to make adjustments in terms of performing daily activities post-operatively. The above excerpt reflects this. The participant communicated the changes that had to be effected in his showering routine, in that a shower stool had to be utilised, to reduce the risk of falling in the shower. Altering entrenched ways of performing routine activities elicited feelings of fear, uneasiness, and uncertainty. Similarly, Jayakaran *et al.* (2019: 121) found that most of their seven participants in New Zealand installed handrails and anti-slip floors, and utilised shower stools in their showers as safety precautions to reduce the risk of falling and slipping.

Performing routine tasks had to be relearnt and required devoted attentiveness. Lack of vigilance while executing daily tasks could precipitate a fall (Godlwana and Stewart 2013: 50). Previous experiences of falling served as a clear indicator to locomote with extreme caution and vigilance. One participant in the current study further expressed using his head against the wall to safely stabilise and improve balance to avoid injury. Similarly, in a local study by Godlwana and Stewart (2013: 50), participants stated that modifying the way they performed daily activities mitigated their frustration and the risk of falling.

Participants described how seating and mobility aids facilitated their adaptations to perform daily activities:

> *"I use the walker to go to the bathroom and toilet, to transfer to the chair and then onto the toilet. It is not difficult"* (AP6).

> *"If I need to get into the car, I go up the driveway in the wheelchair first"* (AP5).

Post-amputation and pre-prosthesis-use, amputees use mobility aids and assistive devices such as wheelchairs, walkers, and crutches to navigate their environment, decrease injuries and enhance the performance of daily activities (de-Rosende Celeiro, Sanjuán and Santos-del-Riego 2017: 1803). From the responses of several participants, wheelchairs and walkers were used to enable mobility on uneven terrains in their yards, to transfer onto the toilet safely and easily, and into the bath/ shower.

Other participants expressed how the amputation had impeded their ability to perform household chores:

> *"My sister would always cook for me and then I used to try and help to learn again"* (AP3).

> *"I used to fetch water from the river but now there are too many stairs so I cannot"* (AP7).

One participant indicated that she strived to relearn how to cook using the stove now that her mobility had been compromised. Learning to adapt to prepare meals, may have been catapulted by guilt as the participant might have felt like a liability to her sibling. Harper, Wilken and Neptune (2020: 4) wrote that ambulation on stairs is a

challenging manoeuvre for amputees since it could easily precipitate a fall. Thus, one participant could no longer fulfil her household responsibility of obtaining water from the river due to the encumbrance of stairs. Following the amputation, few participants residing in rural districts were incapable of fetching the water required for personal hygiene, consumption, and domestic chores. These participants then relied on family members to fulfil such roles. Using one-on-one semi-structured interviews, a study in Romania found that the lack of functional independence to perform daily tasks and resume previous roles frustrated several of the seven participants and led to feelings of bitterness and anger (Roșca *et al.* 2021: 8).

Similarly, in a study conducted in rural Eastern Cape, Manig (2018: 51) drew attention to the difficulties that amputees experienced in adapting to performing daily tasks in impoverished living conditions. One amputee participant performed household chores on all fours, while another herded his cattle in the veld whilst ambulating with a pair of crutches (Manig 2018: 57). Providing for and assisting the family, compelled many of the amputee participants to hurriedly adapt to the amputation. de-Rosende Celeiro, Sanjuán and Santos-del-Riego (2017: 1804) have suggested that rehabilitation programmes for post-operative activities of daily living should be developed for amputees with the objective of fostering self-sufficiency and safety in daily activities.

Sub-theme 4: Familial obligations and responsibilities

The fourth sub-theme derived from the findings was familial obligations and responsibilities. Some participants described the positive effects of receiving support from relatives and boon companions:

> *"My family would always tell me that I am not alone, and I am only human"* (AP8).

> *"I did feel like a burden in the beginning because they were doing almost everything for me. My wife and my daughter are my two crutches"* (AP1).

Amputees may experience situational loneliness post-amputation, as their family members may not entirely understand the gravity of the emotional and physical challenges attached to amputation (Paul 2018: 10). One participant was comforted by his family members who would constantly reassure him that they were available to

provide emotional and physical support. Another participant described his spouse and daughter as his “two crutches”, implying that he was dependent on them for support when he was physically debilitated post-amputation. However, the heavy load placed on family members to be responsible for additional duties left some participants feeling like a burden. This is a common feeling reported in several studies (Roșca *et al.* 2021: 8; Amoah *et al.* 2018: 3; Järnhammer *et al.* 2017: 1432).

Many participants received support from family members, some from friends and the few fortunate ones from both parties. Echoing these sentiments, most of the 30 participants in Stutts *et al.*’s (2015: 749) qualitative study in the United States of America, reported receiving sufficient support from their significant other, relatives, and friends. Interestingly, some participants further stated that their pets were an essential source of support in helping them to cope with the amputation (Stutts *et al.* 2015: 749). In a qualitative study in rural KwaZulu-Natal, the participants were grateful for the familial support they received in accomplishing daily activities and to attend rehabilitation therapy (Naidoo and Ennion 2019: 100).

In Johannesburg, Godlwana and Stewart (2013: 51) found that amputation improved relationships between amputees and their significant others and/ or relatives. In contrast, Stutts and colleagues (2015: 749) found that amputation placed great strain on some marital relationships, specifically when the amputee wives felt misunderstood and uncared-for by their husbands. Paul (2018: 10) argued that while family, friends and healthcare professionals are supportive, their lack of knowledge and understanding of the amputation limits the efficacy of the help they can offer. Manig (2018: 79) stated that family counselling pre- or post-amputation is crucial to equip and educate the family on coping strategies for the new household dynamic.

Some participants described the flaws in their support networks:

> *“They were ashamed in the beginning, but I spoke to them about it”* (AP4).

> *“My family was quite supportive initially… I do feel lonely at times and that my family just abandoned me. But I have decided to put myself first”* (AP13).

Instead of being emotionally triggered by the negative reactions of the family, one participant acknowledged their feelings and proceeded to help them understand and

accept his amputation. Another participant expressed disappointment and sorrow over the short-lived support provided by her relatives. While feelings of neglect and loneliness were inevitable, the participant continued to prioritise her personal growth and well-being. This finding was in keeping with that of a qualitative study by Zhu *et al.* (2020: 4) in Singapore, where participants were displeased and angry after not receiving the solicitude they expected from their relatives. Uytman (2014: 13) stated that feelings of insecurity in amputees may ensue from not receiving the expected familial support, which renders professional and psychological assistance crucial.

Sub-theme 5: Stereotyping in society

The final sub-theme derived under the consequences following amputation surgery was stereotyping in society. Many participants described the negative comments from passers-by on their adjustment process:

> *"Sometimes people in public will call me names such as hop-a-long or hop-a-long Cassidy"* (AP2).

> *"It made me feel like nobody will love me for who I am. Initially their opinions affected me to the point where I never left my house but after some time you adjust and accept the situation"* (AP12).

One participant was a victim of the stigma attached to amputation and had insulting and demeaning words directed at him by the public. While the participant was unperturbed by these negative remarks, it is a clear indication of the stigma and discrimination that exists towards those who are physically challenged. Unnecessary comments from the public elicited feelings of inferiority, embarrassment, and self-consciousness, which drove one participant into self-confinement. The participant further expressed that with time he was able to manage his emotions and accept the amputation, which prepared him for a positive re-integration into society.

Similar reports regarding the stigma attached to amputation were made in a study in Gauteng, where participants described how individuals in the community began to make disparaging jokes regarding the amputees, which angered them (Godlwana and Stewart 2013: 50). The social stigma attached to amputation were also reported by amputees in Singapore (Zhu *et al.* 2020: 4). In a study conducted in Spain by

Montesinos-Magraner *et al.* (2016: 5), participants expressed their discomfort in public areas. The authors found that isolating from public areas and events limits the opportunities of amputees to start and develop romantic relationships (Montesinos-Magraner *et al.* 2016: 5).

Some participants described the inconsiderate and hostile nature of some members of the public with respect to their amputation:

> *"People staring used to make me feel very self-conscious and aware. I started to only use long pants and jeans so that nobody would notice anything different… I stopped caring about what people thought… My mind was focused on getting better and getting the prosthesis"* (AP5).

> *"Amputations are quite popular so many people do not really take notice or get shocked… I do not have to wait in lines and that causes problems because the other people get angry. I get to sit in the front of the taxi or behind the driver and if someone is sitting there, they do not want to move"* (AP7).

One participant reported that the constant stares induced feelings of self-consciousness and low self-confidence which compelled him to use garments that masked his amputation. Afterwards, the participant changed his focal point from the opinions of others to enthusiastically anticipating his prosthesis. This response echoed that of a participant in an international study who reported being unaffected by society's opinion (Zhu *et al.* 2020: 4). The participant was more interested in receiving his prosthesis.

In current times, amputations are quite common, however, that may not guarantee benevolence and amiability of society towards individuals with limb loss. A participant in the current study reported that the amputation awards her first preference in certain public queues, and specific seats when using public transport. While these benefits facilitate mobility and ensure the participant's safety, they antagonise the public. The participant indicated that some individuals openly refuse to give up their seats for her when using public transport such as taxi omnibuses, prompting her to sit further inside. This increases the participant's risk of injury when individuals rush to get in and out of the vehicle. This reflects insensitivity or a lack of understanding towards the plight of the amputee.

Offensive monikers, staring passers-by and hostility reveals the nature of the publics opinion of amputees. In an all-female amputee study conducted in the United States of America, 60 percent of the participants reported having experienced public discrimination (Stutts *et al.* 2015: 747). In Johannesburg, very few of the 12 amputee participants in Godlwana and Stewart's (2013: 50) study described the public as being sympathetic towards them.

While some individuals experienced negative encounters with individuals in society, others indicated the profound influence of amputee support groups:

> *"It also helped to have friends that were amputees, we were all going through the same things"* (AP9).
>
> *"I was a speaker at this one place for other amputees. I would encourage them and speak about my experiences. People treating me normally encouraged me to accept my amputation and be confident"* (AP14).
>
> *"If someone has just undergone an amputation, I would love to speak to them and help them because I wish I had that. No doctor or prosthetist can tell you how it is going to be because they do not understand, only an amputee can share in your experience"* (AP1).

An important finding that emerged, was the effect of receiving support from other amputees. One amputee has offered encouragement, benevolence and coping strategies to other amputees by sharing his experiences of adapting to amputation. Another participant indicated his willingness to offer a similar package of support. Support from relatives, friends and professionals is beneficial but the emotional support and empathy of individuals who share in their mutual experiences are unmatched.

The results of Abu Shawish *et al.*'s (2021: 531) study in the Gaza strip, reflected peer support groups for amputees, which were conducive for mitigating loneliness and palliating anxiety, stress and depression which subsequently improves emotional health. A study that was conducted in Minnesota by Williams (2018: 104) found that participants were more satisfied with life after receiving amputee-to-amputee (one-on-one) or amputee group support. Similar results were found in Stutts and colleagues' (2015: 747) study, where 60 percent of the all-female participants who attended social

support groups, attested to having a positive experience. Stutts *et al.* (2015: 750) and Ali and Haider (2014: 111) have found that social support has proven to be a quintessential aspect of the amputation adjustment process.

4.3.2. Theme 2: The role of spirituality

An integral part of the amputation journey is learning how to cope with its various effects. This brought to the fore, the crucial role of spirituality in the lives of the amputee participants. The participants' responses highlighting the role of spirituality are described under several sub-themes, namely enabling the amputation adjustment process, spiritual practices as coping mechanisms, and support from religious organisations.

Sub-theme 1: Enabling the amputation adjustment process

One of the sub-themes derived from the findings was the role of spirituality in facilitating acceptance of the amputation. The participants reported:

> *"I was becoming stronger and less fearful. I am confident and trust in God a lot more than I did before the amputation"* (AP10).

> *"God has been there for me through it all. If it was not for God, I would have rolled over and died. I would have given up. He gives me the strength every day and God gets me through every challenge I face"* (AP13).

> *"God has helped me get through all the challenges I faced with my amputation because He was always by my side comforting me"* (AP7).

Evidently, many of the amputees expressed the pivotal role that God played in their lives post-operatively, and thereafter. Alleviating the emotional weight of the amputation, religion and their faith in God was a pillar of strength and source of comfort to the amputees. One participant stated that she only survived the amputation and its challenges because of God's presence in her life. Instead of giving up, she relied on God for strength and perseverance. Similarly, the amputee participants in a Ghanian study by Amoah *et al.* (2018: 3), stated that believing and trusting in God was a significant coping mechanism in accepting the reality of their situation.

Contrary to the current study's findings, Stuckey *et al.* (2020: 281) found in Bangladesh that spirituality posed a barrier as one participant saw functional ability for work participation as a matter of fate; if they were meant to work then it was the Almighty's responsibility to make them fit for vocational return. Participants in Johannesburg felt that if they did not believe in God, they would not be protected, guided, or helped by Him (Godlwana and Stewart 2013: 52). Other studies however, documented the salience of spirituality. Internationally, in a Romanian study using qualitative methods, participants indicated that putting their faith in God allowed them to be hopeful, specifically to adjust to the amputation and return to previous roles (Roșca *et al.* 2021: 7). Research undertaken by Imeni *et al.* (2018: 325) in Iran with 54 participants, documented that spirituality and the execution of spiritual care enhanced body image and helped the amputees to accept the changes in their physical appearance. Furthermore, it improved their psychological well-being (Imeni *et al.* 2018: 325).

Sub-theme 2: Spiritual practices as coping mechanisms

The second sub-theme derived from the findings surrounded spiritual practices that served as effective coping mechanisms. Participants in the current study described how various spiritual activities helped them to cope throughout their amputation journey:

> *"Listening to spiritual music and watching spiritual videos online helped me to keep sane while I was in hospital for one year"* (AP10).

> *"I love praying for people, it is my purpose. I go to church every Sunday and do not miss any meetings"* (AP13).

> *"I do a lot of spiritual activities but the most important thing for me is reading the Bible...My favourite quote is God will never put you through something that is more than what you can handle"* (AP14).

From the testimonies of the amputees, prayer was their dominant mechanism of coping. This study's findings are similar to those from a local qualitative study done by Godlwana and Stewart (2013: 51) where the participants reported prayer as a profound strategy to cope with amputation. Additional spiritual activities such as reading the holy book, attending places of worship, and listening to spiritual music helped the

participants to cope with and positively adjust to the amputation. One participant reported that "listening to spiritual music and watching spiritual videos" protected his sanity as he endured the challenges accompanying the amputation. Another participant maintained an active spiritual life as she expressed her enjoyment in praying for other individuals and religiously attending church services and meetings. The participant's gratitude towards God during her amputation journey, increased her desire of prayer intercession.

One participant reported that reading the Bible was at the forefront of any spiritual activity which was evident as he proceeded to quote his favourite scripture, 1 Corinthians 10: 13 which reads; "*… And God is faithful; He will not let you be tested beyond what you can bear. But when you are tested, He will also provide a way out so that you can endure it.*" Resting in this promise allayed the participant's fears and increased his faith in God. The amputee participants in a study by Stuckey *et al.* (2020: 283) in Bangladesh shared similar sentiments that spirituality was an invaluable mechanism to cope with the grief of limb loss and adjust to life with the amputation.

According to Tolson and Koenig (2003: 1), medication, surgery, medical technology, faith and prayer are several gifts from God that facilitate the process of healing. The powerful influence of prayer and faith has made significant differences in patients spiritual, physical, social, and emotional healing (Tolson and Koenig 2003: 1). When individuals pray, they draw closer to God and establish a relationship that comprises real love with the capacity to diminish feelings of stress, worry and fear (Koenig 1997 cited in Narayanasamy and Narayanasamy 2008: 248).

Sub-theme 3: Support from religious organisations

The final sub-theme derived from the data was the support received from religious organisations. The participants described how their particular faith communities provided support to them. The following excerpts are examples:

> *"They always visit me at my house if I need to move things. The women always call me, and we have a great friendship with each other. The church put the railing outside my house because the driveway is steep"* (AP13).

> *"They support me emotionally, but I do not want them to support me financially. I like to help people because there are many people who are more needy than me"* (AP14).

One participant stated that the challenge of ambulating her steep driveway was mitigated when her faith community installed a railing to assist her mobility. The participant added that members of her church provide physical assistance in her household, contact her regularly to check on her well-being, and arrange transportation to church. The positive support that the participant was receiving from her faith community enabled her to cope with the challenges of her amputation. Another participant explained that he was content with receiving emotional but not financial support, as there were several individuals who were substantially more destitute compared to him. The participant reflected an altruistic nature in that he looked beyond his own needs, to the suffering and challenges that others were enduring.

Members of the faith community were doing home visits to the amputees who were unable to travel to their places of worship and arranged transport for the amputees to attend events. Ault and colleagues (2021: 20) aver that the role of the faith community is significant, in that they help the amputees to feel that they are important and belong somewhere by continually involving them in faith gatherings and events. Several amputees found great comfort in being prayed for by members of their faith community. This reflected findings from another study, in which the participants stated that prayers from relatives and friends facilitated adjustment to the amputation (Godlwana and Stewart 2013: 52).

Conversely, one participant became the victim of fraudulent behaviour by his faith communities:

> *"I have had so many people use me for their own gain and people give money, but I don't get any. I am very skeptical now to go to any church"* (AP12).

Members of faith communities would generously donate funds to support the participant, but the leaders allegedly misappropriated the funds. As a result, the participant lost trust in faith communities and ceased to attend church. Given that misappropriation of funds is common in non-governmental organisations and disabled

people's organisations, Bezzina (2019: 9) suggested that disabled individuals should be employed in projects that involve people living with disability.

4.3.3. Theme 3: The impetus behind procuring a prosthesis

One of the major themes that emerged from the findings focused on the impetus behind procuring a prosthesis. The excerpts below reflect the responses of the amputees when asked, "What motivated you to get a prosthesis?"

Sub-theme 1: A semblance of normality

One of the sub-themes derived from the data was a semblance of normality. Many of the participants explained that regaining functional independence to return to their previous roles warranted their need for the prosthesis:

> *"I decided to get the prosthesis because I saw other people with it, and I was tired of being wheeled around in the wheelchair"* (AP7).
>
> *"I was looking in the newspaper for a prosthetist because my family would tell me about adverts for prosthetists… I wanted to become independent because I was very active and independent before the amputation"* (AP13).
>
> *"I am also a pastor so if I can't walk then how will I be able to go to church all the time"* (AP14).

Evidently, the reasons participants sought prosthetic intervention were personal and specific to the individual amputee. For one participant, mobilising independent of mobility aids and witnessing the positive ambulatory abilities of other prosthetic users, motivated her to get her own prosthesis. Another participant reported how her family and friends were actively seeking prosthetists in the newspapers as she desired to urgently return to her active lifestyle, which was hindered by the physical limitation of the amputation. Another participant expressed that obtaining the prosthesis would fulfil his desire to be self-sufficient again and allow him to return to his occupation.

There is a lack of literature focusing on the various factors that motivated individuals with limb loss to obtain a prosthesis. A key observation from many of the participants' responses was the yearning to return to their way of life pre-amputation; from the

rudimentary ability to ambulate independently to the predicament of vocational return. The amputees' lack of independence was the primary objective of securing a prosthesis to restore independence and functional mobility (Miller *et al.* 2020: 1026). The prosthesis affords the amputees a considerable degree of autonomy and eradicates feelings of guilt, disappointment, frustration, and annoyance attached to being reliant on other individuals. A study conducted by Uytman (2014: 133) in Edinburgh, found that while satisfying the personal needs of the amputees, the prosthesis also facilitated their successful integration into society. In addition, the participants described the urgency of returning to work in order to sustain themselves and their families (Uytman 2014: 133).

In the current study, other participants reported:

> *"I just went into [hospital X] on my own, and they took the measurements and cast of my stump. It was only through the grace of God"* (AP6).

> *"He [the doctor] would take me around the hospital and show me people who were in wheelchairs because they were paralysed and how I was not even close to that. Then he showed me active people running with their prosthesis and told me that can be me. He was encouraging me every day"* (AP10).

One participant stated that he was not aware he would be able to obtain the prosthesis at the facility and believed that this was through divine intervention. Another participant was motivated by his doctor to obtain a prosthesis to improve his mobility. The doctor compared the participant's capabilities to those of individuals who would never regain mobility due to irreversible complications of specific health conditions and provided illustrations of amputees who were physically active with their prosthesis. While the healthcare professional had good intentions, unrealistic expectations may arise when amputees are misinformed. Public medical facilities offer inexpensive prosthetic devices which do not include those intended for sporting activities.

Eligibility to use a prosthesis is entirely dependent on the physical condition of the amputee. When amputees are educated on these factors by the prosthetists, they may become frustrated and hopeless (Uytman 2014: 130), which could impede positive adjustment to the prosthesis. Uytman (2014: 28) wrote that the time period between surgery and casting the residual limb for a prosthesis, is determined by the amputee's

physical health and mobility rather than their personal goals. Hence, this period is patient specific.

In contrast, some participants did not have a specific reason for obtaining the prosthesis. Some of the participants said:

> *"There was a private prosthetist that lived down my road and he told me about this place… I was ready mentally because I was strong"* (AP2).

> *"I was referred by the physiotherapist. I did not know anything about prosthetics until I went to get one"* (AP5).

> *"I was referred by the doctor and I was quite young, so it was just the next step in the process for me"* (AP12).

While many participants were seeking prosthetic services, the abovementioned responses indicate that some participants were completely unaware of such an assistive device. One participant reported that he was referred to the medical facility by a private prosthetist, which suggested that the participant was unable to afford private practice rates. Based on the recommendation made, he proceeded to the medical facility to obtain a more affordable prosthesis. Many amputees were referred to the prosthetic medical facility by their doctors, and physiotherapists during rehabilitation, or did not possess any knowledge of prosthetic devices until they were in the process of receiving one. Evidently, a multitude of individuals have a deficit of knowledge surrounding the prosthetic industry.

One participant commented that receiving the prosthesis was just the next step in the rehabilitation process. A key factor was the participant's age; being young indicated the lack of understanding of the processes that were occurring. There is an urgent need to promote prosthetic services and educate individuals across the globe.

4.3.4. Theme 4: Prosthesis-use

Ideally, the goal of the prosthesis is to provide functional independence and improve mobility, which would subsequently enhance the physical, psychological, social, and environmental effects of the amputation. The biopsychosocial effects of the amputation were previously discussed in the first major theme (4.3.1). The findings below indicate

how the prosthesis mitigated some of the consequences attached to an amputation. In addition, significant challenges and benefits of the prosthesis have been included through the verbatim responses of the participants.

Sub-theme 1: Quality of the prosthesis

One of the sub-themes derived from the findings was the quality of the prosthesis. The excerpts below reflect the views of the amputee participants on the overall quality of their prosthesis, encompassing the following characteristics: fit, weight, noise, colour, physical appearance, hygiene procedures, and componentry.

The participants described the fit, noise and weight of their prosthesis in the following ways:

> *"The fit is perfect"* (AP7).
>
> *"It is fitting me fine… There aren't any noises"* (AP3).
>
> *"Great, it is not heavy… There are no noises"* (AP7).
>
> *"There are no weight problems. In the beginning, it did feel different and a bit heavy"* (AP3).

Most participants reported that there were no sounds created during ambulation with their prosthesis. Several participants were also content with the fit and weight of the prosthesis. Prosthetic sockets are reinforced with several layers of weighty materials during the manufacturing process, depending on the weight and activity level of the user (Padi, Mukundan, and Subramani 2017: 21). The materials and metal components may affect the weight of the prosthesis (Turner, Belsi and McGregor 2021: 64). Padi, Mukundan, and Subramani (2017: 20) highlighted that a lightweight prosthesis reduces energy expenditure, and the pressure on the residual limb. Initially, the prosthesis may feel heavy as it is not anatomically connected to the skeleton compared to the natural limb. Hence, amputees are required to strengthen the residual limb muscles with physical exercise to ease the weight of the prosthesis.

The participants described the colour and physical appearance of their prosthesis below:

"It is perfect, I am comfortable with this colour" (AP14).

"It is fine, no problem because it is close to my skin colour" (AP1).

"The colour and appearance is good" (AP5).

"I would like it a bit darker to match my skin colour" (AP7).

Most of the participants explained that they were content with the colour of the prosthesis. However, few participants stated that it did not match their skin colour as they had anticipated; it was either lighter or darker in comparison to their skin tone. This indicates that they may feel self-conscious if the prosthesis does not match their skin tone as the difference will be noticeable.

The pigments available at the public medical facility are limited, and due to the volume of devices that need to be manufactured, it would pose a challenge for the prosthetists to mix different pigments to create a match for the skin colour of each amputee. Uytman (2014: 125) reasoned that relying on amputees to communicate their cosmetic desires, insufficient funding, and obsolete cosmetic technology may result in the cosmetic needs of some patients being unmet.

The participants described the hygiene procedures they followed to clean the prosthesis. The following are examples of descriptions:

"I use a towel, water and soap to wash the socks and inside the socket. I wash it regularly because of the sweat" (AP7).

"I wash and clean it all the time" (AP2).

"I wipe the socket and wash the stump sock" (AP5).

"I was never told to clean the socket. I am surprised that you can even clean it" (AP10).

Turner, Belsi and McGregor (2021: 63) noted that perspiration in the socket, due to the use of nonbreathable materials, necessitates frequent cleaning of the prosthesis. While most of the amputees described their specific hygiene procedures to keep their prothesis clean, few participants were not well-informed of the hygiene procedures for

the prosthesis. It is imperative that prosthetists educate amputees on hygiene procedures of the residual limb and prosthesis (Goodworth *et al.* 2017: 31), to circumvent infection, circulatory disorders, and blisters on the residual limb (Zaborna *et al.* 2019: 401).

This study's findings were corroborated by those from a study conducted in Iran by Ebrahimzadeh *et al.* (2016: 54), which revealed that the veteran amputee participants frequently cleaned their stump socks, sockets, and residual limbs.

The participants described their satisfaction with the componentry (socket, prosthetic ankle-foot system, and suspension system) of their prosthesis:

> *"Maybe the foot could be different so I can use all types of shoes"* (AP13).

> *"The Silesian belt is causing some pain because I have kidney problems. I have to put some sort of cushion so that there is no pain in my kidneys"* (AP7).

Half of the amputees were content with the overall efficacy of the components. The latter half expressed their discomfort with two specific components of the prosthesis, namely the Silesian belt and prosthetic foot. One participant expressed the desire to use various types of shoes. The conventional low-cost Solid-Ankle Cushion-Heel (SACH) foot, available at public medical facilities, exhibits limited tolerance of different footwear types as the various heel heights will offset alignment of the prosthesis, which may create wounds, pain, and blisters on the residual limb (Nickel *et al.* 2020: 2). In a Brazilian study conducted by Santos *et al.* (2021: 279), 91.3 percent of the 34 participants using the SACH foot reported high levels of satisfaction with the prosthesis.

Another participant indicated that the prosthesis waist belt was piercing into and causing discomfort to her kidneys. To prevent the belt from exacerbating her kidney complications, the participant adapted the suspension system with specific placement of a cushioning item. The rigidity of the leather waist belt would cause discomfort and pain. Due to a deficit of funds, the materials available at the public medical facility were low-quality. The use of improved and advanced prosthetic materials and components would mitigate the discomforts of low-quality prostheses and significantly improve the quality of life of amputees.

Sub-theme 2: Enhancing physical well-being

In the physical domain of quality of life, one of the sub-themes derived from the findings was the prosthesis enhancing the physical well-being of the amputees. This involved metabolic cost, wearing time of the prosthesis, and the ability to do daily tasks.

The participants described whether they expended more energy with the prosthesis or without it:

> *"I have more energy with the prosthesis. I get tired if I do things without it"* (AP7).

> *"If I walk a long distance, then the next day I have to rest the entire day because there will be pain"* (AP14).

All the participants indicated that less energy is expended when the prosthesis is worn. Completing tasks with mobility aids or by hopping around requires strenuous exertion and increased energy expenditure, thereby tiring oneself out more rapidly. This is evident in the response of one participant who described feeling drained when performing tasks without the prosthesis. Another participant indicated that long-distance ambulation with the prosthesis generates pain in the residual limb. A defining factor was age; the participant was elderly and therefore, exhausting himself by ambulating great distances. Turner, Belsi and McGregor (2021: 65) highlighted that it is essential for prosthesis-users to rest as fatigue is common during ambulation with the prosthesis. Considering that the componentry of the prosthesis is not intended for long-distance walking, extensive pressure on the residual limb is a plausible explanation for the pain.

Hafner *et al.* (2021: 9) indicated that the metabolic cost of ambulation with the prosthesis is influenced by the terrain, prosthetic ankle-foot system, and ambulation velocity. A Malaysian study found that frail patients expended more energy during ambulation with the prosthesis (Wan Hazmy *et al.* 2006 cited in Yosuf *et al.* 2019: 25). Santos *et al.* (2021: 282) conducted a study in Brazil, in which many of the 34 elderly participants reported experiencing pain during ambulation with the prosthesis. Participants in Yu and Ennion's (2019: 3) study in the Western Cape, reported experiencing challenges in standing for lengthy periods of time and ambulating long distances. In Mpumalanga, participants in Ennion and Manig's (2018: 10) study were

able to ambulate on uneven terrains, standing for lengthy periods of time and ambulate long distances. As a result of fatigue, some participants indicated the need to rest occasionally when ambulating long distances with the prosthesis (Ennion and Manig 2018: 10).

The particular time periods of prosthesis-use and the reasons for same, are reflected below:

> *"Every day, all the time. I only take it off before bed and before I bath"* (AP10).

> *"I use it every third day and if I am going out… Sometimes I'm lazy to put it on because of the belt which is a bit uncomfortable"* (AP5).

Most of the participants stated that the prosthesis is worn daily and only doffed for specific activities, namely bathing, sleeping, and relaxing at home. From the consistency of its daily use, it is apparent that many of the amputees have successfully adapted to the prosthesis. One participant stated that he primarily utilises the prosthesis when he leaves home. The belt of the prosthesis is reportedly cumbersome, which results in occasional abandonment of the prosthesis while the participant is at home. Prosthetists instruct patients to utilise the prosthesis on a daily basis. However, discomforts in the prosthesis influence regularity of its use (Turner, Belsi and McGregor 2021: 64).

This study's findings were in line with those from a study conducted in Iran by Ebrahimzadeh *et al.* (2016: 56), where 78 percent of the participants reported regular use of the prosthesis. Contrary to the current study's findings, most of the participants in Torbjörnsson *et al.* (2020: 4) study, in Sweden, reported that their prosthesis wearing time was three hours a day. Furthermore, mobility aids were used in conjunction with the prosthesis (Torbjörnsson *et al.* 2020: 4).

In the current study, the participants reported their restored ability to perform daily tasks and activities with the assistance of the prosthesis. The participants were previously incapable of independently executing these simple routine tasks due to lack of mobility. They said:

> *"I still go shopping... I clean my house"* (AP3).

"I do exercises on my own to practise with the leg" (AP6).

"I still do everything that I used to do before. I still garden… I do not rely on anyone to take me for my medication, I go to the clinic on my own" (AP7).

All the participants in this study were satisfied with their ability to independently perform several activities constituting their daily routine using their prosthesis. They were able to perform household chores, visit shopping centres to purchase groceries and other items, ambulate in home and social surroundings, and tend to their gardens. Regaining independence led to enhanced psychosocial well-being as the participants could now assist family members with certain tasks that they were unable to do prior to prosthesis-use. One participant also stated that he regularly performed home exercises to strengthen the residual limb muscles. This signifies a positive adjustment to and acceptance of the prosthesis as the amputee was able to improve his mobility and functional skills to enhance his performance with the prosthesis. Another participant displayed responsible behaviour in managing her medications by independently fetching them from the clinic.

Kizilkurt and colleagues (2020: 116) highlighted that using a suitable prosthesis expedites restoration of mobility and facilitates positive adjustment to the amputation. In a study conducted in Brazil with 34 participants, it was found that they were satisfied with the functionality of the prosthesis as it facilitated their performance of daily activities (Santos *et al.* 2021: 281).

One participant however, indicated concern for his safety due to the amputation and with the prosthesis. The following was said:

"Before I was able to change the globe in the ceiling but now, I won't do that in case I fall" (AP10).

The participant reported that they were no longer able to change a light bulb in his home as this entailed standing on a household item of height (i.e., a ladder or chair) to reach the ceiling, which increased the risk of a debilitating fall. Similarly, local findings in a study conducted in the Western Cape, revealed that participants were afraid of falling after enduring a fall (Yu and Ennion 2019: 4). In Santos *et al.*'s (2021: 281)

longitudinal study conducted in Brazil, participants reported improved balance, reduced fear of falling, and enhanced security with the components of the prosthesis.

Sub-theme 3: Enhancing psychosocial well-being

One of the sub-themes derived from the findings was how the prosthesis enhanced the psychosocial well-being of the amputees. The responses of the participants regarding the benefits of the prosthesis are indicated below:

> *"Grateful because it helps me a lot"* (AP1).

> *"I was quite thrilled to be getting the prosthesis because then I can go back to work again"* (AP11).

> *"I stopped drinking because when I used to drink, I would abuse the leg. I would just take it off and leave it around. I would not take care of it. So, I stopped drinking because it was making me irresponsible"* (AP10).

Many participants were enthusiastic about using the prosthesis as it ensured restoration of their functional independence and mobility, allowing them to resume previous roles. One participant was "thrilled" to receive the prosthesis as it will soon enable successful reintegration into his profession. According to Kizilkurt *et al.* (2020: 116), gaining functional independence with the prosthesis improves confidence levels and facilitates positive adjustment to the social milieu and the work environment. Researchers in Sweden found that independent mobility awarded by the prosthesis, improved the quality of life of amputees (Torbjörnsson *et al.* 2020: 7).

Another participant indicated that his alcohol use, led to him doffing and neglecting the prosthesis. Valuing and appreciating the prosthesis led to cessation of alcohol consumption.

Only a few participants expressed negative emotions towards the prosthesis. The following are examples of what was said:

> *"I miss my real leg when I use shorts or a skirt because that is when you can see the whole prosthesis. It reminds me that I am amputated"* (AP9).

> *"I feel it is fake and I would not use it if I didn't need to. I like to be real and for people to see me as I am"* (AP12).

One participant indicated that the use of specific clothing garments exposes the prosthesis and triggers the reality of being amputated. The prosthesis serves as a poignant reminder of the limb that she lost. Longing for the lost limb suggests that the participant misses the range of mobility and activities the limb permitted, which can never be completely regained. Another participant reported that the prosthesis is "fake," thus individuals see his altered appearance rather than his true identity. Hence, he may feel detached or disconnected from the prosthesis as it cannot compare to his genuine lower extremity.

As previously discussed, the participants expressed the effects of amputation on their body image. The participants' responses below reflect the influence of the prosthesis on their body image:

> *"I did feel different in the beginning... The prosthesis helped me feel normal again"* (AP9).

> *"I was not self-conscious. I was too happy to care if someone thought I looked different"* (AP8).

> *"It is a part of me now, I love it"* (AP2).

Most of the participants explained that the prosthesis diminished their body image anxiety triggered by the amputation. One participant stated that the prosthesis restored her body image, and normalcy. The responses suggest that a sense of belonging and connection to society has been restored with the prosthesis. One participant stated that the prosthesis "is a part of" him. A deep feeling of connection is evident in that the prosthesis is not a separate entity but rather tantamount to the limb that was amputated. Roșca and colleagues (2021: 2) commented that the prosthesis mitigates the psychological consequences of limb loss.

However, one participant expressed having an altered body image with the prosthesis, and said the following:

> *"I feel self-conscious because it doesn't look exactly like my leg, but I use skirts and pants to cover the prosthesis. I try to be strong and not worry about what others say"* (AP13).

The participant stated that the appearance of the prosthesis was different to her contralateral limb, which generated feelings of low self-esteem and decreased confidence. Therefore, she would wear clothes that obscure the prosthesis. Evidently, the participant had not accepted the prosthesis, but has acknowledged her negative emotions and was attempting to improve them. Kizilkurt *et al.* (2020: 117) emphasised that body image anxieties must be addressed during rehabilitation to ensure successful integration into society.

Some of the 34 participants in a study conducted in Brazil, reported feeling insecure and embarrassed to use the prosthesis due to dissatisfaction with its aesthetic appearance (Santos *et al.* 2021: 281). However, as they adapted to the prosthesis, these feelings were reduced (Santos *et al.* 2021: 281). In Bangladesh, Stuckey and colleagues (2020: 287) proposed that these experiences accentuate opportunities for rehabilitation professionals to address the stigma attached to amputation and provide an understanding of the capabilities of amputees within their communities.

The reactions of the participants' family members towards the prosthesis, facilitated the psychosocial well-being of the amputees. Some of the familial reactions reported by the participants are as follows:

> *"My family was very happy when I had the prosthesis because I can walk around and do things for myself, I am able to take family pictures and be independent"* (AP5).

> *"They felt bad when I was amputated but they were very excited when I got the prosthesis because I was able to walk again and help with my disabled son"* (AP6).

Restoration of mobility and independence with the prosthesis elicited feelings of joy and contentment from all the participants' family members. One participant expressed delight, and suggested a sense of belonging, as he could be a part of family portraits once again. A contrasting familial reaction was reported by a participant in a local

study, whose family was only comfortable when the prosthesis was worn, because it concealed the amputation they considered as a source of embarrassment (Godlwana and Stewart 2013: 50). Santos *et al.* (2021: 282) indicated that receiving familial support may facilitate positive adjustment to the prosthesis.

Another participant indicated that he could resume his parental responsibilities and assist with caring for his disabled son. The participant displayed selflessness in putting his own needs aside and focusing on those of his child. Similarly, researchers in Bangladesh found that wives sought employment while their amputee husbands fulfilled household and childcare responsibilities (Stuckey *et al.* 2020: 286).

Sub-theme 4: Environmental barriers

One of the sub-themes derived from the data was environmental barriers with prosthesis-use. Physical safety and security of prosthesis-users in public areas was one of the key environmental barriers reported by the amputees. Some participants described the environmental barriers in their home terrain. The following are examples:

> *"The roads are not tarred. It is made of stone and rock. I walk on the grass"* (AP8).
>
> *"I have a lot of stairs to climb up and it is a little challenge. There are no challenges inside my house, it is all fine"* (AP2).
>
> *"The ground is flat. There are stones and rocks but I do not walk there. I manage on the flat ground"* (AP6).

Ambulating on uneven terrain is a challenging task for amputated individuals due to the absence of control at the prosthetic ankle which affects balance and places greater strain on the contralateral limb to control movement (Chiu, Voloshina and Collins 2021: 1; Kent, Takahashi and Stergiou 2019: 9). Most of the participants described the terrain outside their homes as "not tarred" and covered with "stones and rocks." This indicated that the participants ambulate on uneven and unsafe home terrains, which may precipitate debilitating falls.

Similar results were reported in a study conducted in the Western Cape Province of South Africa, where most of the 43 amputee participants struggled to ambulate on

uneven terrains outdoors. The uneven terrains affected their balance and necessitated the use of crutches with the prosthesis (Pienaar and Visagie 2019: 280). Contrary to this study's findings, participants in Ennion and Manig's (2018: 10) study conducted in Mpumalanga were reportedly able to navigate uneven terrains with the prosthesis.

The responses below illuminate the participants' experiences in society:

> *"I can't go to the mall on my own… I just like to have someone there so I can hold their shoulder in case I fall. Because my amputation wasn't done properly and my bone is sticking out, I feel very afraid and unstable… I stay on the side and hold the walls and walk. I shop quickly because I'm afraid of someone hurting me or causing me to fall"* (AP13).

> *"I have also been mugged four times when I'm walking on the road. Because I am slower, people see me as an easy target"* (AP12).

Most participants felt secure in public areas while smoothly ambulating with the prosthesis. Some participants described the use of mobility aids to facilitate ambulation in shopping centres. One participant described balancing on the walls or on the shoulder of a friend to gain stability. Wound closure techniques during amputation surgery influence socket fit which affects stability. Turner, Belsi and McGregor (2021: 64) highlighted that amputees tend to compensate for discomforts in the prosthesis by altering their movement or weight distribution which may lead to several health complications. Improving the infrastructure would enhance the security and safety of individuals with physical disabilities. In a study comprising 50 lower limb amputees, Yu and Ennion (2019: 4) found that mobility challenges were caused by the fear of falling and poor balance.

One participant was a victim of crime as he was mugged on several occasions while ambulating on sidewalks. Prosthesis-users may ambulate at a slower pace considering that each action or movement needs to be carefully thought-out before execution, to avert serious injury. The physical weakness of disabled individuals captures the attention of criminals (Buciunas and Bulgakova 2019: 51). Thus, amputees are more prone to becoming victims of criminal acts than their counterparts who live without disability.

Another environmental barrier reported by the participants was their experiences with public transport:

> *"The hospital does not even organise transport. I have to pay R300 just to one hospital, get a referral letter and come back here. It is too expensive when I only have a grant to keep me going"* (AP6).

> *"Getting off the taxi is hectic because the driver is in a hurry to leave and make money, and the passengers also just rush and push you out. It is quite scary"* (AP12).

Most of the participants had familiarised themselves with public transport. However, a prevalent compliant was the exorbitant travel costs. One participant expressed his discontent with the lack of private transport offered by the medical facility to patients attending the facility since the amputees are required to travel to a different hospital for a referral document and then to the medical facility for the prosthesis. The costly journey consumes a large portion of the government grant, which leaves a negligible amount to sustain oneself for that month. With the impatient nature of taxi drivers and passengers, participants' safety was compromised as the risk of injury was increased. Such experiences instil feelings of fear, distress and anxiety in amputees. Indisputably, access to medical facilities needs to be substantially improved to accommodate the financial and physical needs of individuals with limb loss.

Parallel findings were revealed in a study conducted by Ennion and Rhoda (2016: 570) in South Africa. The authors found that participants had to hire a private vehicle or use public transport to access healthcare services, which is a severe financial burden considering that these individuals are solely reliant on social assistance grants. Naidoo and Ennion (2019: 98) asserted that the lack of transportation and financial constraints result in individuals not receiving the healthcare services they urgently require.

One of the reasons participants anticipated prosthesis delivery was to return to their vocation. The participants described their experiences of resuming vocational roles:

> *"Due to immobility and poor health, had to stop my business"* (AP1).

> *"Employed as a chef… I can only go back when I can use the prosthesis properly"* (AP11).

Most of the participants were employed prior to the amputation. Some participants became pensioners while only three were able to regain employment. One participant reported that his poor mobility and health complications compelled him to close his business. For, one participant that was recently amputated, learning how to successfully mobilise with the prosthesis was a requisite for his vocational return.

Similarly, in a study conducted in India by Chander and Kannan (2021: 8), findings revealed that of the 17 percent of participants who were employed pre-amputation, only eight percent resumed employment post-amputation. In a desperate effort to ensure a source of income, participants in Bangladesh reportedly borrowed capital to establish private businesses despite their professional incompetence and financial risks (Stuckey *et al.* 2020: 287). Other participants indicated that the prosthesis impeded work participation as it was not suitable for their work environment and was subsequently abandoned during work activities (Stuckey *et al.* 2020: 287). In Haiti, Wen and colleagues (2018: 6) highlighted the challenges that amputated individuals faced when seeking employment due to the lack of job opportunities. Furthermore, employed amputees struggled to accomplish occupational tasks due to the intense physical demand of their jobs (Wen *et al.* 2018: 6).

Some participants reported being victims of unfair dismissal:

> *"The boss did not want me to work with my amputation, so he gave me a two-month salary and did not take me back. That was an unfair dismissal, and I got a lawyer, but the boss said he can only pay me if I find the people that threw me off the train. Ever since then, I have been unemployed"* (AP8).

> *"I wanted to go back to work. My work felt that I wouldn't be able to manage so they replaced me"* (AP13).

Several amputees diligently followed each process of the rehabilitation plan in order to resume their vocational roles and provide for their families, as well as themselves. The individuals were promised job security on condition of successful ambulation with the prosthesis. Evidently, some of these promises were made in vain as the individuals were unfairly dismissed and replaced at their places of work. Those participants who were unfairly dismissed remained unemployed.

Due to the unemployment of most of the amputee participants, the researcher enquired how the participants financially supported themselves and their families. The excerpts below list the participants' financial circumstances:

> *"I support myself. I earn a salary at work. I also have a disability grant which barely helps but I survive each month"* (AP12).

> *"I live off the pension. I have to take care of my son who is disabled. My wife works a low-income job but now she is ill"* (AP6).

Most participants were solely dependent on their pensions or disability grants for financial support. One participant reported that he scarcely survives off the financial constraints of his employment income and disability grant. Another participant described how he was using his pension pay out to provide for his family, inclusive of the costly products needed to care for his disabled child. The participant further reported the loss of one of the sources of finance due to his wife's poor health. They claimed that the grant was insufficient to ensure financial stability and enhance quality of life. The financial challenge of providing for one's family or oneself on limited financial resources was described as being extremely stressful and daunting.

In parallel, the findings of a study conducted in the Western Cape revealed that 50 percent of the 50 participants were financially sustained by disability grants or pension (Yu and Ennion 2019: 3). Personal savings, household savings, loans from unorganised moneylenders, and mortgages were the various sources of finance reported by the participants of a study conducted in Delhi (Chander and Kannan 2021: 9).

A few participants reported receiving financial support from family members. One of the participants said:

> *"I live off my pension but sometimes my ex-husband helps me out with groceries and other items"* (AP13).

The participants expressed gratitude for their children and other relatives who voluntarily provided financial support to them. One participant described the generosity of her ex-spouse who, on some occasions, provided her with groceries and other essential items. Receiving financial assistance in any form alleviates the stress of

financial concerns. These findings were confirmed in a study conducted in Bangladesh by Stuckey *et al.* (2020: 285), where participants were grateful to receive some form of financial support from relatives.

4.3.5. Theme 5: The patient-prosthetist relationship

An important theme that emerged from the data surrounded the patient-prosthetist relationship. In order to gain an understanding of the depth and experiences of the relationship, the perspectives of both the amputee patient and the prosthetist are crucial.

Sub-theme 1: The experiences of amputees

An important sub-theme derived from the findings was the amputees' relationship with their prosthetist. The excerpts below reflect the responses of the amputee participants describing the patient-clinician relationship:

> *"They listen to me… I feel comfortable to talk to them about any pains and if I need adjustments to the prosthesis"* (AP8).
>
> *"I am able to communicate anything I feel. I even call him a pastor because he consoles me so well… We have a great relationship… I sometimes forget I am amputated"* (AP14).
>
> *"I had a great relationship with them because they would educate me on everything"* (AP9).

Murray (2013: 516) suggested that good communication, respect, trust, and honesty in the patient-prosthetist relationship will result in a good prosthesis and a comfortable environment for the patient. Most of the participants described having a healthy relationship with their prosthetist encompassing the aforementioned elements. One participant reported that he openly communicated any emotional or physical discomforts he experienced because the prosthetist was approachable, and a trustworthy relationship was established. The data suggests that the relationship goes beyond the prosthesis, where a great friendship is formed between the amputee and the prosthetist. Another participant indicated that the prosthetist clearly discussed all

the necessary information that helped her to easily understand the procedures regarding the prosthesis.

A salient point reported by the amputee participants was being actively listened to, which helped them to feel comfortable, and to easily communicate about any repairs needed on the prosthesis. Murray (2013: 516) stated that patients should remain the focal point during discussion of the prosthetic prescription as this will allow a prosthesis to be manufactured according to what the patient is comfortable with.

In contrast, some participants described a strictly professional patient-prosthetist relationship:

> *"If I do have issues, then I tell her because at the end of the day, it is her job to provide these services to me. They do not ask about emotional issues, and it is fine because I don't think they understand my pain"* (AP12).

> *"I told him [initial prosthetist] my stump was bleeding at the bottom. He did not take interest in me and told me to get used to it. He felt he made a perfect prosthesis and was unhappy to make a second... [Prosthetist X] was very helpful and did whatever he could to make me feel better. The next time I went, I insisted on seeing him… With the other prosthetist, it was chalk and cheese, he was merely doing his job to make a prosthesis"* (AP1).

One participant reported that he openly communicated any discomforts emanating from using the prosthesis with the prosthetist, as it is their job to repair it. With respect to emotional issues, the participant preferred not to converse about any, as he thought that the prosthetist lacked genuine understanding of the amputation experience. Suppressing emotions limits the care and assistance the patient can receive and places undue strain on psychological health.

It is imperative for prosthetists to adjust the prosthesis where necessary as any malfunctions can severely injure the amputee and prevent prosthesis-use (Turner, Belsi and McGregor 2021: 63). One amputee participant described an unfavourable encounter with his initial prosthetist who refused to adjust the prosthesis, which caused bleeding of the residual limb. The prosthetist was unaccommodating, which led the participant to seek assistance from a different prosthetist, who listened to him and

provided quality care. For this reason, the participant requested to be treated only by that specific prosthetist.

Another participant indicated the fault in his prosthetic foot. The following was said:

> *"There is a noise at the foot. They told me to tighten the foot with Allen keys, but I do not even have that or know what it is. One day, it just came out as I was walking, and I almost fell but I quickly sat down on the nearest chair"* (AP5).

One participant reported that the prosthetic foot precipitated a debilitating fall that he fortunately averted by a quick reflex action. When the participant telephonically communicated this issue to his prosthetist, he was told to "tighten the foot with Allen keys." This implies that a physical assessment of the foot had not been completed to locate the source of the noise, and to make the correct adjustment. The participant stated that he was unfamiliar with such a tool and therefore, he was unable to fix the foot. Thus, his risk of injury was increased. Prosthetists possess the requisite skills and knowledge to accurately use the tools necessary to adjust and repair the prosthesis. Therefore, it is not the responsibility of the patient to make any adjustments or repairs to the prosthesis on their own. Aside from damaging the prosthesis, an incorrectly adjusted prosthesis could injure the user.

Sub-theme 2: The experiences of prosthetists

One of the sub-themes derived from the data highlighted the experiences of prosthetists in their relationship with amputee patients. The prosthetists shared the following:

> *"We joke with them just to get a positive environment… This helps them to confide in me and open up. I try by all means not to act as a prosthetist, I try by all means to be as friendly as possible so that I can get as much information from them… I sing for them. I can't sing but those kinds of things just to make them comfortable"* (PP10).

> *"Remember that everyone talks amongst themselves. When you are too empathetic, you become a soft target because now everybody is going to want to go to you"* (PP2).

Most of the prosthetist participants stated that they had established a good rapport with the amputees. The prosthetists described how exhibiting an amiable and approachable demeanour lays the foundation for amputees to trust and confide in them about physical and emotional discomforts. Thus, allowing the prosthetist to provide pertinent assistance and services. Some prosthetists indicated conversing about topics unrelated to prosthetics, singing, and making jokes creates a cordial and relaxed atmosphere for the amputees to feel comfortable and less intimidated. However, some patients may take advantage of an empathetic person. Amongst themselves, the amputees discussed their experiences with the prosthetists and thereafter, requested to be treated by the most compassionate prosthetist.

A few prosthetists reported the difference in the personalities of patients from urban areas compared to those from rural areas:

> *"I once cried because of a patient. The patients from the rural areas are so respectful and nice. The patients from urban areas are so disrespectful"* (PP13).
>
> *"Patients in the rural areas are very grateful because they aren't used to receiving things in general"* (PP15).
>
> *"When the patients are from rural areas, they have that mindset that this is a professional, so I need to be respectful and behave myself"* (PP11).

Several prosthetists reported the humble and respectful demeanor of many of their rural patients as opposed to some arrogant patients that hailed from urban settings. One prosthetist was brought to tears due to the disrespectful nature of a patient. Presumably, urban patients are more privileged and familiar with easily accessible healthcare services compared to rural individuals who rarely receive any form of healthcare.

4.3.6. Theme 6: Contribution of the prosthetist

The final theme that emerged from the findings was the contribution of the prosthetist in improving the quality of life of individuals with limb loss. Being a large part of the study's focal point, pertinent questions were used to extract salient points from prosthetists during the focus group discussion. This provided significant insight into the

various roles and contributions of the prosthetist in improving the quality of life of transtibial amputees.

Sub-theme 1: Improving physical well-being

One of the sub-themes derived from the data was the ways in which prosthetists improved the physical health of the amputees. The participants indicated their use of referrals in the following way:

> *"In outreach clinics, I have had more success referring them to social workers than to psychology because social workers are there. They don't do the same service, but they can get to the root of the problem, is it something at home, is it money etc. So, they either organize a grant or a carer"* (PP1).

> *"I always send my patients back to the doctor, maybe for a re-amputation if the stump is too long or if we know there's a problem and can't do a fitting of a prosthesis. I also refer them to the physiotherapist if there are contractures of the stump and the patient is flexed so the leg needs to be in a neutral position. Also referring to the physio for stump bandaging, gait training and sometimes pylon training"* (PP4).

All the prosthetists indicated the use of referrals to members of the multidisciplinary team to improve diverse aspects of the physical well-being of amputees. One participant reported using social worker services, specifically in rural regions, to assist the amputee with financial or household matters. Another prosthetist reported referring amputees to surgeons for revision surgery of the residual limb, in order for the amputee to be eligible for prosthesis-use. Further, many prosthetists referred amputees to physiotherapists who assisted with shaping the residual limb, gait training and treatment of contractures.

A Durban based study conducted by Manickum, Ramklass and Madiba (2019: 44) found that only 17.4 percent of the amputee participants were referred to physiotherapy services. The authors highlighted the importance of the multidisciplinary approach to assist amputees in the adjustment process of amputation (Manickum, Ramklass and Madiba 2019: 44).

Other participants reported that they encouraged amputees to improve their health using regular exercise and activities:

> *"I regularly check up on the patients where I know they had problems and ask them about the prosthesis, their health and if they're exercising. I tell them they must do things for themselves… I encourage them to exercise and walk"* (PP9).

Langford *et al.* (2019: 1068) asserted that several health benefits are associated with physical activity therefore, prosthetists should encourage amputees to increase their participation in physical activities. This was reflected by the reports by many prosthetists who reported encouraging and motivating the amputees to become independent and improve their physical health with regular exercise. Genuine concern was reflected in the response of a compassionate prosthetist who reported monitoring the well-being of his patients through regular telephonic communication. This benevolent act would subsequently enhance the psychological health of patients in knowing they are cared for by their respective prosthetist.

Some prosthetists described their reactions when adjustments or repairs were required on the prosthesis:

> *"I don't have that mentality of telling them, 'You'll get used it, it happens.' … I understand if anything is wrong with the prosthesis, it can damage them and it can prevent them from wearing another prosthesis forever… I understand that these patients are struggling already, so I need to make them able to do things for themselves"* (PP9).

> *"As a prosthetist, it is important that you ask about each aspect to see if there are any issues with the prosthesis. So many of them are just so excited… They think that if they tell you about pain or issues then you may take the leg away… You can't get angry at your patients because it's your job to help them and fix any issues they're experiencing with the prosthesis… But if the patient has a psychological problem, then no prosthesis you ever make will be perfect for them, they will always come back with complaints"* (PP6).

Uytman (2014: 123) indicated that the prosthetist's work is considered successful when few or no complaints are reported by the patients. The prosthetists indicated that it is

imperative to thoroughly inspect every aspect of the prosthesis with the patient. Therefore, if the amputee returns with complaints, the prosthetist will not be liable for any injury sustained. The prosthetist participants stated that it is unprofessional to display anger and frustration when patients require adjustments. Rather, it is ethical, and central to their role, to listen and willingly adjust the prosthesis to reduce any discomforts the patient may be experiencing. Any malfunctions of the prosthesis could cause injury and consequently, prevent the amputee from utilising a prosthesis again. Uytman (2014: 123) argued that when patients report any physical discomforts with the prosthesis, prosthetists need to actively listen to, and understand the needs of the patient, and the reasons for their discontent with the prosthesis.

Kizilkurt *et al.* (2020: 116) noted that dissatisfaction with the prosthesis engenders significant physical, psychological, and social issues, thereby reducing quality of life. Several prosthetists reported that because the amputees were overwhelmed with excitement to receive the prosthesis, some decided not to communicate any discomforts because of the fear that the prosthesis could be taken away. However, some participants reported that amputees who had not accepted the amputation would frequently return with complaints regarding the prosthesis.

Sub-theme 2: Improving psychosocial well-being

One of the sub-themes derived from the data was the efforts of prosthetists to improve the psychological health and social well-being of individuals with limb loss. The excerpts below reflect these efforts:

> *"The doctor is supposed to make that referral. We can only suggest but we can't really refer, even physios can refer"* (PP8).
>
> *"I try to motivate and encourage them"* (PP6).
>
> *"You give them some type of hope that they'll do better than how they're feeling right now"* (PP4).

Most of the participants indicated that if any psychological issues were noticed, amputees were advised to seek psychological services. Motivating, encouraging, and instilling hope in the amputee patients were some ways reported by the prosthetist to help improve psychological well-being. The participants stated that while some

healthcare professionals are allowed to refer patients to mental health professionals, prosthetists do not possess this right and may only suggest these services to amputees. Thus, it is the responsibility of the medical professionals treating patients post-amputation to make the necessary referrals. Many participants reported that they motivated and instilled confidence in amputees who had shown either signs of low self-esteem, anxiety, or depression.

Psychological evaluation and intervention will considerably enhance rehabilitation post-amputation and is therefore, indispensable prior to prosthesis-use (Kizilkurt *et al.* 2020: 117). Srivastava and Chaudhury (2014: 5) highlighted that venting personal issues and reassurance from professionals helps to diminish stress. Medical professional participants in an Australian study indicated that patient-raised emotional concerns should not be disregarded by the prosthetist but rather, they should be discussed and addressed (Mackenzie *et al.* 2020: 13).

> *"Some of the amputees are reserved and hesitant to share information about the amputation. It's a thing of denial, especially diabetic patients. In the rural areas, diabetes doesn't make sense to them so they will say it is witchcraft instead of gangrene"* (PP15).

According to Tolsen and Koenig (2003: 2), ancient artefacts, sickness and disease were treated as demon possession and evil spirits. One prosthetist explained that some amputees, specifically those that resided in rural areas were unaware of diabetes mellitus, which leads them to believe their amputation is an act of witchcraft. For this reason, the amputees limit their communication with the prosthetists, and do not seek professional help. There is a dire need to raise awareness and promote prosthetic services in outlying areas for marginalised individuals to receive the appropriate physical and psychological care they require.

Naidoo and Ennion (2019: 101) reported that some South African rural communities attribute several disabilities to either bewitchment or punishment from ancestors. Furthermore, drivers of public transport believe that if they transport individuals with disabilities, they will be cursed (Naidoo and Ennion 2019: 101). This further impedes individuals access to healthcare services.

The excerpts below reflect the prosthetists' responses to a probe question: If programmes are introduced to help prosthetists develop their skills and expertise to improve the psychosocial well-being of amputees, would you join?

> *"It wouldn't take away from the psychologist because we would see the amputees. They see the psychologist in the beginning and then stop. They are seeing us for years on end so we can help every time… We will be able to monitor it and help where and if we can"* (PP8).

> *"People in the rural areas are just oblivious to their emotions and their feelings about the situation. I feel that they would definitely benefit from that. If we are better equipped to help them then it would be great"* (PP15).

Most participants indicated their willingness to participate in programmes to develop and improve their psychology skills to enhance the quality of the services they can deliver. The participants stated that prosthetists frequently treat the amputees, hence they are able to regularly monitor the psychological progress of amputees. One participant reported that individuals residing in rural areas were unaware of emotional discomforts, subsequently these emotions are not communicated or dealt with. Therefore, prosthetists who possess the skills and knowledge to assist with psychological issues would provide invaluable care to these individuals.

In contrast, few prosthetists stated that provision of psychology services would overstep the professional roles of psychologists:

> *"I wouldn't give any advice or try to be a psychologist when I'm not. I'm only here to make the prosthesis. If I notice any psychological issues, I will just refer the patient to the psychologist. Everyone has a job… We can't take away from someone else's job"* (PP5).

Few prosthetists reported their reluctance to participate in psychology programmes as it would infringe on the services provided by psychologists. One participant stated that her professional service entails the provision of prosthetic devices hence, if any psychological issues were observed in a patient, the services of a psychologist would be suggested. The various healthcare professionals interviewed in an Australian study,

by Mackenzie *et al.* (2020: 13), indicated that prosthetists should be equipped with the necessary skills to ascertain when referrals to mental health services were required.

The excerpts below reflect the ways the prosthetists endeavoured to improve the social well-being of amputees:

> *"I do not know of any amputee groups or searched for any, but I think it would definitely help the patients… Sometimes secondary patients will motivate the primary patients… They communicate, they give each other hope"* (PP10).

> *"When they are alone then they are really free to talk and be themselves… If I need to tell anything to the patient, then I say it in front of everyone so that they are also aware of what's happening. Without making anyone feel bad and also to show the family what role they need to have in the patient's life"* (PP8).

Most participants were not aware of methods to improve the social well-being of amputees. Furthermore, the prosthetists indicated that they were not aware of any amputee support groups in KwaZulu-Natal. Some secondary patients would motivate and recommend ways in which primary patients could perform certain tasks and activities with the prosthesis. Since the secondary patients understood the challenges of being a first-time prosthesis-user, they empathised with the primary patients and voluntarily offered sound advice. One prosthetist described that isolation of amputees from their family members during appointments, accorded the patient the liberty to openly communicate any issues. Thereafter, the prosthetist sensibly offers suggestions on how the family can provide support to the amputee.

Srivastava and Chaudhury (2014: 5) pointed out that interactions in amputee support groups provided psychological relief, reduced anxiety, and could help in universalising the amputation experience. Members of the multidisciplinary team concurred that prosthetists should enquire how individuals were managing with the amputation in society and the reactions of family members and friends to the amputation (Mackenzie *et al.* 2020: 13). A directory of organisations and resources for individuals with disabilities in South Africa is available on the KwaZulu-Natal Department of Health website (Available: http://www.kznhealth.gov.za/occtherapy/disability_directory.pdf). Familiarisation with these facilities will allow prosthetists to suggest organisations or resources pertinent to the needs of amputees.

Some prosthetists reported providing componentry that may facilitate participation in some high-energy activities:

> *"Some patients are very active and tell you they need specific legs because they want to go back to playing soccer. In this sector though, we do not have the right components for the prosthesis of an active person. We try our best to give them what we have to live a good active lifestyle as before"* (PP14).

The desire to resume social roles, sees some amputees requesting specific components to inherit the capability to participate in recreational activities. One prosthetist reported that they make great efforts to provide componentry that could offer a wider range of mobility to permit participation in some outdoor activities. However, the public sector does not cater for such needs which leaves several amputees unable to participate in their desired activities. Purchasing advanced prosthetic componentry should be considered by the authorities managing the funds intended for prosthetic supplies at the medical facility.

Sub-theme 3: Factors impeding the efficacy of prosthetic services

A cardinal sub-theme derived from the data was the miscellaneous factors that impeded the efficacy of the services provided by the prosthetists. These factors are illuminated in the prosthetists' responses below:

Some prosthetists described the language barrier between them and non-anglophone patients:

> *"If you don't understand what they're saying to you or vice versa then you can completely miss something important… If you ask your colleagues to help you then you're taking them away from their work"* (PP6).

> *"It is one thing if I say it to them in English and someone else comes to say it to them in Zulu… They are the worst person ever because it's like you're saying, 'Do you understand now what you have to do?'"* (PP1).

The few English-speaking prosthetists reported their difficulty in effectively communicating with patients that were not competent English speakers. Each prosthesis is tailor-made to meet the personal goals of its user, which requires crucial

and pertinent information from the patient. The language barrier prevents this information from being communicated. Some prosthetists reported eliciting assistance from bilingual colleagues, which meant putting their work on hold to assist with translations. Furthermore, patients perceived prosthetists as condescending when a colleague was brought in to communicate information to the patient in their native language.

Ennion and Rhoda (2016: 569) drew attention to the language barrier between patients and clinicians in a qualitative study comprising nine prosthesis-users, three traditional healers, and 28 healthcare workers from different disciplines. Findings revealed that the language barrier between English-speaking healthcare professionals and isiZulu-speaking patients affected the rehabilitation members' ability to educate, counsel, and deliver quality health services (Ennion and Rhoda 2016: 569). To promote effective communication and improve service delivery, prosthetists should be competent in the languages commonly spoken by their patients (Ennion and Rhoda 2016: 569).

Many prosthetists indicated that the rotation system employed at the medical facility prevented the continuation of relationships:

> *"You're at clinic for a year or two, at least you're there for so long. Here, it is a list… it is the most equal way to divide up work… But if you are really good at your job and the patients prefer to see you, you will end up with more prosthetic patients than someone who doesn't put in an effort"* (PP1).

A prosthetist will form a relationship with a patient from the first assessment to delivery of the prosthesis. Thereafter, when the patient returns for a new prosthesis, the next prosthetist on the rotation list will be assigned to that patient. As a result, patients would be reluctant to share personal issues as new relationships have to be formed each time. Many prosthetists lost relationships with patients due to the rotation system. The services of meticulous prosthetists were sought after which resulted in a voluminous workload compared to that of the other prosthetists. Therefore, the system was established to equally distribute the workload amongst the prosthetists. Correct assessment, fabrication, fitment, alignment, and adjustment of the prosthesis entails considerable skill and great expertise (Padi, Mukundan, and Subramani 2017: 21).

The prosthetists reported the influence of privacy and time constraints. The following were shared:

> *"Patients are not getting the appropriate privacy for them to be able to share with you what their concerns are because we consult in an environment where there is a lot of people that can eaves drop and listen to your conversation… Because the patients know that there is a long line of patients waiting outside, they basically just get to the gist of the problem. Not going to get into detail because it is all about time"* (PP2).

> *"There isn't enough time to notice if the patients need any psychological help. You will have 30 patients waiting for you and only two hours in which you can see them"* (PP13).

Some prosthetists suggested that the confined spaces in the facility limit individuals' privacy as anything discussed, is audible to other patients. These factors discouraged patients from openly communicating physical or emotional discomforts to the prosthetist, which would subsequently restrict the services the prosthetist can provide. Furthermore, prosthetists stated the gravity of their time constraints diminishes their attentiveness and hence, any psychological issues endured by amputees could escape their notice. Due to the multitude of patients required to be consulted with in a specific time frame, prosthetists primarily focus on prosthetic matters rather than patients' psychological needs.

Mduzana *et al.* (2020: 10) emphasized that the demand for prosthetic services in rural contexts remains extreme and unsatisfied. Improving the architecture of clinics and other medical facilities to include several well-partitioned consultation rooms will ensure privacy during appointments. While increasing the frequency of prosthetist visitations at outreach clinics is a good suggestion, establishing prosthetic facilities with stationed prosthetists in these rural communities would be exceptional as prosthetic services would be readily available to the community.

Several prosthetists described the unrealistic expectations of amputees:

> *"Sometimes they think that what we are making them is going to come close to their natural limb, which is true only to an extent, so some lose a bit of hope due*

to that. Some come with a lot of expectations and then only to find a basic limb just to ambulate" (PP10).

The prosthesis provides mobility to a certain degree to allow ambulation and basic functional skills. The prosthetists reported that amputees expected to receive a prosthesis that emulates the functionality of the biological extremity. Misinformation from other healthcare professionals who are unaware of the functional scope of prostheses, the internet and other sources may predispose these unrealistic expectations (Uytman 2014: 122). Inclusion of the prosthetist post-surgery will allow the individual to be appropriately educated on and gain a thorough understanding of the multifaceted rehabilitation process.

Several prosthetists described the availability of stock at the medical facility. An example is the quotation below:

"Sometimes we do not even have components and so they travelled all the way for nothing. They feel let down and it is quite traumatic for them. Sometimes you have to strip some other prostheses to give them components and let them leave happy" (PP15).

Some prosthetists communicated that the limited availability of stock placed immense financial strain on patients. Patients would use their social assistance grants or pensions to cover steep transport fees to travel to the facility only to learn that there is no stock. Not receiving what they expected left patients feeling disappointed and distraught. Due to this emotional distress, prosthetists take components from other prosthetic devices to avoid the patients' travel costs being wasted.

Similar experiences regarding the lack of prosthetic supplies in public healthcare facilities were reported by the participants in a study conducted in Mpumalanga (Ennion and Manig 2018: 10). The availability of stock needs to be significantly improved to accommodate the transportation and financial difficulties experienced by individuals with limb loss.

4.4. Conclusion

In this chapter, the researcher presented a discussion of the findings through six themes and 18 sub-themes (Table 4.1). A comprehensive understanding of the biopsychosocial effects of a prosthesis and the contribution of the prosthetist in improving the quality of life of transtibial amputees was gained from individual interviews with the amputee participants and a focus group discussion with the prosthetist participants. The next chapter focuses on the conclusions and recommendations for future studies.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

In this chapter, the researcher presents the key findings in the context of the research questions. The value and contribution of these findings in the field of research are discussed. Limitations of the current study are presented and lastly, recommendations for future research are offered. Biggam (2008: 137) wrote that everything the researcher does in the dissertation, leads to the concluding chapter. Hence, the concluding chapter is an integral aspect of the dissertation as this is where the crux of the study output is captured (Biggam 2008: 137).

5.1.2. Salient findings of the study

This study aimed to explore the biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees. The findings indicated that the prosthesis significantly enhanced the quality of life of transtibial amputees through improved mobility, independence, and functionality. While various contributions were made by prosthetists to enhance the physical well-being of amputees, there was a consensus that prosthetists lacked adequate skills and expertise to improve the psychosocial well-being of individuals with limb loss. The four research questions of the study provide a comprehensive structure within which the salient findings are thoroughly discussed.

5.1.2.1. The biopsychosocial and spiritual effects of an amputation on individuals post-surgery

An exploration of the biopsychosocial effects of a transtibial amputation illuminated the diverse range of challenges amputees experienced post-amputation. Phantom limb pain, limited functional mobility, and adapting to perform daily tasks were among the main physical effects reported by the amputee participants. The findings indicate that losing a limb gives birth to several psychological issues, namely grief, lack of independence, reduced self-esteem, body-image anxiety, depression, self-isolation, and fear of the future. This brought to the fore the importance of psychological

intervention and a strong support network. While familial support facilitated the adjustment process, the amputees indicated that receiving support from other amputees would be unmatched in mitigating the various psychological effects. This study recognised the stigma attached to amputation as some participants described their experiences in society as including negative remarks, hostility, and staring. Regardless of the challenges experienced, being resilient and having a positive mindset was reported to promote successful adjustment to the amputation.

There is a dearth of local literature focusing on spirituality as a coping mechanism in the lives of individuals enduring limb loss. A particular strength of this study was that it captured the value of the support that faith communities provide in assisting amputees to experience a sense of belonging. As most of the amputee participants described their experiences from amputation, it was evident that God was a constant and significant source of strength, comfort, and peace. Prayer, faith and trust in God allayed their fears, anxieties, and worry. Praying, reading their holy book, listening to spiritual music, and attending places of worship were powerful coping mechanisms. In addition, the amputee participants were able to accept their reality and strongly believed that God was by their side through all of life's trials and tribulations.

5.1.2.2. The factors motivating amputees to consider the use of a prosthesis

This study aimed to bridge the gap in the literature by exploring the factors that motivated the current study's participants to obtain a prosthesis. Regaining functional mobility was one of the primary reasons amputees sought prosthetic intervention. The desire to be self-sufficient, mobilise independent of crutches and wheelchairs, return to employment, and resume previous social roles also drove amputees to procure a prosthesis. However, several amputee participants were unaware of prosthetic services until they were referred to the prosthetist either by their medical practitioner or physiotherapist. This finding highlighted the lack of awareness surrounding prosthetic services, both in urban and rural communities.

5.1.2.3. The challenges and benefits transtibial prosthesis-users experience in their daily lives

Many of the amputee participants made remarkable progress in their transition from enduring the various difficulties post-amputation to accepting the amputation and successfully utilising the prosthesis in their daily lives. The benefits of utilising a prosthesis greatly outweighed the challenges encountered when using this assistive device. This study recognised the role the prosthesis played as many of the amputees removed the prosthesis only to sleep. Expending less energy during ambulation, executing tasks of daily living, resuming previous roles, mobilising independently, and using public transport were among the array of benefits attached to using the prosthesis. The prosthesis mitigated body-image anxiety and enhanced psychological health. Amputees were able to easily communicate with their prosthetist regarding adjustments and repairs to the prosthesis, particularly when they were listened to, and respected. Despite the restoration of mobility and functional independence, barriers that impeded an enhanced quality of life were financial constraints, exorbitant travel costs, and poor infrastructure.

With respect to componentry, some individuals desired an aesthetically pleasing appearance in that the prosthesis was hoped to mirror the biological limb in relation to skin tone and physical appearance. The Silesian belt system caused great discomfort while the prosthetic ankle and foot system did not permit long-distance walking and participation in sporting activities. Considering the costly travel expenses, amputees expressed anger and frustration at the lack of prosthetic components. Evidently, the componentry and its availability in the public sector needs to be improved, as dissatisfaction with the prosthesis can lead to its abandonment. In terms of maintenance of the prosthesis, the need for prosthetists to adequately explain the necessary procedures to users was highlighted.

5.1.2.4. The ways in which the prosthetist is able to improve the holistic well-being of amputees

To date, the work produced by researchers has concentrated on the roles of the prosthetist in solely improving the functional independence and mobility of amputees. This study, on the other hand, differs in the following respects: it offered insight into the

strengths and weaknesses in service delivery from prosthetists in improving the holistic well-being of amputees, and the factors hindering the efficacy of prosthetic services.

Prosthetists create a comfortable and relaxing environment to allow amputees to openly communicate in order to receive a prosthesis that is most optimal. Effective communication, clarification of all necessary procedures regarding the prosthesis, and quality care from prosthetists played a crucial role in ensuring acceptance of and satisfaction with the prosthesis. To improve physical well-being, prosthetists motivated and encouraged amputees to exercise and receive physiotherapy. In addition, they were always willing to repair and adjust the prosthesis to allow the user to mobilise comfortably and reduce the risk of injury. When amputees present with psychological issues, prosthetists recommend external psychological interventions as they lacked adequate professional psychological expertise to address these issues on their own. The lack of requisite skills and knowledge in prosthetists to enhance the social and psychological well-being of amputees, indicates the importance of referrals to other members of the multidisciplinary team, as well as an interdisciplinary relationship.

The findings further revealed various factors impeding the efficacy of prosthetic services, namely language barriers between prosthetists and amputees, a rotational system which prevents the establishment of long-term relationships, the lack of privacy due to confined spaces, poor stock availability, and time constraints due to the volume of patients that need to be treated.

5.2. Limitations

While this study provided significant data regarding the quality of life of individuals with limb loss, it was not without limitations.

- The current study's amputee participants resided in the urban regions of KwaZulu-Natal. Further research should explore the biopsychosocial challenges experienced by amputees in rural regions. Such data will provide insight into the specific rehabilitation services and care required and will enable the provision of these services in outlying areas to be operational.

5.3. Recommendations

The experience of losing a limb and the integration of the prosthesis into daily life, is multifaceted. While the experiences of amputees have been richly explored internationally, little has been pursued locally. Based on the findings, the following recommendations should be considered:

5.3.1. Further research on the needs of individuals with limb loss

There is still a paucity of South African literature focusing on the psychological and social needs of amputees, specifically those residing in rural areas. Gaining an understanding of these needs, will educate and motivate the necessary healthcare professionals to meet them during service delivery.

5.3.2. Improve accessibility and awareness of prosthetic services

Raising awareness of prosthetic services in both urban and rural communities, will allow a multitude of marginalised individuals to receive the healthcare services they require. Furthermore, it will assist in reducing the stigma attached to amputation. Access to healthcare services in South Africa is a well-established concern that remains neglected. Considering that most amputees were financially sustained by social grants, the public sector should offer subsidised modes of transportation or designated vehicles to the medical facilities offering prosthetic services. There is a dire need to improve access to prosthetic services in rural areas, considering an individual's basic right to access healthcare services is guaranteed by the South African Constitution. As a matter of urgency, establishing prosthetic clinics with stationed prosthetists in outlying areas would be invaluable to the amputees residing in these locations, and significantly enhance their quality of life. Furthermore, it would allow prosthetists to manufacture prosthetic devices with particular componentry able to accommodate rural terrains.

5.3.3. Improve interdisciplinary relationships

A plethora of physical, psychological, environmental, and social challenges were reported by amputee participants. Most participants did not receive the physiotherapy, psychology, and social support services they required. It is imperative that healthcare

professionals make referrals to the requisite services the individuals need, and follow-up that these services have been received. Furthermore, effective communication between healthcare professionals would shed light on the specific areas requiring assistance in the amputee's life and improve their overall quality of life.

5.3.4. Developing knowledge and skills

To remove the language barrier, prosthetists should be competent in the primary languages spoken in the areas in which they operate. Mixed responses were received regarding prosthetists' participation in programmes to cultivate psychology skills, expertise, and knowledge. Professional psychology skills should also be integrated as necessary courses for future development of prosthetists. Prosthetists are well-positioned to be able to recognise psychosocial discomforts and subsequently deliver the requisite care and services. In addition, integrating spiritual care into prosthetic healthcare services can create more thorough and solicitous systems of care, and may provide positive results.

5.4. Conclusion

Phantom limb pain, depression, body image anxiety, decreased mobility, and a lack of independence are among the main effects attached to limb loss. This study found that the prosthesis was pivotal in mitigating multiple of the negative physical and psychosocial effects of an amputation. Strong support networks, amputee support groups, and spirituality are essential coping mechanisms that facilitate the acceptance of the amputation. With effective communication, the prosthetist is able to manufacture the optimal prosthesis to improve the physical well-being of the patient. Further professional spiritual and psychosocial development will allow prosthetists to provide a holistic form of care to enhance the quality of life of individuals enduring limb loss.

You are altogether beautiful, my darling; there is no flaw in you.

Song of Songs 4:7

REFERENCES

Abdi, K., Arab, M., Rashidian, A., Kamali, M., Khankeh, H. R. and Farahani, F. K. 2015. Exploring barriers of the health system to rehabilitation services for people with disabilities in Iran: a qualitative study. *Electronic Physician*, 7(7): 1476-1485. Available: https://www.researchgate.net/profile/Farideh-Khalajabadi-Farahani/publication/284880344_Exploring_Barriers_of_the_Health_System_to_Rehabilitation_Services_for_People_with_Disabilities_in_Iran_A_Qualitative_Study/links/5660b6a408ae418a78667a49/Exploring-Barriers-of-the-Health-System-to-Rehabilitation-Services-for-People-with-Disabilities-in-Iran-A-Qualitative-Study.pdf (Accessed 05 November 2020).

Abouammoh, N., Aldebeya, W. and Abuzaid, R. 2021. Experiences and needs of patients with lower limb amputation in Saudi Arabia: a qualitative study. *Eastern Mediterranean Health Journal*, 27(4): 407-411. Available: https://applications.emro.who.int/emhj/fulltext/1020-3397-2021-2704-319-428-eng.pdf#page=93 (Accessed 29 November 2021).

Abu Shawish, M. O., Baloushah, S., Aljeesh, Y. I. and Osman, I. A. 2021. Effectiveness of group support in alleviating anxiety, depression, stress among amputees in Gaza Strip. *Scholarly Journal of Psychology and Behavioral Sciences*, 5(1): 529-532. Available: https://d1wqtxts1xzle7.cloudfront.net/82943691/SJPBS.MS.ID.000203.pdf?1648662413=&response-content-disposition=inline%3B+filename%3DEffectiveness_of_Group_Support_in_Allevi.pdf&Expires=1658230018&Signature=ADufjAfoIO~xL9UFMgrpI7agzKkJ5DuxUyjYrdINQabO3ri5RRMZCtWlltZc6a4Ce-3D1ApOgvwnZJu8-Qa7Ge1smjwcgJHFUCTDcuuF1pWMCmoeDgpWKN4H6V9NgaKF6ATaQ8et460u4g3Wjlwg5IjbCptLga9MmjEiWdVYgyDct6J5xQCQ0JEyIBP1So1aX4yj~7tBX2QHPw67oR9zQHPs1fNARs-Ch2BsxsM7d-CipF59m4QzG45dnvUfBItsY8Xrkk7k~AVgxRnXZMG3AQStrwmv24d4Tu1Ysh49qf7EEkKbBHZjUECL4t3KvuEzonCqlgoZXxJuTFYDV6RbOg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 25 January 2022).

Acharya, A. S., Prakash, A., Saxena, P. and Nigam, A. 2013. Sampling: why and how of it. *Indian Journal of Medical Specialties*, 4(2): 330-333. Available: https://www.researchgate.net/profile/Anita-Acharya-2/publication/256446902_Sampling_Why_and_How_of_it_Anita_S_Acharya_Anupam_Prakash_Pikee_Saxena_Aruna_Nigam/links/0c960527c82d449788000000/Sampling-Why-and-How-of-it-Anita-S-Acharya-Anupam-Prakash-Pikee-Saxena-Aruna-Nigam.pdf (Accessed 14 January 2021).

Adams, E. D. and Bianchi, A. L. 2008. A practical approach to labor support. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 37(1): 106-115. Available: https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1552-6909.2007.00213.x (Accessed 29 September 2020).

Adegbola, M. 2011. Spirituality, self-efficacy, and quality of life among adults with sickle cell disease. *Southern Online Journal of Nursing Research*, 11(1): 1-16. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3137798/pdf/nihms299000.pdf (Accessed 20 September 2020).

Agli, O., Bailly, N. and Ferrand, C. 2014. Spirituality and religion in older adults with dementia: a systematic review. *International Psychogeriatrics*, 27(5): 1-9. Available: https://www.researchgate.net/profile/Claude-Ferrand/publication/265055772_Spirituality_and_religion_in_older_adults_with_dementia_A_systematic_review/links/54033a3f0cf23d9765a5cb62/Spirituality-and-religion-in-older-adults-with-dementia-A-systematic-review.pdf (Accessed 20 September 2020).

Agli, O., Bailly, N., Ferrand, C. and Martinent, G. 2018. Spirituality, quality of life, and depression in older people with dementia. *Journal of Religion, Spirituality & Aging*, 30(3): 268-278. Available: https://www.tandfonline.com/doi/pdf/10.1080/15528030.2018.1452832?needAccess=true (Accessed 20 September 2020).

Ahmad, N., Thomas, G. N., Gill, P., Chan, C. and Torella, F. 2014. Lower limb amputation in England: prevalence, regional variation and relationship with revascularisation, deprivation and risk factors. A retrospective review of hospital

data. *Journal of the Royal Society of Medicine*, 107(12): 483-489. Available: https://journals.sagepub.com/doi/pdf/10.1177/0141076814557301 (Accessed 10 January 2021).

Al-Adwan, M., Najjar, Y., Hdaib, M. and Al-Khateeb, M. 2017. Variables affecting the amputees' reactions artificial limbs in the Kingdom of Jordan. *Journal of the American Academy of Special Education Professionals*, 140: 140-153. Available: https://files.eric.ed.gov/fulltext/EJ1164690.pdf (Accessed 10 January 2021).

Albertson, E. R., Neff, K. D. and Dill-Shackleford, K. E. 2014. Self-compassion and body dissatisfaction in women: a randomized controlled trial of a brief meditation intervention. *Mindfulness*, 6(3): 444-454. Available: https://d1wqtxts1xzle7.cloudfront.net/34398308/mindfulness-2014-albertson-neff-shackleford-with-cover-page-v2.pdf?Expires=1654725130&Signature=bEk9C5aqj1D1TKja6VWzpTZMay7n8HifRW8DJzwtYEJbyYyTJHBJd63Xa6JrWewuWgvvS9HBloO8Ex2L1rJ4hKdRhp85kAx2UL54OjXhJmIj19aypGfrlDIVL03N~vO8sOHPFan2Na7zj5ae5PQE--8XU0FCaIfCqnfBmQ7CHK7MvO-gfumRe6haB30-px~UyDxravCo3Upqk2oxqjbGTXUuqDKBlcL3C5Wma6pT4s-Vq1SYKT1KJ51e~WXPyWKJBGdLSzbP9mjH6lWv6fPfmcyDhLM8Vy4vnzFmdgoIS85Vm0zljAZXxpY6iA~L3O7qti9kv-0egNjKAFMLz9Pj1w__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 29 September 2020).

Ali, S. and Haider, S. K. F. 2014. Life after amputation: facing numerous challenges. *Journal of Law and Society*, 45(65): 105-111. Available: http://journals.uop.edu.pk/papers/65-2014-7.pdf (Accessed 25 January 2022).

Al Imam, M. H., Alamgir, H., Akhtar, N. J., Hossain, Z., Islam, R. and Hossain, M. S. 2020. Characterisation of persons with lower limb amputation who attended a tertiary rehabilitation centre in Bangladesh. *Disability and Rehabilitation*, 42(14): 1995-2001. Available: https://doi.org/10.1080/09638288.2018.1544671 (Accessed 15 July 2021).

Al-Mutair, A. S., Plummer, V., Clerehan, R. and O'Brien, A. 2014. Needs and experiences of intensive care patients' families: a Saudi qualitative study. *Nursing in Critical Care*, 19(3): 1-10. Available: https://www.researchgate.net/profile/Abbas-Al-Mutair/publication/257751706_Needs_and_experiences_of_intensive_care_patients

%27_families_A_Saudi_qualitative_study/links/5a9cd08daca2721e3f322742/Needs-and-experiences-of-intensive-care-patients-families-A-Saudi-qualitative-study.pdf (Accessed 20 September 2021).

Amankwaa, L. 2016. Creating protocols for trustworthiness in qualitative research. *Journal of Cultural Diversity*, 23(3): 121-127. Available: https://eds.s.ebscohost.com/eds/pdfviewer/pdfviewer?vid=2&sid=3ba18a92-2158-448a-ab3e-78e60a2a7e51%40redis (Accessed 20 February 2021).

Amoah, V. M. K., Anokye, R., Acheampong, E., Dadson, H. R., Osei, M. and Nadutey, A. 2018. The experiences of people with diabetes-related lower limb amputation at the Komfo Anokye Teaching Hospital (KATH) in Ghana. *BMC Research Notes*, 11(1): 1-5. Available: https://d1wqtxts1xzle7.cloudfront.net/55989720/Amoah_et_al-2018-BMC_Research_Notes-with-cover-page-v2.pdf?Expires=1654726107&Signature=DjLFXs6E~49tyPIm6dfKTo5u~YkV-kzgY87A-Z~pDvO2Os0U8NJInOjhVfFjPZ4F9FGZjF28pyzUC3RhRavWu8vU0o-RQBo97xy5TFjt4eDdBYD82mPIQrDQgieaEXi~MgkmRQ9pNrcq3Z4~9Yd1Es-wqGXPY3SVFChpE8i3ZPoTJMSP3jCE7Hze6tQTo4b3PT4IaxYgvi89xqnb6lJnCjF5-VB16vPyPtSEyJHy7bxK5feolj-I0pW~xwQCWQED6RWDOHuVOz5fRcPXFcWshad~GuVsV-EzoxxolmbYmr1qA-vaUY1u1JUEmtM113ab2MpvKrjVfC-Goa2uyuvSmw__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 17 January 2022).

Amosun, S. L., Mutimura, E. and Frantz, J. M. 2005. Health promotion needs of physically disabled individuals with lower limb amputation in Rwanda. *Disability and Rehabilitation*, 27(14): 837-847. Available: https://www.researchgate.net/profile/Jose-Frantz/publication/7664675_Health_promotion_needs_of_physically_disabled_individuals_with_lower_limb_amputation_in_Rwanda/links/0c960533fc88e3664a000000/Health-promotion-needs-of-physically-disabled-individuals-with-lower-limb-amputation-in-Rwanda.pdf (Accessed 25 June 2020).

Amputee Coalition. 2020. *Well-being program*. Available: https://www.amputee-coalition.org/healthcare-providers/well-being-program/ (Accessed 13 March 2020).

Andjić, M., Božin, B., Draginić, N., Kočović, A., Jeremić, J. N., Tomović, M., Milojević Šamanović, A., Kladar, N., Čapo, I., Jakovljević, V. and Bradić, J. V. 2021. Formulation and evaluation of helichrysum italicum essential oil-based topical formulations for wound healing in diabetic rats. *Pharmaceuticals*, 14(8): 1-18. Available: https://doi.org/10.3390/ph14080813 (Accessed 17 January 2022).

Ault, M. J., Slocum, V., Collins, B. C., Leahy, M. M. and Miller, V. P. 2021. Perceptions of faith leaders on the inclusion and participation of individuals with disabilities in their communities. *Journal of Disability & Religion*, June: 1-22. Available: https://www.tandfonline.com/doi/epub/10.1080/23312521.2021.1932691?needAccess=true (Accessed 28 January 2022).

Barr, S. and Howe, T. E. 2018. Prosthetic rehabilitation for older dysvascular people following a unilateral transfemoral amputation. *Cochrane Database of Systematic Reviews*, (10): 1-11. Available: https://research.tees.ac.uk/ws/files/6713679/Barr_et_al_2018_Cochrane_Database_of_Systematic_Reviews.pdf (Accessed 13 May 2022).

Best, M., Butow, P. and Olver, I. 2015. Do patients want doctors to talk about spirituality? A systematic literature review. *Patient Education and Counseling*, 98(11): 1320-1328. Available: https://reader.elsevier.com/reader/sd/pii/S0738399115001974?token=81EC79C95E138A8F030ED3BBD4A957AE3BFBFAF7E8E5417E8CE77FE2DB9805A3508736066D7FE8766426D31E92A219AA&originRegion=eu-west-1&originCreation=20220523054449 (Accessed 13 May 2022).

Bezzina, L. 2019. Disabled people's organisations and the disability movement: perspectives from Burkina Faso. *African Journal of Disability*, 8(1): 1-10. Available: http://www.scielo.org.za/pdf/ajod/v8/15.pdf (Accessed 27 January 2022).

Bhutani, S., Bhutani, J., Chhabra, A. and Uppal, R. 2016. Living with amputation: anxiety and depression correlates. *Journal of Clinical and Diagnostic Research: JCDR*, 10(9): 9-12. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5072032/pdf/jcdr-10-RC09.pdf (Accessed 15 February 2021).

Biccheri, E., Roussiau, N. and Mambet-Doué, C. 2016. Fibromyalgia, spirituality, coping and quality of life. *Journal of Religion and Health*, 55(4): 1189-1197. Available: https://fibromyalgiesos.fr/rdv2/wp-content/uploads/2018/05/art-fibromyalgia-spirituality-coping-and-quality-of-life.pdf (Accessed 15 September 2021).

Biddiss, E., McKeever, P., Lindsay, S. and Chau, T. 2011. Implications of prosthesis funding structures on the use of prostheses: experiences of individuals with upper limb absence. *Prosthetics and Orthotics International*, 35(2): 215-224. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364611401776 (Accessed 01 June 2020).

Biggam, J. 2008. *Succeeding with your master's dissertation: a step-by-step handbook.* United Kingdom: Open University Press- McGraw-Hill Education. Available: http://paninicampus.edu.np/wp-content/uploads/2020/09/John_Biggam_Succeeding_with_Your_Masters_DisserBookFi.pdf (Accessed 15 May 2022).

Blatchford Limited. 2022*. Standard features of a below knee prosthesis* (image). Available: https://www.blatchfordus.com/wp-content/uploads/2019/09/below-knee-diagram.jpg (Accessed 17 May 2022).

Bloor, M. and Wood, F. 2006. *Keywords in qualitative methods: a vocabulary of research concepts*. London: SAGE Publications.

Bosmans, J. C., Suurmeijer, T. P., Hulsink, M., van der Schans, C. P., Geertzen, J. H. and Dijkstra, P. U. 2007. Amputation, phantom pain and subjective well-being: a qualitative study. *International Journal of Rehabilitation Research*, 30(1): 1-8. Available: https://d1wqtxts1xzle7.cloudfront.net/50845851/Amputation_phantom_pain_and_subjective_w20161212-12628-bdaace-with-cover-page-v2.pdf?Expires=1654730989&Signature=BZ6wkQqcM2Y2poUkqHXpx8~YldnuAPNmmtz6HmgaLbsXYrBLUfr~Th8whFwzeDNBZU-b0mdc9cgMDbXAWAUTM9KJO-XWD5pK~1TKObAFOgbp2mFQp8-yFXezLCOiAkqbQ-UYv6b~d8v1B6vH11bAWtgf02hJnCHw2~1paeMbmTpvaCvEPt8WeoEwbb~xeO5tQ5L8jAP6FresMWX-9QfLJGseCuYpYKJAifWJcwOX4ZiHcXxRaqJCBjHoAWsfun1THu9A-

YsXGgJFXyimyIi9cy5NocZZ5pPqgtcfCnIuLoQYz1W1tK9pHmATtAhfjlBSzF3fbGWbQ04g7yrxwXYI1g__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 14 August 2021).

Boyd, P. R. 2020. *Sensing and adaption for long-term hand rehabilitation*. PhD, The University of Portsmouth. Available: https://pure.port.ac.uk/ws/portalfiles/portal/22350446/UP658763_PeterBoyd_MergedPhDThesis.pdf (Accessed 15 January 2021).

Brack, R. and Amalu, E. H. 2021. A review of technology, materials and R&D challenges of upper limb prosthesis for improved user suitability. *Journal of Orthopaedics*, 23: 88-96. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7787923/pdf/main.pdf (Accessed 13 May 2022).

Bragaru, M., Dekker, R., Geertzen, J. H. and Dijkstra, P. U. 2011. Amputees and sports. *Sports Medicine*, 41(9): 721-740. Available: https://d1wqtxts1xzle7.cloudfront.net/50845882/Amputees_and_Sports20161212-12638-18xz5en-with-cover-page-v2.pdf?Expires=1654731345&Signature=XUFHYshkXzJUixGmoaMpK8rKeP2YtbjEZdubn~xFFpArrxfLYEqQkseHfJtP4ILbSYX3LbJ7kbI3~wMgBI7d93jjK~M3loF4MMGyiqNTSHcpE~~4yzfxqYa2vNz7CtYbUL3bIQI~rSFzk2NJuIczKpeAwbRzX5O0MleCoxSvNdy8JM99y3EyLaUcsNr8oEOAXHSBWsX0xU2-PP7fKnL1Ho-7UFqVizb67IjbL5WsbN8N13T23sOG37OWSgjbFuDSHHWi6pkquoThALPSVBdfltYeHUYcKZEnSjqZBxNnhBut1Qo-LGZG0iHanFEPTncFvkiSxMmXo4AtvJ6N~SBNhQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 17 January 2021).

Bricki, N. and Green, J. eds. 2007. *A guide to using qualitative research methodology*. London: Medecins Sans Frontieres. Available: https://nau.edu/wp-content/uploads/sites/30/Qualitative-research-methodology.pdf (Accessed 1 May 2020).

Brown, B. J., and Attinger, C. E. 2013. The below-knee amputation: to amputate or palliate? *Advances in Wound Care*, 2(1): 30–35. Available: https://doi.org/10.1089/wound.2011.0317 (Accessed 16 July 2021).

Brunelli, S., Bonanni, C., Foti, C. and Traballesi, M. 2020. A literature review of the quality of life, health status and prosthesis satisfaction in older patients with a trans-tibial amputation. *Canadian Prosthetics & Orthotics Journal*, 3(1): 1-7. Available: https://pdfs.semanticscholar.org/6199/c9f0306c8f01d584149579e4758dd4c2c7ed.pdf (Accessed 01 June 2020).

Buciunas, G. and Bulgakova, I. 2019. Protection of the rights of disabled persons as victims of crime in criminal procedure. In: *Society. Integration. Education. Proceedings of the International Scientific Conference,* 3: 51-59. Available: http://journals.ru.lv/index.php/SIE/article/view/3800/3787 (Accessed 20 March).

Burger, H. and Marinček, Č. 2009. Return to work after lower limb amputation. *Disability and Rehabilitation*, 29(17): 1323-1329. Available: https://worksupport.com/research/documents/pdf/Returntoworkafterlowerlimbamputation.pdf (Accessed 15 July 2021).

Butler, C. R., Schwarze, M. L., Katz, R., Hailpern, S. M., Kreuter, W., Hall, Y. N., Rath, M. E. M. and O'Hare, A. M. 2019. Lower extremity amputation and health care utilization in the last year of life among medicare beneficiaries with ESRD. *Journal of the American Society of Nephrology*, 30(3): 481-491. Available: https://jasn.asnjournals.org/content/jnephrol/30/3/481.full.pdf (Accessed 10 July 2021).

Casey M. A., and Krueger R. A. 1994. Focus group interviewing. In: MacFie, H. J. H. and Thomson, D. M. H. eds. *Measurement of Food Preferences*. Boston: Springer, 77. Available: https://link.springer.com/chapter/10.1007/978-1-4615-2171-6_4 (Accessed 08 February 2021).

Chander, C. and Kannan, S. 2021. Assistive technology awareness and utilization of its potential among lower limb amputees of Delhi, India. In: GAATO/RESNA. eds. *Assistive Technology Outcomes and Impact Summit 2020 Proceedings*. Global Alliance of Assistive Technology Organisations, 8-11. Available: https://www.resna.org/sites/default/files/conference/2020/GAATO/153Chandler.html (Accessed 18 March 2022).

Chandramohan, S. 2013. *Spirituality and spiritual care amongst professional nurses at public hospitals in Kwazulu-Natal*. M.Tech., Durban University of Technology. Available: https://openscholar.dut.ac.za/bitstream/10321/1107/1/CHANDRAMOHAN_2013.pdf (Accessed 03 June 2020).

Chaves, L. J. and Gil, C. A. 2015. Older people's concepts of spirituality, related to aging and quality of life. *Ciencia & Saude Coletiva*, 20: 3641-3652. Available: https://pdfs.semanticscholar.org/1e6f/4d2bfbefbea4ec65761525d5ea7d89dde34f.pdf (Accessed 03 June 2020).

Chiu, V. L., Voloshina, A. S. and Collins, S. H. 2021. The effects of ground-irregularity-cancelling prosthesis control on balance over uneven surfaces. *Royal Society Open Science*, 8(1): 1. Available: https://royalsocietypublishing.org/doi/pdf/10.1098/rsos.201235 (Accessed 27 April 2022).

Clarke, V. and Braun, V. 2018. Using thematic analysis in counselling and psychotherapy research: a critical reflection. *Counselling and Psychotherapy Research*, 18(2): 1-8. Available: https://uwe-repository.worktribe.com/preview/865547/Using%20thematic%20analysis%20in%20counselling%20and%20psychotherapy%20research%20UWE%20Repository%20Version.pdf (Accessed 14 January 2022).

Coffey, L., Gallagher, P., Horgan, O., Desmond, D. and MacLachlan, M. 2009. Psychosocial adjustment to diabetes-related lower limb amputation. *Diabetic Medicine*, 26(10): 1063-1067. Available: https://mural.maynoothuniversity.ie/7026/1/LC-Psychosocial-adjustment.pdf (Accessed 15 June 2021).

Crawford, D. A., Hamilton, T. B., Dionne, C. P. and Day, J. D. 2016. Barriers and facilitators to physical activity participation for men with transtibial osteomyoplastic amputation: a thematic analysis. *JPO: Journal of Prosthetics and Orthotics*, 28(4): 165-172. Available: https://journals.lww.com/jpojournal/fulltext/2016/10000/Barriers_and_Facilitators_to_Physical_Activity.7.aspx (Accessed 16 January 2022).

Dalby, P., Sperlinger, D. J. and Boddington, S. 2012. The lived experience of spirituality and dementia in older people living with mild to moderate dementia. *Dementia*, 0(0): 1-19. Available: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.896.4799&rep=rep1&type=pdf (Accessed 10 September 2021).

Darter, B. J., Hawley, C. E., Armstrong, A. J., Avellone, L. and Wehman, P. 2018. Factors influencing functional outcomes and return-to-work after amputation: a review of the literature. *Journal of Occupational Rehabilitation*, 28(4): 656-665. Available: https://link.springer.com/content/pdf/10.1007/s10926-018-9757-y.pdf (Accessed 12 July 2021).

Davie-Smith, F., Coulter, E., Kennon, B., Wyke, S. and Paul, L. 2017. Factors influencing quality of life following lower limb amputation for peripheral arterial occlusive disease: a systematic review of the literature. *Prosthetics and Orthotics International*, 41(6): 537-547. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364617690394 (Accessed 10 January 2021).

Day, M. C., Wadey, R. and Strike, S. 2019. Living with limb loss: everyday experiences of “good” and “bad” days in people with lower limb amputation. *Disability and Rehabilitation*, 41(20): 2433-2442. Available: https://pure.roehampton.ac.uk/ws/files/961975/main_document_final.pdf (Accessed 10 January 2021).

Denzin, N. and Lincoln, Y. 1994. *Handbook of qualitative research*. Thousand Oaks: SAGE Publications.

de-Rosende Celeiro, I., Sanjuán, L. S. and Santos-del-Riego, S. 2017. Activities of daily living in people with lower limb amputation: outcomes of an intervention to reduce dependence in pre-prosthetic phase. *Disability and Rehabilitation*, 39(18): 1799-1806. Available: https://ruc.udc.es/dspace/bitstream/handle/2183/21930/Rosende_Activities.pdf (Accessed 17 January 2022).

DeSantis, L. and Ugarriza, D. N. 2000. The concept of theme as used in qualitative nursing research. *Western Journal of Nursing Research*, 22(3): 351-372. Available: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.899.6217&rep=rep1&type=pdf (Accessed 14 January 2022).

Desmond, D. and MacLachlan, M. 2002. Psychosocial issues in the field of prosthetics and orthotics. *JPO: Journal of Prosthetics and Orthotics*, 14(1): 19-22. Available: https://d1wqtxts1xzle7.cloudfront.net/46357873/JPO_2002__Vol_14__Num_1__p_19-with-cover-page-v2.pdf?Expires=1652808970&Signature=ISsTsku9Stahkg5snxrgU7WVoWiY7hvxICmzJdZxR9jPgUyzH5jaB-9oF9bG-5vH3mjLVN5ITiPK3rWcQztv0eRBhj-uCFLGwCmoHoj7ncC3q9rmpOfhl3Cpji8i8HVhzrCbeFVfwBGcFsgRL2I6wa08Km5vcNMrBjLiTQON6x2sg7FXmwo4EBcfFaghgeKE0bsefeyX6kwOQzS1yL7mvZLPLOUTscxVZu2XsBoF-7Wf98aHmbN9yghubmZ9mLVhi2Z0htK1SfD1OqV3QpUeWLkleYsAbFz0DfDY5VLXkQxRqLL5V4W4Da8H4heL0zOM47EsBpoYM8OpAL6KRJ~lOQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 18 June 2020).

Dewi, D. S. E. and Hamzah, H. B. 2019. The relationship between spirituality, quality of life, and resilience. In: *6th International Conference on Community Development (ICCD 2019).* Atlantis Press: 145-147. Available: https://doi.org/10.2991/iccd-19.2019.39 (Accessed 15 September 2021).

Dhankar, S. and Bele, A. 2020. A case of fracture shaft femur in a patient with transtibial amputation. *Journal of Datta Meghe Institute of Medical Sciences University*, 14(4): 394-395. Available: http://www.journaldmims.com/temp/JDattaMegheInstMedSciUniv144394-7235197_200551.pdf (Accessed 28 August 2020).

Di Gregorio, S. 2000. Using Nvivo for your literature review. In: *Strategies in qualitative research: Issues and results from analysis using QSR NVivo and NUD* IST*. Institute of Education, London, 29-30 September 2000. London and Boston: SdG Associates, 2. Available: https://cmapspublic3.ihmc.us/rid=1GXNJD0W2-

HGB31R-DGD/literature_review_%20cdoing%20_nvivo.pdf (Accessed 06 August 2020).

Dunne, S., Coffey, L., Gallagher, P., Desmond, D. and Ryall, N. 2015. Beyond function: using assistive technologies following lower limb loss. *Journal of Rehabilitation Medicine*, 47: 561-568. Available: https://mural.maynoothuniversity.ie/6164/1/DD-Beyond-Function.pdf (Accessed 13 May 2022).

Dworkin, S. L. 2012. Sample size policy for qualitative studies using in-depth interviews. *Archives of Sexual Behavior,* 41(6): 1319-1320. Available: https://link.springer.com/content/pdf/10.1007/s10508-012-0016-6.pdf (Accessed 20 August 2020).

Ebrahimzadeh, M. H., Moradi, A., Bozorgnia, S. and Hallaj-Moghaddam, M. 2016. Evaluation of disabilities and activities of daily living of war-related bilateral lower extremity amputees. *Prosthetics and Orthotics International*, 40(1): 51-57. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364614547410 (Accessed 02 February 2022).

Edelstein, J. E. and Moroz, A. 2011. *Lower-limb prosthetics and orthotics: clinical concepts*. New Jersey, United States of America: SLACK Incorporated.

Eilami, O., Moslemirad, M., Naimi, E., Babuei, A. and Rezaei, K. 2019. The effect of religious psychotherapy emphasizing the importance of prayers on mental health and pain in cancer patients. *Journal of Religion and Health*, 58(2): 444-451. Available: https://www.proquest.com/docview/2108024729/fulltextPDF/157C37947FAE49FAPQ/1?accountid=10612 (Accessed 30 August 2021).

Ennion, L., Johannesson, A. and Rhoda, A. 2017. The use of a direct manufacturing prosthetic socket system in a rural community in South Africa: a pilot study and lessons for future research. *Prosthetics and Orthotics International*, 41(5): 455-462. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364616683982 (Accessed 15 March 2021).

Ennion, L. and Manig, S. 2018. Experiences of lower limb prosthetic users in a rural setting in the Mpumalanga Province, South Africa. *Prosthetics and Orthotics*

International, 1: 1-16. Available: https://repository.uwc.ac.za/bitstream/handle/10566/3958/Ennion_Experiences-of-lower_2018.pdf?sequence=1&isAllowed=y (Accessed 15 March 2021).

Ennion, L. and Rhoda, A. 2016. Roles and challenges of the multidisciplinary team involved in prosthetic rehabilitation, in a rural district in South Africa. *Journal of Multidisciplinary Healthcare*, 9: 565-573. Available: https://pdfs.semanticscholar.org/fc36/54b8225d00c344965b4f8f1e728ad18e50d6.pdf (Accessed 15 March 2021).

Escorpizo, R., Reneman, M. F., Ekholm, J., Fritz, J., Krupa, T., Marnetoft, S. U., Maroun, C. E., Guzman, J. R., Suzuki, Y., Stucki, G. and Chan, C. C. 2011. A conceptual definition of vocational rehabilitation based on the ICF: building a shared global model. *Journal of Occupational Rehabilitation*, 21(2): 126-133. Available: https://doc.rero.ch/record/311763/files/10926_2011_Article_9292.pdf (Accessed 16 July 2021).

Evers, J. C. 2011. From the past into the future. How technological developments change our ways of data collection, transcription and analysis. In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 12(1): 20. Available: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.679.9156&rep=rep1&type=pdf (Accessed 16 February 2021).

Farris, D. J., Kelly, L. A., Cresswell, A. G. and Lichtwark, G. A. 2019. The functional importance of human foot muscles for bipedal locomotion. *Proceedings of the National Academy of Sciences*, 116(5): 1645-1650. Available: https://www.pnas.org/doi/pdf/10.1073/pnas.1812820116 (Accessed 05 January 2021).

Fisher, K., Francis, A. and Collins, N. 2018. Prosthetics, orthotics and spiritual care. In: Koenig, H. ed. *Spiritual care for allied health practice: a person-centered approach*. London and Philadelphia: Jessica Kingsley Publishers, 207. Available: https://books.google.co.za/books?hl=en&lr=&id=SpxJDwAAQBAJ&oi=fnd&pg=PA207&ots=uqQZeR2TGD&sig=_wchK70_xHTbbncuGw32MbHXHi8&redir_esc=y#v=onepage&q&f=false (Accessed 13 May 2022).

Flinn, R. 2016. *Prosthetic Architecture: Enabling Connection, Movement, and Empowerment.* M.Arch., University of Maryland. Available: https://drum.lib.umd.edu/bitstream/handle/1903/18466/Flinn_umd_0117N_17287.pdf?isAllowed=y&sequence=1 (Accessed 03 May 2020).

Fuchs, X., Flor, H. and Bekrater-Bodmann, R. 2018. Psychological factors associated with phantom limb pain: a review of recent findings. *Pain Research and Management*, June: 1-12. Available: https://pdfs.semanticscholar.org/bec9/2c04c59ba3e8133f01e62f2d38144506c704.pdf (Accessed 16 January 2022).

Fusch, P. I. and Ness, L. R. 2015. Are we there yet? Data saturation in qualitative research. *The Qualitative Report*, 20(9): 1408-1416. Available: https://cpb-us-east-1-juc1ugur1qwqqqo4.stackpathdns.com/sites.nova.edu/dist/a/4/files/2015/09/fusch1.pdf (Accessed 02 April 2020).

Gallant, M. P. 2003. The influence of social support on chronic illness self-management: a review and directions for research. *Health Education & Behavior*, 30(2): 170-195. Available: https://doi.org/10.1177/1090198102251030 (Accessed 15 July 2021).

Gant, A. 2016. *Educating nurses about spirituality's effects on quality of life with chronic illness*. DNP, Duke University. Available: https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=3254&context=dissertations (Accessed 20 September 2021).

García-Pallero, M. Á., Cardona, D., Rueda-Ruzafa, L., Rodriguez-Arrastia, M. and Roman, P. 2022. Central nervous system stimulation therapies in phantom limb pain: a systematic review of clinical trials. *Neural Regeneration Research*, 17(1): 59-63. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8451556/pdf/NRR-17-59.pdf (Accessed 13 May 2022).

Gardner, F., Tan, H. and Rumbold, B. 2018. What spirituality means for patients and families in health care. *Journal of Religion and Health*, 59(1): 195-203. Available: https://www.spiritualhealth.org.au/Articles/57-Gardner2018_Article_WhatSpiritualityMeansForPatien.pdf (Accessed 17 May 2022).

Ghosh Das, P. and Lahiri, S. 2013. Prevalence and aetiology of amputation in Kolkata, India: a retrospective analysis. *Hong Kong Physiotherapy Journal*, 31(1): 36-40. Available: https://cyberleninka.org/article/n/371855.pdf (Accessed 15 January 2021).

Godlwana, L. L. 2009. *The impact of lower limb amputation on quality of life: a study done in the Johannesburg metropolitan area, South Africa*. M.Sc. Physiotherapy, University of the Witwatersrand. Available: https://core.ac.uk/download/pdf/39666453.pdf (Accessed 03 March 2020).

Godlwana, L. L. 2015. *The epidemiology and functional outcomes after a major lower limb amputation (LLA) in Johannesburg*. PhD, University of the Witwatersrand. Available: http://wiredspace.wits.ac.za/bitstream/handle/10539/19688/Final%20Thesis.July27th2015PhD.pdf?isAllowed=y&sequence=1 (Accessed 22 September 2021).

Godlwana, L., Nadasan, T. and Puckree, T. 2008. Global trends in incidence of lower limb amputation: a review of the literature. *South African Journal of Physiotherapy*, 64(1): 8-12. Available: https://sajp.co.za/index.php/sajp/article/view/93/90 (Accessed 03 March 2020).

Godlwana, L. and Stewart, A. 2013. The impact of lower limb amputation on community reintegration of a population in Johannesburg: a qualitative perspective. *South African Journal of Physiotherapy*, 69(4): 48-54. Available: https://sajp.co.za/index.php/sajp/article/view/379/405 (Accessed 03 March 2020).

Godlwana, L., Stewart, A. and Musenga, E. 2012. Quality of life following a major lower limb amputation in Johannesburg, South Africa. *South African Journal of Physiotherapy*, 68(2): 17-22. Available: https://sajp.co.za/index.php/sajp/article/view/11/9 (Accessed 03 March 2020).

Gonçalves Jnr., E., Knabben, R. J. and da Luz, S. C. T. 2017. Portraying the amputation of lower limbs: an approach using ICF. *Fisioterapia em Movimento*, 30(1): 97-106. Available: https://pdfs.semanticscholar.org/bd86/cb4b6af9d7a7765fc1f4d6983ffde5007755.pdf (Accessed 01 May 2020).

Goodworth, A. D., Veneri, D. A., Burger, J. and Lee, D. J. 2017. Development and pilot testing of an international knowledge assessment of prosthetic management for patients using lower-limb prostheses. *JPO: Journal of Prosthetics and Orthotics*, 29(1): 28-34. Available: https://oce.ovid.com/article/00008526-201701000-00006/HTML (Accessed 05 February 2022).

Grant, C. and Osanloo, A. 2014. Understanding, selecting, and integrating a theoretical framework in dissertation research: developing a “blueprint” for your house. *Administrative Issues Journal Education Practice and Research*, 4(2): 12–26. Available: http://jolle.coe.uga.edu/wp-content/uploads/2015/02/89596_manuscript-file_249104.pdf (Accessed 15 November 2020).

Gretschel, D., Visagie, S. and Inglis, G. 2017. Community integration of adults with disabilities post discharge from an in-patient rehabilitation unit in the Western Cape. *The South African Journal of Physiotherapy*, 73(1): 1-7. Available: https://pdfs.semanticscholar.org/8933/8fe9d91a2e6a9bbbe0c24a6a8b67f85e3f1c.pdf (Accessed 12 July 2021).

Grzebień, A., Chabowski, M., Malinowski, M., Uchmanowicz, I., Milan, M. and Janczak, D. 2017. Analysis of selected factors determining quality of life in patients after lower limb amputation- a review article. *Polish Journal of Surgery,* 89(2): 57-61. Available: https://ppch.pl/resources/html/article/details?id=145885&language=en (Accessed 02 May 2020).

Guba, E. G. 1981. Criteria for assessing the trustworthiness of naturalistic inquiries. *Ectj*, 29(2): 75-91. Available: https://www.jstor.org/stable/30219811?saml_data=eyJzYW1sVG9rZW4iOiI4ZmYwYzEwNi0xM2Y5LTRkOTEtODhiYS0yMTU1NDk4ZTkzODEiLCJpbnN0aXR1dGlvbklkcyI6WyI4NzE0NzAyOS00ZDljLTQyM2YtYjkwYy1kZjM4MGEwY2Y2NDAiXX0&seq=1 (Accessed 01 February 2022).

Gupta, N., Castillo-Laborde, C. and Landry, M. D. 2011. Health-related rehabilitation services: assessing the global supply of and need for human resources. *BMC Health Services Research,* 11(1): 276. Available: https://www.researchgate.net/profile/Michel-Landry/publication/51724757_Health-Related_Rehabilitation_Services_Assessing_the_Global_Supply_of_and_Need_for_

Human_Resources/links/0912f5104b8e19fec8000000/Health-Related-Rehabilitation-Services-Assessing-the-Global-Supply-of-and-Need-for-Human-Resources.pdf (Accessed 02 September 2020).

Gutenbrunner, C., Ward, A. B. and Chamberlain, M. A. 2007. White book on physical and rehabilitation medicine in Europe. *Europa Medicophysica*, 42(4): 298-299. Available: https://www.udc.gal/grupos/apumefyr/docs/white_book_PRM_in_Europe_2006.pdf (Accessed 08 February 2021).

Hafner, B. J., Halsne, E. G., Morgan, S. J., Morgenroth, D. C. and Humbert, A. T. 2021. Effects of prosthetic feet on metabolic energy expenditure in people with transtibial amputation: a systematic review and meta-analysis. *PM&R: The Journal of Injury, Function and Rehabilitation,*1-17. Available: https://onlinelibrary.wiley.com/doi/epdf/10.1002/pmrj.12693?saml_referrer (Accessed 05 February 2022).

Handford, M. L. 2018. *Simulating human-prosthesis interaction and informing robotic prosthesis design using metabolic optimization*. PhD, The Ohio State University. Available: https://etd.ohiolink.edu/apexprod/rws_etd/send_file/send?accession=osu1539707296618987&disposition=inline (Accessed 05 January 2021).

Harper, N. G., Wilken, J. M. and Neptune, R. R. 2020. Muscle contributions to balance control during amputee and nonamputee stair ascent. *Journal of Biomechanical Engineering*, 142(12): 4. Available: https://sites.utexas.edu/neptune/files/2020/09/JBME142.pdf (Accessed 18 January 2022).

Harris, B., Goudge, J., Ataguba, J. E., McIntyre, D., Nxumalo, N., Jikwana, S. and Chersich, M. 2011. Inequities in access to health care in South Africa. In: *Journal of Public Health Policy*, 32(1): S102-S123. Available: https://www.jstor.org/stable/pdf/20868835.pdf?casa_token=G8nJMm7jdBIAAAAA:1Yvl_48MsVzUj-E2pZnrZ4e64uHHjs1YAa2Y6CoJ5PB0_-gvVIsV2lMAvtK4hZtmc9BBaKRNoEuiFI1hKvcwVbq5RwPOfNHQ1Fx2acKVE-vyc-tU-QA (Accessed 06 January 2021).

Hart, C. 1998. *Doing a literature review: releasing the social science research imagination*. London, Thousand Oaks and Delhi: SAGE Publications. Available: https://d1wqtxts1xzle7.cloudfront.net/62475437/HART_Doing_a_literature_review_1988_ch120200325-33872-ucm8mf-with-cover-page-v2.pdf?Expires=1658237245&Signature=BDBqG6qXOW1DcPXvOS6C2-FSS60CH1AS6vhl-A44dqBJ8lJ8BkQxQt3jzsPIkpNtfoOcD79XGnZrqMk3x86J2ZMzo8ni1AxPDjmGVdgTfURqLcoOYS8F5v5vW2mJgBhxfeYYK6YmuI8X1w107XND9ztkmFHhga~GYPM19rBBdsDXQqaJ4e6zhJw7DhF9ZpN5iI1JGBws-9OghF1hhztUToC9T32DYIQ9zJO0macaAJM4NXZfCs0KztZYZNn5zmhJasYhyF~JPd-uqvELcbx4TODP4zZUEzBmcQqDNxlEkCmIJxW6aYzSMBzBTK36hh8CjdIMoUHBJm2RX7umPtgiUA__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 12 August 2020).

Hawkins, A. T., Henry, A. J., Crandell, D. M. and Nguyen, L. L. 2014. A systematic review of functional and quality of life assessment after major lower extremity amputation. *Annals of Vascular Surgery*, 28(3): 763-780. Available: https://d1wqtxts1xzle7.cloudfront.net/46941208/j.avsg.2013.07.01120160701-23139-pzaw4n-with-cover-page-v2.pdf?Expires=1655217791&Signature=ZFNTm4kVhI5WgVC6zqmxYji5L1VNBJKKZArdxSuiwlnk5L6MvrNQYOcuzCQ1NvZEYjlY5hN37GnxNz8iGo~2w9CUim~Mjbv8sY9dTUHWqsMxQVqt7fND6ooDHFwAdBqUdrXgRfr9eFCsxxFt6hXw5CSnq5c3Tjtud~LPgTbC8j0jICN72uk6lJQGbU00n~cQpJyTin5acQW2W20aX1yRoXhvV2R0eIGiZM0EdR85LX~j9KwshJb8cOsBfbskATFDzp4tPfpxNOYp8QJ~SiKIqd2-sXRMZh4GLM~2JEtH6ihyCuUHYRDqQTFa74jNrwQ4rznn0yc3MLISlNVNK9ffqA__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 05 January 2021).

Herrador Colmenero, L., Perez Marmol, J. M., Martí-García, C., Querol Zaldivar, M. D. L. Á., Tapia Haro, R. M., Castro Sánchez, A. M. and Aguilar-Ferrándiz, M. E. 2018. Effectiveness of mirror therapy, motor imagery, and virtual feedback on phantom limb pain following amputation: a systematic review. *Prosthetics and Orthotics International*, 42(3): 288-298. Available:

https://journals.sagepub.com/doi/pdf/10.1177/0309364617740230 (Accessed 13 May 2022).

Highsmith, M. J., Kahle, J. T., Klenow, T. D., Andrews, C. R., Lewis, K. L., Bradley, R. C., Ward, J. M., Orriola, J. J. and Highsmith, J. T. 2016. Interventions to manage residual limb ulceration due to prosthetic use in individuals with lower extremity amputation: a systematic review of the literature. *Technology & Innovation*, 18(2-3): 115-123. Available: https://www.ingentaconnect.com/contentone/nai/ti/2016/00000018/f0020002/art00004?crawler=true&mimetype=application/pdf (Accessed 22 May 2022).

Holzer, L. A., Sevelda, F., Fraberger, G., Bluder, O., Kickinger, W. and Holzer, G. 2014. Body image and self-esteem in lower-limb amputees. *PLoS ONE*, 9(3): 1-7. Available: https://www.researchgate.net/profile/Gerold-Holzer/publication/261069155_Body_Image_and_Self-Esteem_in_Lower-Limb_Amputees/links/0deec534ca26238063000000/Body-Image-and-Self-Esteem-in-Lower-Limb-Amputees.pdf (Accessed 15 August 2021).

Houghton, C., Casey, D., Shaw, D. and Murphy, K. 2013. Rigour in qualitative case-study research. *Nurse Researcher*, 20(4): 12-16. Available: https://www.proquest.com/docview/1317920491/fulltextPDF/42F77B748FC440D6PQ/1?accountid=10612 (Accessed 23 February 2021).

Igwesi-Chidobe, C. 2012. Obstacles to obtaining optimal physiotherapy services in a rural community in south-eastern Nigeria. *Environment*, 8: 5. Available: https://www.scienceopen.com/document_file/a1ec2f3e-b02e-493a-92ea-43fb7a3a4cb1/PubMedCentral/a1ec2f3e-b02e-493a-92ea-43fb7a3a4cb1.pdf (Accessed 13 May 2022).

Imenda, S. 2014. Is there a conceptual difference between theoretical and conceptual frameworks? *Journal of Social Sciences*, 38(2): 185-195. Available: http://akuntansi.feb.mercubuana.ac.id/wp-content/uploads/2018/03/Is-There-a-Conceptual-Difference-between-Theoretical-and-Conceptual-Frameworks_.pdf (Accessed 29 November 2020).

Imeni, M., Sabouhi, F., Abazari, P. and Iraj, B. 2018. The effect of spiritual care on the body image of patients undergoing amputation due to type 2 diabetes: a randomized clinical trial. *Iranian Journal of Nursing and Midwifery Research*, 23(4): 322-326. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6034524/pdf/IJNMR-23-322.pdf (Accessed 25 January 2022).

Iranmehr, A. and Kadkani, H. 2017. The effectiveness of religious-cognitive training based on Quran verses on reducing pensioners' anxiety and hopelessness. *Journal of Religion and Health*, 5(1): 32-39. Available: http://jrh.mazums.ac.ir/files/site1/user_files_d258bd/telehealth-A-10-598-28-7a9d2eb.pdf (Accessed 15 September 2021).

Isma, S. P. P., Irsan, I. I., Purantoro, F. and Putera, M. A. 2020. Amputation demographic assessment at Saiful Anwar hospital: 5 years of study. *International Journal of Research in Medical Sciences*, 8(3): 1123-1126. Available: https://www.researchgate.net/publication/339544469_Amputation_demographic_assessment_at_Saiful_Anwar_hospital_5_years_of_study/fulltext/5e5868b7a6fdccbeba07a369/Amputation-demographic-assessment-at-Saiful-Anwar-hospital-5-years-of-study.pdf (Accessed 07 January 2021).

Janesick, V. J. 1998. Journal writing as a qualitative research technique: history, issues, and reflections. *Educational Resources Information Center*, April: 1-26. Available: https://files.eric.ed.gov/fulltext/ED420702.pdf (Accessed 02 April 2020).

Järnhammer, A., Andersson, B., Wagle, P. R. and Magnusson, L. 2017. Living as a person using a lower-limb prosthesis in Nepal. *Disability and Rehabilitation*, 40(12): 1426-1433. Available: https://www.tandfonline.com/doi/pdf/10.1080/09638288.2017.1300331 (Accessed 17 January 2022).

Jayakaran, P., Perry, M., Kondov, M., McPherson, T., Sutherland, L. and Wypych, A. 2019. Attitudes and beliefs towards physical activity participation in individuals with below-knee amputation. *New Zealand Journal of Physiotherapy*, 47(2): 118-129. Available: https://web.archive.org/web/20200215075757id_/https://pnz.org.nz/Folder?Action=View%

20File&Folder_id=454&File=NZJP%20Volume%2047%20Number%202%2006.pdf (Accessed 17 January 2022).

Jefferies, P. 2015. *"Just normal": a grounded theory of prosthesis use.* PhD, Dublin City University. Available: https://doras.dcu.ie/20393/1/PJ_Thesis_v2.5_%5bhardbound%5d.pdf (Accessed 02 May 2020).

Johnson, B. and Christensen, L. 2012. *Educational research: quantitative, qualitative and mixed approaches.* 4th ed. California: SAGE Publications.

Jones, K. F., Dorsett, P., Briggs, L. and Simpson, G. K. 2018. The role of spirituality in spinal cord injury (SCI) rehabilitation: exploring health professional perspectives. *Spinal Cord Series and Cases*, 4(1): 1-7 Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6018788/pdf/41394_2018_Article_78.pdf (Accessed 13 May 2022).

Kalra, S., Sridhar, G. R., Balhara, Y. P. S., Sahay, R. K., Bantwal, G., Baruah, M. P., John, M., Unnikrishnan, A. G., Madhu, K., Verma, K. and Sreedevi, A. 2013. National recommendations: psychosocial management of diabetes in India. *Indian Journal of Endocrinology and Metabolism*, 17(3): 376-390. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3712367/pdf/IJEM-17-376.pdf (Accessed 10 January 2021).

Kaouache, S. 2019-2020. Master 1 – Didactics (lecture notes). Research Methodology. Department of Letters and English Language, Faculty of Letters and Languages, Frères Mentouri University. Available: https://fac.umc.edu.dz/fll/images/cours_ang/M1/M1_Didactics_Research%20Methodology%20_S%20Kaouache.pdf (Accessed 06 August 2020).

Karaali, E., Duramaz, A., Çiloğlu, O., Yalın, M., Atay, M. and Aslantaş, F. Ç. 2020. Factors affecting activities of daily living, physical balance, and prosthesis adjustment in non-traumatic lower limb amputees. *Turkish Journal of Physical Medicine and Rehabilitation*, 66(4): 405-412. Available: https://www.ftrdergisi.com/uploads/pdf/pdf_4230.pdf (Accessed 10 January 2021).

Kaur, A. and Guan, Y. 2018. Phantom limb pain: a literature review. *Chinese Journal of Traumatology*, 21(06): 366-368. Available: https://medcentral.net/doi/pdf/10.1016/j.cjtee.2018.04.006 (Accessed 13 May 2022).

Kennedy, M. 2006. *Interview Guides*. Available: https://msu.edu/user/mkennedy/digitaladvisor/Research/interviewing.htm (Accessed 2 May 2020).

Kent, J. A., Takahashi, K. Z. and Stergiou, N. 2019. Uneven terrain exacerbates the deficits of a passive prosthesis in the regulation of whole body angular momentum in individuals with a unilateral transtibial amputation. *Journal of NeuroEngineering and Rehabilitation*, 16(25): 1-10. Available: https://jneuroengrehab.biomedcentral.com/track/pdf/10.1186/s12984-019-0497-9.pdf (Accessed 27 April 2022).

Khan, M. Z., Smith, M. T., Bruce, J. L., Kong, V. Y. and Clarke, D. L. 2020. Evolving indications for lower limb amputations in South Africa offer opportunities for health system improvement. *World Journal of Surgery*, 44(5): 1436-1443. Available: https://link.springer.com/content/pdf/10.1007/s00268-019-05361-9.pdf (Accessed 28 November 2020).

Kizilkurt, O. K., Kizilkurt, T., Gulec, M. Y., Giynas, F. E., Polat, G., Kilicoglu, O. I. and Gulec, H. 2020. Quality of life after lower extremity amputation due to diabetic foot ulcer: the role of prosthesis-related factors, body image, self-esteem, and coping styles. *Dusunen Adam The Journal of Psychiatry and Neurological Sciences*, 33(2): 109-119. Available: https://dusunenadamdergisi.com.tr/storage/upload/pdfs/1593532282-en.pdf (Accessed 19 February 2022).

Knežević, A., Salamon, T., Milankov, M., Ninković, S., Jeremić-Knežević, M. and Tomašević-Todorović, S. 2015. Assessment of quality of life in patients after lower limb amputation. *Medicinski Pregled,* 68(3-4): 103-108. Available**:** http://www.doiserbia.nb.rs/img/doi/0025-8105/2015/0025-81051504103K.pdf (Accessed 06 May 2020).

Knight, D. 2013. *Interview guide preparation and use*. Available: https://www.studocu.com/en-us/document/east-carolina-university/statistics-and-research-design/interview-guide-preparation-and-use/1066359 (Accessed 2 May 2020).

Koleva, I. B., Ioshinov, B. R. and Yoshinov, R. D. 2017. Complex analgesia (infiltrations and deep oscillation) in patients with stump pain and phantom pain after lower limb amputation (double-blind randomised controlled trial of efficacy). *Journal of Advances in Medicine and Medical Research*, 22(11): 1-17. Available: https://www.physiomed.ro/wp-content/uploads/Articol-2.pdf (Accessed 16 January 2022).

Kothari, C. R. 2004. *Research methodology: methods and techniques*. 2nd ed. New Delhi: New Age International Publishers. Available: http://lms.aambc.edu.et:8080/xmlui/bitstream/handle/123456789/243/Research%20Methodology.pdf?sequence=1 (Accessed 28 January 2021).

Kumar, A. 2020. Prosthetics and orthotics in rehabilitation: a short communication. *Global Journal for Research Analysis (GJRA)*, 9(8): 17. Available: https://www.worldwidejournals.com/global-journal-for-research-analysis-GJRA/recent_issues_pdf/2020/August/prosthetics-and-orthotics-in-rehabilitation-a-short-communication_August_2020_1597671979_5305581.pdf (Accessed 21 May 2022).

KwaZulu-Natal Department of Health. *Disability directory*. Available: http://www.kznhealth.gov.za/occtherapy/disability_directory.pdf (Accessed 11 April 2022).

Langford, J., Dillon, M. P., Granger, C. L. and Barr, C. 2019. Physical activity participation amongst individuals with lower limb amputation. *Disability and Rehabilitation*, 41(9): 1063-1070. Available: https://doi.org/10.1080/09638288.2017.1422031 (Accessed 25 March 2022).

Lasebikan, O. A., Okorie, I. S., Oguzie, G. C. and Ofoegbu, J. I. 2019. Pattern of presentation and indications for amputation in National Orthopaedic Hospital, Enugu. *Nigerian Journal of Medicine*, 28(3): 301-304. Available:

https://www.ajol.info/index.php/njm/article/download/190928/180104 (Accessed 09 July 2021).

Lawrence, C. 2008. Amputation. *The Lancet*, 371(9618): 1065. Available: https://www.thelancet.com/action/showPdf?pii=S0140-6736%2808%2960472-9 (Accessed 10 January 2021).

Luo, Y. and Anderson, T. A. 2016. Phantom limb pain: a review. *International Anesthesiology Clinics*, 54(2): 121. Available: https://journals.lww.com/anesthesiaclinics/Citation/2016/05420/Phantom_Limb_Pain__A_Review.7.aspx (Accessed 16 January 2022).

Lusardi, M. M., Jorge, M. and Nielsen, C. C. 2013. *Orthotics and prosthetics in rehabilitation*. 3rd ed. St. Louis, Missouri: Elsevier Health Sciences.

Lydon-Lam, J. 2012. Models of spirituality and consideration of spiritual assessment. *International Journal of Childbirth Education*, *27*(1): 18-22. Available: https://www.proquest.com/docview/920597269/fulltextPDF/A02C3787E72C42D2PQ/1?accountid=10612 (Accessed 10 September 2021).

Maart, S. and Jelsma, J. 2014. Disability and access to health care- a community based descriptive study. *Disability and rehabilitation*, 36(18): 1489-1493. Available: https://aac.matrix.msu.edu/wp-content/uploads/2019/08/Disability_Healthcare_Africa.pdf (Accessed 15 January 2021).

MacKenzie, E. J., Bosse, M. J., Kellam, J. F., Pollak, A. N., Webb, L. X., Swiontkowski, M. F., Smith, D. G., Sanders, R. W., Jones, A. L., Starr, A. J. and McAndrew, M. P. 2006. Early predictors of long-term work disability after major limb trauma. *Journal of Trauma and Acute Care Surgery*, 61(3): 688-694. Available: https://worksupport.com/research/documents/pdf/EarlyPredictorsofLongTermWorkDisabilityAfterMajorLimbTrauma.pdf (Accessed 10 January 2021).

Mackenzie, R. L., Murphy, G., Balasundaram, A. P. and Morris, M. E. 2020. An exploration of role expectations of the clinical prosthetist. *Prosthetics and Orthotics International*, 44(1): 10-17. Available:

https://journals.sagepub.com/doi/pdf/10.1177/0309364619889482 (Accessed 28 March 2022).

Madsen, U. R., Hommel, A., Bååth, C. and Berthelsen, C. B. 2016. Pendulating- A grounded theory explaining patients' behavior shortly after having a leg amputated due to vascular disease. *International Journal of Qualitative Studies on Health and Well-being*, 11(1): 1-8. Available: https://www.tandfonline.com/doi/pdf/10.3402/qhw.v11.32739 (Accessed 18 November 2020).

Magnusson, L. 2014. *Prosthetic and orthotic services in developing countries*. PhD, Jönköping University. Available: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.966.4745&rep=rep1&type=pdf (Accessed 29 May 2020).

Manickum, P., Ramklass, S. S. and Madiba, T. E. 2019. A five-year audit of lower limb amputations below the knee and rehabilitation outcomes: the Durban experience. *Journal of Endocrinology, Metabolism and Diabetes of South Africa*, 24(2): 41-45. Available: https://journals.co.za/doi/pdf/10.1080/16089677.2018.1553378 (Accessed 02 May 2020).

Manig, S. 2018. Understanding the rehabilitation needs of persons living with a lower limb amputation in rural areas of the OR Tambo district of the Eastern Cape, South Africa. M.Sc., University of the Western Cape. Available: https://etd.uwc.ac.za/bitstream/handle/11394/6882/3364-4332-1-SM.pdf?sequence=1&isAllowed=y (Accessed 18 February 2021).

Matheis, E. N., Tulsky, D. S. and Matheis, R. J. 2006. The relation between spirituality and quality of life among individuals with spinal cord injury. *Rehabilitation Psychology*, 51(3): 265. Available: https://www.proquest.com/openview/3eeadeec05737e74f9bdedd7095b41c2/1?pq-origsite=gscholar&cbl=60923 (Accessed 05 September 2021).

Matos, D. R., Naves, J.F. and Araujo, T. C. C. F. D. 2020. Quality of life of patients with lower limb amputation with prostheses. *Estudos de Psicologia*

(Campinas), 37(e190047): 1-12. Available: https://www.redalyc.org/journal/3953/395364604034/395364604034.pdf (Accessed 23 January 2021).

Mays, N. and Pope, C. 1995. Qualitative research: observational methods in health care settings. *BMJ,* 311: 182-184. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2550229/pdf/bmj00601-0048.pdf (Accessed 13 February 2021).

McDonald, C. 2017. *Global incidence of major, non-fatal amputation due to traumatic causes.* MPH, University of Washington. Available: https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/40421/McDonald_washington_0250O_17825.pdf?sequence=1&isAllowed=n (Accessed 06 January 2021).

McDonald, C. L., Westcott-McCoy, S., Weaver, M. R., Haagsma, J. and Kartin, D. 2020. Global prevalence of traumatic non-fatal limb amputation. *Prosthetics and Orthotics International*, 1-12. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364620972258 (Accessed 06 January 2021).

Mduzana, L., Tiwari, R., Lieketseng, N. and Chikte, U. 2020. Exploring national human resource profile and trends of prosthetists/orthotists in South Africa from 2002 to 2018. *Global Health Action*, 13(1): 1-11. Available: https://www.tandfonline.com/doi/pdf/10.1080/16549716.2020.1792192 (Accessed 01 September 2020).

Memaryan, N., Rassouli, M. and Mehrabi, M. 2016. Spirituality concept by health professionals in Iran: a qualitative study. *Evidence-Based Complementary and Alternative Medicine*, 2016: 1-9. Available: https://downloads.hindawi.com/journals/ecam/2016/8913870.pdf (Accessed 02 September 2021).

Miller, T. A., Paul, R., Forthofer, M. and Wurdeman, S. R. 2020. Impact of time to receipt of prosthesis on total healthcare costs 12 months postamputation. *American Journal of Physical Medicine & Rehabilitation*, 99(11): 1026-1031. Available:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7547875/pdf/phm-99-1026.pdf (Accessed 15 January 2022).

Mishra, A. 2014. Lower limb amputations. In: *A conference paper, Maulana Azad Medical College*. Available: https://www.researchgate.net/profile/Anurag-Mishra-20/publication/272487981_Lower_Limb_Amputations/links/54e5ee130cf2bff5a4f1d091/Lower-Limb-Amputations.pdf (Accessed 05 January 2021).

Montesinos-Magraner, L., Issa-Benítez, D., Meléndez-Plumed, M., González-Viejo, M. A. and Castellano-Tejedor, C. 2016. Physical and psychosocial functions of adults with lower limb congenital deficiencies and amputations in childhood. *Rehabilitation Research and Practice*, 2016: 1-7. Available: https://www.researchgate.net/profile/Carmina-Castellano/publication/301650310_Montesinos-Magraner_et_al_2016/links/571fd1e608aed056fa2359bd/Montesinos-Magraner-et-al-2016.pdf (Accessed 17 January 2022).

Mota, A. 2017. Memorandum on materials of prosthetic limbs. Pomona: California State Polytechnic University. Available: https://broncoscholar.library.cpp.edu/bitstream/handle/10211.3/193171/MotaAnissa_LibraryResearchPaper2017.pdf (Accessed 13 May 2022).

Mpezeni, S. 2018. Community experiences of persons with lower limb amputations in Malawi. MSPT, University of the Western Cape. Available: https://etd.uwc.ac.za/bitstream/handle/11394/7062/mpezeni_msc_chs_2018.pdf?sequence=1&isAllowed=y (Accessed 02 August 2021).

Münger, M., Pinto, C. B., Pacheco-Barrios, K., Duarte, D., Enes Gunduz, M., Simis, M., Battistella, L.R. and Fregni, F. 2020. Protective and risk factors for phantom limb pain and residual limb pain severity. *Pain Practice*, 20(6): 578-587. Available: https://www.researchgate.net/profile/Muhammed-Gunduz-3/publication/339961984_Protective_and_Risk_Factors_for_Phantom_Limb_Pain_and_Residual_Limb_Pain_Severity/links/603d2b8e4585154e8c6df502/Protective-and-Risk-Factors-for-Phantom-Limb-Pain-and-Residual-Limb-Pain-Severity.pdf (Accessed 16 January 2022).

Munk, N., Mannheimer, S., Piotrowski, J. and Lulgjuraj, M. 2015. (545) Novel prototype device combines massage therapy with components of mirror therapy to address phantom limb pain in lower-limb amputees. *The Journal of Pain*, 16(4): S112. Available: https://www.jpain.org/action/showPdf?pii=S1526-5900%2815%2900504-0 (Accessed 16 January 2022).

Murray, C. D. 2013. 'Don't you talk to your prosthetist?' Communicational problems in the prescription of artificial limbs. *Disability and Rehabilitation,* 35(6): 513-521. Available: https://doi.org/10.3109/09638288.2012.704125 (Accessed 04 September 2020).

Murray, C. D. and Forshaw, M. J. 2014. "Look and feel your best": representations of artificial limb users in prosthetic company advertisements. *Disability and Rehabilitation*, 36(2): 170-176. Available: https://doi.org/10.3109/09638288.2013.782365 (Accessed 13 May 2022).

Naidoo, U. and Ennion, L. 2019. Barriers and facilitators to utilisation of rehabilitation services amongst persons with lower-limb amputations in a rural community in South Africa. *Prosthetics and Orthotics International*, 43(1): 95-103. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364618789457 (Accessed 25 February 2021).

Narayanasamy, A. and Narayanasamy, M. 2008. The healing power of prayer and its implications for nursing. *British Journal of Nursing*, 17(6): 248. Available https://www.researchgate.net/profile/Dr-Aru-Narayanasamy/publication/5438983_The_healing_power_of_prayer_and_its_implications_for_nursing/links/54d8b9b30cf2970e4e789d14/The-healing-power-of-prayer-and-its-implications-for-nursing.pdf (Accessed 08 April 2022).

Neighbors, D. E. 2017. *Effects of hypnosis on phantom limb pain*. PhD, Washington State University. Available: https://s3.amazonaws.com/na-st01.ext.exlibrisgroup.com/01ALLIANCE_WSU/storage/alma/FA/CB/38/5B/06/61/7F/96/13/37/B0/BC/03/D3/6F/E3/D_Neighbors_11131428_Hypnosis%20for%20Phantom%20Limb%20Pain.pdf?response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Date=20220615T145902Z&X-Amz-SignedHeaders=host&X-Amz-Expires=119&X-Amz-

Credential=AKIAJN6NPMNGJALPPWAQ%2F20220615%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Signature=fe1f4ffd2a8c236d67693372006781ce0e6970fe7e56e1c7722fb0c34d1ea607 (Accessed 16 August 2021).

Neuman, W. 1997. *Social research methods qualitative and quantitative approaches*. 3rd ed. Needham Heights, Massachusetts: Allyn & Bacon.

Nickel, E., Voss, G., Slater, B., Mueller, E. and Hansen, A. 2020. Improving footwear options for persons with lower limb amputations. In: Frontiers in Biomedical Devices. ed. *Proceedings of the 2020 Design of Medical Devices Conference*. Minneapolis, 6, 7-9 April 2020. American Society of Mechanical Engineers. Available: https://doi.org/10.1115/DMD2020-9044 (Accessed 02 February 2022).

Nisa, M. 2004. Influence of spirituality in the health care system of trauma patients. *Journal of Advance Research in Science and Social Science (JARSSC),* 02(01): 33-39. Available: http://jarssc.com/attachments/Influence-of-Spirituality-in-the-Healthcare-System-of-Trauma-Patients-Dr.-Mehmoodun-Nisa.pdf (Accessed 30 September 2020)

Norlyk, A., Martinsen, B., Hall, E. and Haahr, A. 2016. Being in-between: the lived experience of becoming a prosthesis user following the loss of a leg. *SAGE Open*, 6(3): 1-9. Available: https://journals.sagepub.com/doi/pdf/10.1177/2158244016671376 (Accessed 20 May 2022).

Norlyk, A., Martinsen, B. and Kjaer-Petersen, K. 2013. Living with clipped wings-patients' experience of losing a leg. *International Journal of Qualitative Studies on Health and Well-being*, 8(1): 1-8. Available: https://www.tandfonline.com/doi/pdf/10.3402/qhw.v8i0.21891 (Accessed 28 July 2021).

Nowell, L. S., Norris, J. M., White, D. E. and Moules, N. J. 2017. Thematic analysis: striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16: 1-13. Available:

https://journals.sagepub.com/doi/pdf/10.1177/1609406917733847 (Accessed 16 February 2021).

Nyumba, T. O., Wilson, K., Derrick, C. J. and Mukherjee, N. 2018. The use of focus group discussion methodology: insights from two decades of application in conservation. *Methods in Ecology and Evolution*, 9(1): 20-32. Available: https://besjournals.onlinelibrary.wiley.com/doi/pdfdirect/10.1111/2041-210X.12860?download=true (Accessed 06 February 2021).

Ogurtsova, K., da Rocha Fernandes, J. D., Huang, Y., Linnenkamp, U., Guariguata, L., Cho, N. H., Cavan, D., Shaw, J. E. and Makaroff, L. E. 2017. IDF Diabetes Atlas: global estimates for the prevalence of diabetes for 2015 and 2040. *Diabetes Research and Clinical Practice*, 128: 40-50. Available: https://www.diabetesresearchclinicalpractice.com/action/showPdf?pii=S0168-8227%2817%2930375-3 (Accessed 10 January 2021).

O'Keeffe, B. and Rout, S. 2019. Prosthetic rehabilitation in the lower limb. *Indian Journal of Plastic Surgery*: official publication of the Association of Plastic Surgeons of India, 52(1): 134-143. Available: https://www.thieme-connect.com/products/ejournals/pdf/10.1055/s-0039-1687919.pdf (Accessed 23 January 2020).

Olotu, B. and Anderson, F. 2019. Knowledge and attitude of patients undergoing lower extremity amputation at RK Khan Hospital, Chatsworth. *South African Journal of Surgery*, 57(4): 9-13. Available: https://web.archive.org/web/20200211014733id_/http://www.scielo.org.za/pdf/sajsurg/v57n4/11.pdf (Accessed 20 January 2021).

Össur. 2017. *An introduction to living well with limb loss in South Africa*. South Africa: Össur.

Össur. 2017. *Common levels of lower-limb amputation* (image). In: Össur. An introduction to living well with limb loss in South Africa. South Africa: Össur.

Padi, K. K., Mukundan, C. and Subramani, K. 2017. Trends and challenges in lower limb prosthesis. *IEEE Potentials*, 36(1): 19-23. Available: https://www.researchgate.net/profile/Kishore-Kumar-

Padi/publication/312299180_Trends_and_Challenges_in_Lower_Limb_Prosthesis/links/5ab8a2c40f7e9b68ef51f21d/Trends-and-Challenges-in-Lower-Limb-Prosthesis.pdf (Accessed 02 February 2021).

Pargament, K. I. and Mahoney, A. 2005. Theory: "Sacred matters: Sanctification as a vital topic for the psychology of religion." *The International Journal for the Psychology of Religion*, 15(3): 179-198. Available: https://www.bjpa.org/content/upload/bjpa/kenn/Kenneth%20Pargament%20-Article-Sacred%20Matters.PDF (Accessed 23 May 2022).

Pascale, B. A. and Potter, B. K. 2014. Residual limb complications and management strategies. *Current Physical Medicine and Rehabilitation Reports*, 2(4): 241-249. Available: https://link.springer.com/content/pdf/10.1007/s40141-014-0063-0.pdf (Accessed 22 May 2022).

Patel, S., Srivastava, S., Singh, M. R. and Singh, D. 2019. Mechanistic insight into diabetic wounds: pathogenesis, molecular targets and treatment strategies to pace wound healing. *Biomedicine & Pharmacotherapy*, 112: 1-15. Available: https://www.researchgate.net/profile/Satish-Patel-6/publication/331222605_Mechanistic_insight_into_diabetic_wounds_Pathogenesis_molecular_targets_and_treatment_strategies_to_pace_wound_healing/links/5c73754ba6fdcc4715990d25/Mechanistic-insight-into-diabetic-wounds-Pathogenesis-molecular-targets-and-treatment-strategies-to-pace-wound-healing.pdf (Accessed 16 January 2022).

Patino, C. M. and Ferreira, J. C. 2018. Inclusion and exclusion criteria in research studies: definitions and why they matter. *Jornal Brasileiro de Pneumologia*, 44(2): 84. Available: https://cdn.publisher.gn1.link/jornaldepneumologia.com.br/pdf/2018_44_2_6_english.pdf (Accessed 12 January 2021).

Patton, M. Q. 1999. Enhancing the quality and credibility of qualitative analysis. *HSR: Health Services Research*, 34(5 Part II): 1189-1208. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1089059/pdf/hsresearch00022-0112.pdf (Accessed 01 May 2020).

Paul, J. 2018. Pain support from family and providers in the diabetic amputee: a lived experience. Hons., East Carolina University. Available: https://thescholarship.ecu.edu/bitstream/handle/10342/6840/PAUL-HONORSTHESIS-2018.pdf?sequence=1 (Accessed 16 January 2022).

Peek, M. E. 2011. Gender differences in diabetes-related lower extremity amputations. *Clinical Orthopaedics and Related Research*, 469(7): 1951-1955. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3111773/pdf/11999_2010_Article_1735.pdf (Accessed 15 January 2022).

Peirano, A. H. 2010. *Spirituality and quality of life among individuals with limb amputation.* D.H.A., University of Phoenix. Available: https://www.proquest.com/docview/744523561?pq-origsite=gscholar&fromopenview=true (Accessed 13 May 2020).

Peirano, A. H. and Franz, R. W. 2012. Spirituality and quality of life in limb amputees. *The International Journal of Angiology,* 21(1): 47-52. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3444036/pdf/ija21047.pdf (Accessed 01 May 2020).

Penn-Barwell, J. G. 2011. Outcomes in lower limb amputation following trauma: a systematic review and meta-analysis. *Injury, Int. J. Care Injured,* 42(12): 1474-1479. Available: https://reader.elsevier.com/reader/sd/pii/S0020138311003457?token=F1EA75C158FD446F4F669A41D8DC6218483C63BDCF00019EF2AA13D37F863E132AB34EB19586B1E8A6D8F201DC02CAF4&originRegion=eu-west-1&originCreation=20220615160032 (Accessed 09 July 2021).

Pezzin, L. E., Dillingham, T. R., MacKenzie, E. J., Ephraim, P. and Rossbach, P. 2004. Use and satisfaction with prosthetic limb devices and related services. *Archives of Physical Medicine and Rehabilitation*, 85(5): 723-729. Available: https://d1wqtxts1xzle7.cloudfront.net/56164513/Use_and_Satisfaction-with-cover-page-v2.pdf?Expires=1655161574&Signature=CQPOD0k8TLT1MpmlLt9B3poZKc9GMuCJ8uSP5gKUTE4pa~kbYWsMYdA~jrWlLKBR6sxSKSUAdKaO0DYrBrCBPzIenwM1IJ

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Pienaar, E. and Visagie, S. 2019. Prosthetic use by persons with unilateral transfemoral amputation in a South African setting. *Prosthetics and Orthotics International*, 43(3): 276-283. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364619825891 (Accessed 27 April 2022).

Postema, S. G., Bongers, R. M., Brouwers, M. A., Burger, H., Norling-Hermansson, L. M., Reneman, M. F., Dijkstra, P. U. and Van der Sluis, C. K. 2016. Upper limb absence: predictors of work participation and work productivity. *Archives of Physical Medicine and Rehabilitation*, 97(6): 54-66. Available: https://pure.rug.nl/ws/portalfiles/portal/40131059/Chapter_4.pdf (Accessed 20 July 2021).

Puchalski, C. M. 2008. Spirituality and the care of patients at the end-of-life: an essential component of care. *OMEGA-Journal of Death and Dying*, 56(1): 33-46. Available: https://doi.org/10.2190/OM.56.1.d (Accessed 30 September 2020).

Puchalski, C. M., Sbrana, A., Ferrell, B., Jafari, N., King, S., Balboni, T., Miccinesi, G., Vandenhoeck, A., Silbermann, M., Balducci, L. and Yong, J. 2019. Interprofessional spiritual care in oncology: a literature review. *ESMO Open*, 4(1): 1-11. Available: http://www.scienzaevita.org/wp-content/uploads/2020/02/Interprofessional-spiritual-care-in-oncology.pdf (Accessed 22 May 2022).

Quigley, M., Dillon, M. P. and Duke, E. J. 2016. Comparison of quality of life in people with partial foot and transtibial amputation: a pilot study. *Prosthetics and Orthotics International*, 40(4): 467-474. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364614568414 (Accessed 22 May 2022).

Rai, N. and Thapa, B. 2015. A study on purposive sampling method in research. *Kathmandu: Kathmandu School of Law*, 1-12. Available: https://d1wqtxts1xzle7.cloudfront.net/48403395/A_Study_on_Purposive_Sampling_Method_in_Research-with-cover-page-v2.pdf?Expires=1655228692&Signature=fTDn1wJqop6HYicWStriwhfxz3aszMWtx21zELBfixaShi2VdikaXvXQwIJz80pt9mUqmBf7t6GU~UhuUGBPfXzTOAeKXGoz4v8mC2dkLFPIYLJCMK66-QbZ2ZI2Cpv9YvitZRoOi5O5PiJZ5GxvouXTqKRNhbq9apWvNHaSztkbDAkML3BWTu4MJRrxNvOkBjteyEWvGoZ-treN6Mq0oHx1QzOSvVaix8RuEHaGoIHCEDHOjhnVYdmAMJg86ihIcxGeJIqiiJsx-Ue58Yx3gb~DfnKp0153GClZfWFO3sH~PqjLzuxDY2MyCI1Y0z5zEwBNzWIu14qL2BqgPIeF7g__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 15 January 2021).

Raichle, K. A., Hanley, M. A., Molton, I., Kadel, N. J., Campbell, K., Phelps, E., Ehde, D. and Smith, D. G. 2008. Prosthesis use in persons with lower-and upper-limb amputation. *Journal of Rehabilitation Research and Development*, 45(7): 961. Available: https://www.researchgate.net/profile/Ivan-Molton-2/publication/23934796_Prosthesis_use_in_persons_with_lower-_and_upper-limb_amputation/links/00b49531df3c8d1350000000/Prosthesis-use-in-persons-with-lower-and-upper-limb-amputation.pdf (Accessed 15 May 2020).

Ramanand, A. 2016. *The childbirth experience amongst women from diverse spiritual backgrounds: an exploratory study at public hospitals in the uMgungundlovu District of KwaZulu-Natal.* MHSc, Durban University of Technology. Available: https://openscholar.dut.ac.za/bitstream/10321/1762/1/RAMANAND_2016.pdf (Accessed 07 July 2020).

Ramkisson, S., Pillay, B. J. and Sartorius, B. 2016. Anxiety, depression and psychological well-being in a cohort of South African adults with Type 2 diabetes mellitus. *South African Journal of Psychiatry*, 22(1): 4. Available: https://www.ajol.info/index.php/sajpsyc/article/view/143085/132829 (Accessed 20 July 2021).

Ramstrand, N. and Ramstrand, S. 2018. Competency standards for newly graduated prosthetist/orthotists in Sweden. *Prosthetics and Orthotics International*, 42(4): 387-393. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364618774056 (Accessed 05 June 2020).

Rasmussen, B. S., Yderstraede, K. B., Carstensen, B., Skov, O. and Beck-Nielsen, H. 2016. Substantial reduction in the number of amputations among patients with diabetes: a cohort study over 16 years. *Diabetologia*, 59(1): 121-129. Available: http://bendixcarstensen.com/SDC/Ampu/Rasmussen.2016.pdf (Accessed 21 January 2021).

Reis, L. A. D. and Menezes, T. M. D. O. 2017. Religiosity and spirituality as resilience strategies among long-living older adults in their daily lives. *Revista Brasileira de Enfermagem*, 70(4): 761-766. Available: https://pdfs.semanticscholar.org/bd66/708747e46a9f606ba494b1d52fdaf0b30cba.pdf (Accessed 10 November 2020).

Richardson, C. and Kulkarni, J. 2017. A review of the management of phantom limb pain: challenges and solutions. *Journal of Pain Research*, 10: 1861-1870. Available: https://pdfs.semanticscholar.org/1a16/e7606632c02b821f7abdff0683f9e0ea9a9d.pdf (Accessed 17 January 2022).

Riley, B. B., Perna, R., Tate, D. G., Forchheimer, M., Anderson, C. and Luera, G. 1998. Types of spiritual well-being among persons with chronic illness: their relation to various forms of quality of life. *Archives of Physical Medicine and Rehabilitation*, 79(3): 258-264. Available: https://d1wqtxts1xzle7.cloudfront.net/67214025/s0003-9993_2898_2990004-120210505-10373-wuujpu-with-cover-page-v2.pdf?Expires=1655161178&Signature=bpBKAFMdedCaSWWQdTixm-1N1Ult~tM3zHeZCcpKtD9SgoXLD1HwdUjGf72E7o1Br5LMzzIqCTypevOPxE~9rKqkUxD7dyKlZp4MlBKLzQ2zCzVDTRq6WQA-csNArvE0u4D4wEFVM0UwXJs~ERLyLuhY1fxq2ZwaekqII2xAovOqe9aBStaSOWWkn391NbxyiqfEjZTYLOialhmu5u68GZQvD-1Tg7QgnmxqA59rt99ZlDOa6cDUrv-ou8559EULWoqn2e3sDpSr9RRGRJempLXZC0KaIXlPhNPqsLytkU1h-

yFSvr6KTfrijdB61dxj6giwBaZ2ZsYrtR-gY-gHfw__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 15 November 2020).

Robbs, J. V. 2010. Lower limb amputation for ischaemia with special reference to the diabetic patient: the ultimate goal after amputation is rehabilitation to the limit of what the patient can achieve. *Continuing Medical Education*, 28(4): 164-170. Available: https://www.ajol.info/index.php/cme/article/download/71233/60193 (Accessed 11 January 2021).

Roșca, A. C. Baciu, C. C., Burtăverde, V. and Mateizer, A. 2021. Psychological consequences in patients with amputation of a limb: an interpretative-phenomenological analysis. *Frontiers in Psychology*, 12: 1-11. Available: https://d1wqtxts1xzle7.cloudfront.net/67444187/fpsyg_12_537493-libre.pdf?1622133176=&response-content-disposition=inline%3B+filename%3DPsychological_Consequences_in_Patients_W.pdf&Expires=1652995243&Signature=WsEnIzpipBmt8FkjVsdExhEWS5orVxuyBLhPv3R2tAJsSqwTuE1HFgsuYnQ~hzyG-zFyEV4ZN80~FL9yxPKv3OYnd60sq16cXY4IgNe-g8O0J2uAlcji5oiyiz~qr-BpVct-0V9MQ4a7jL4ao1km1egKqmJl5K~9RQxubh1m1SSutWpGXRYSLwnYrIW~c-D4o3QRYhjCpjiBT-Pw3Tu88APRLA9Mbmfu1SP13LrudTP60jWBsUuVmc4UOlAqoihhw-PmuXqjUFS8OYOXPNfnB9Y8SWZaD7NANGr4onIRETMz59noNNbXTDP1vnAzQHsTofekYSWZ1tWTNa-aDkbrAQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 17 January 2022).

Ross, L., McSherry, W., Giske, T., van Leeuwen, R., Schep-Akkerman, A., Koslander, T., Hall, J., Steenfeldt, V. Ø. and Jarvis, P. 2018. Nursing and midwifery students' perceptions of spirituality, spiritual care, and spiritual care competency: a prospective, longitudinal, correlational European study. *Nurse Education Today*, 67: 64-71. Available: http://eprints.bournemouth.ac.uk/30736/3/Paper%20for%20uploadSPNM2018.pdf (Accessed 20 August 2021).

Safari, R. M. and Meier, M. R. 2015. Systematic review of effects of current transtibial prosthetic socket designs- Part 1: qualitative outcomes. *Journal of Rehabilitation*

Research and Development, 52(5): 491-508. Available: https://derby.openrepository.com/bitstream/handle/10545/621061/jrrd-2014-08-0183.pdf?sequence=1&isAllowed=y (Accessed 13 May 2022).

Saker, N. S. 2016. Effect of limb massage and exercises on phantom limb pain among amputee patients. *Alexandria Scientific Nursing Journal*, 18(2): 127-136. Available: https://asalexu.journals.ekb.eg/article_208678_90a15e75817d328feb564100bca0166b.pdf (Accessed 16 January 2022).

Santos, I. P. D., Silva, A. D. M., Furtado, G. S., Menezes, R. M. M. D., Santos, K. O. B. D. and Ferraz, D. D. 2021. Patient's satisfaction with a lower limb prosthesis: a longitudinal study. *Fisioterapia e Pesquisa*, 28(3): 276-283. Available: https://doi.org/10.1590/1809-2950/20014728032021 (Accessed 02 February 2022).

Saravanan, P. and Menold, J. 2021. Developing an evidence-based clinical decision-support system to enhance prosthetic prescription. In: *Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care*. Los Angeles, 2021. California: SAGE Publications. Available: https://journals.sagepub.com/doi/pdf/10.1177/2327857921101116 (Accessed 13 May 2022).

Sarigöz, A. O. and Yaşartürk, F. 2020. Investigation of the relationship between healthy lifestyle behavior, quality of life and leisure constraint levels of amputee individuals who take sports education. *International Journal of Sport Culture and Science*, 8(4): 286-301. Available: https://dergipark.org.tr/en/download/article-file/1430483 (Accessed 02 July 2021).

Sarvestani, A. S. and Azam, A. T. 2013. Amputation: a ten-year survey. *Trauma Monthly*, 18(3): 126-129. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3864397/pdf/traumamon-18-126.pdf (Accessed 10 January 2021).

Schneider, H., le Marcis, F., Grard, J., Penn-Kekana, L., Blaauw, D. and Fassin, D. 2010. Negotiating care: patient tactics at an urban South African hospital. *Journal of*

Health Services Research & Policy, 15(3): 137-142. Available: https://www.jstor.org/stable/pdf/26751129.pdf (Accessed 11 January 2021).

Schneider, M. and I'Papi'Nkoli, M. 2011. Affirmative action and disability in South Africa. *Transformation: Critical Perspectives on Southern Africa*, 77: 90. Available: https://muse.jhu.edu/article/465460 (Accessed 12 July 2021).

Seering, M. S. and Punia, S. 2020. Amputation pain management. In: Waisundara, V. Y., Banjari, I. and Balkić, J. eds. *Pain Management: Practices, Novel Therapies and Bioactives*. InTechOpen, 1-13. Available: https://www.intechopen.com/chapters/73273 (Accessed 15 August 2020).

Senra, H., Oliveira, R.A., Leal, I. and Vieira, C. 2012. Beyond the body image: a qualitative study on how adults experience lower limb amputation. *Clinical Rehabilitation*, 26(2): 180-191. Available: https://core.ac.uk/download/pdf/70650651.pdf (Accessed 15 August 2020).

Shakespeare, T. and Officer, A. 2014. Breaking the barriers, filling the gaps. *Disability and Rehabilitation*, 36(18): 1-2. Available: https://www.researchgate.net/profile/Tom-Shakespeare/publication/259696299_Breaking_the_barriers_filling_the_gaps/links/55a4dffc08ae5e82ab1f66ac/Breaking-the-barriers-filling-the-gaps.pdf (Accessed 12 January 2021).

Shenton, A. K. 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2): 63-75. Available: https://www.pm.lth.se/fileadmin/_migrated/content_uploads/Shenton_Trustworthiness.pdf (Accessed 25 February 2021).

Shepherd, M. K., Azocar, A. F., Major, M. J. and Rouse, E. J. 2018. Amputee perception of prosthetic ankle stiffness during locomotion. *Journal of NeuroEngineering and Rehabilitation*, 15(99): 1-10. Available: https://jneuroengrehab.biomedcentral.com/track/pdf/10.1186/s12984-018-0432-5.pdf (Accessed 13 May 2022).

Sherwood, A., Brinkmann, J. and Fatone, S. 2018. Review of benefits to practitioners of using good patient-practitioner communication. *JPO: Journal of Prosthetics and*

Orthotics, 30(1): 5-12. Available: https://doi.org/10.1097/JPO.0000000000000165 (Accessed 13 May 2022).

Sinha, R., van den Heuvel, W. J. and Arokiasamy, P. 2014. Adjustments to amputation and an artificial limb in lower limb amputees. *Prosthetics and Orthotics International*, 38(2): 115-121. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364613489332 (Accessed 10 July 2021).

Sinha, R., van den Heuvel, W. J., Arokiasamy, P. and van Dijk, J. P. 2014. Influence of adjustments to amputation and artificial limb on quality of life in patients following lower limb amputation. *International Journal of Rehabilitation Research*, 37(1): 74-79. Available: https://www.researchgate.net/profile/Jitse-P-Dijk/publication/258043089_Influence_of_adjustments_to_amputation_and_artificial_limb_on_quality_of_life_in_patients_following_lower_limb_amputation/links/5a8fcf03aca272140560aada/Influence-of-adjustments-to-amputation-and-artificial-limb-on-quality-of-life-in-patients-following-lower-limb-amputation.pdf (Accessed 09 July 2021).

South Africa, Department of Justice. 1996*. The Constitution of the Republic of South Africa, Act 108 of 1996*. Cape Town: National Legislative Bodies/ National Authorities. Available: https://www.justice.gov.za/legislation/constitution/saconstitution-web-eng.pdf (Accessed 07 January 2021).

Spampinato, S. F., Caruso, G. I., De Pasquale, R., Sortino, M. A. and Merlo, S. 2020. The treatment of impaired wound healing in diabetes: looking among old drugs. *Pharmaceuticals*, 13(4): 1-17. Available: https://mdpi-res.com/d_attachment/pharmaceuticals/pharmaceuticals-13-00060/article_deploy/pharmaceuticals-13-00060.pdf?version=1585743525 (Accessed 17 January 2022).

Spoden, M., Nimptsch, U. and Mansky, T. 2019. Amputation rates of the lower limb by amputation level – observational study using German national hospital discharge data from 2005 to 2015. *BMC Health Services Research*, 19(8): 1-9. Available: https://core.ac.uk/download/pdf/227028536.pdf (Accessed 12 January 2021).

Srivastava, K. and Chaudhury, S. 2014. Rehabilitation after amputation: psychotherapeutic intervention module in Indian scenario. *The Scientific World Journal*, 2014: 1-5. Available: https://downloads.hindawi.com/journals/tswj/2014/469385.pdf (Accessed 28 March 2022).

Stebbins, R. A. 2001. *Exploratory research in the social sciences*. Thousand Oaks, California: SAGE Publications. Available: https://books.google.co.za/books?hl=en&lr=&id=hDE13_a_oEsC&oi=fnd&pg=PA7&dq=Stebbins,+R.A.+2001.+Exploratory+research+in+the+social+sciences.+Sage.+Vol.+48:+&ots=NmUJY4FDrJ&sig=1900m1FfxIZ8ZPrtdba5y0gk760&redir_esc=y#v=onepage&q=Stebbins%2C%20R.A.%202001.%20Exploratory%20research%20in%20the%20social%20sciences.%20Sage.%20Vol.%2048%3A&f=false (Accessed 30 January 2021).

Stockburger, S. J., Sadhir, M. and Omar, H. A. 2016. Phantom limb pain. *Journal of Pain Management*, 9(2): 161-163. Available: https://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1243&context=pediatrics_facpub (Accessed 16 January 2022).

Stuckey, R., Draganovic, P., Ullah, M. M., Fossey, E. and Dillon, M. P. 2020. Barriers and facilitators to work participation for persons with lower limb amputations in Bangladesh following prosthetic rehabilitation. *Prosthetics and Orthotics International*, 44(5): 279-289. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364620934322 (Accessed 27 January 2022).

Stutts, L. A., Bills, S. E., Erwin, S. R. and Good, J. J. 2015. Coping and posttraumatic growth in women with limb amputations. *Psychology, Health & Medicine*, 20(6): 742-752. Available: https://web.s.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=2&sid=a6c150d2-ee5e-4afe-ac5e-bc99a4aedd99%40redis (Accessed 19 January 2022).

Subrata, S. A. 2020. Implementation of spiritual care in patients with diabetic foot ulcers: a literature review. *British Journal of Nursing*, 29(15): S24-S32. Available:

https://web.p.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0&sid=325103fc-20af-40f3-b817-e6f92af24ea6%40redis (Accessed 21 August 2021).

Sugawara, A. T., Ramos, V. D., Alfieri, F. M. and Battistella, L. R. 2018. Abandonment of assistive products: assessing abandonment levels and factors that impact on it. *Disability and Rehabilitation: Assistive Technology*, 13(7): 1-8. Available: https://www.researchgate.net/profile/Fabio-Alfieri/publication/322512776_Abandonment_of_assistive_products_assessing_abandonment_levels_and_factors_that_impact_on_it/links/5c347b89299bf12be3b69a1c/Abandonment-of-assistive-products-assessing-abandonment-levels-and-factors-that-impact-on-it.pdf (Accessed 13 May 2022).

Swain, J. ed. 2017. *Designing research in education: concepts and methodologies*. London: SAGE Publications.

Swartz, L. and MacLachlan, M. 2009. From the local to the global: the many contexts of disability and international development. In: MacLachlan, M. and Swartz, L. eds. *Disability & International Development: Towards inclusive global health.* New York: Springer. Available: https://manavata.org/able/wp-content/uploads/sites/10/2020/07/disability-and-towards-inclusive-global-health.pdf#page=26 (Accessed 01 June 2020).

Tan, H., Rumbold, B., Gardner, F., Glenister, D., Forrest, A. and Bowen, L. 2020. How is spiritual care/pastoral care understood and provided in general hospitals in Victoria, Australia?–Staff perspectives. *Journal for the Study of Spirituality*, 10(2): 114-126. Available: https://www.spiritualhealth.org.au/Articles/(186)How%20is%20spiritual%20care%20pastoral%20care%20understood%20and%20provided%20in%20general%20hospitals%20in%20Victoria%20Australia%20Staff%20perspectives.pdf (Accessed 17 May 2020).

Tan, J. 2015. Exploring the physical, social and care needs and experiences of established amputees. *Limbless Association*, October: 1-45. Available: https://www.researchgate.net/publication/283077987_Exploring_the_physical_social_and_care_needs_and_experiences_of_established_amputees (Accessed 15 June 2021).

The WHOQOL Group. 1998. The World Health Organization Quality of Life assessment (WHOQOL): development and general psychometric properties. *Social Science & Medicine*, 46(12): 1569-1585. Available: http://www.psychology.hku.hk/ftbcstudies/refbase/docs/thewhoqolgroup/1998/71_TheWHOQOLGroup1998.pdf (Accessed 11 August 2020).

Tolson, C. and Koenig, H. 2003. *The healing power of prayer: the surprising connection between prayer and your health*. Michigan: Baker Books. Available: https://books.google.co.za/books?hl=en&lr=&id=C-pbDk4_X1EC&oi=fnd&pg=PT9&dq=koenig+power+of+prayer&ots=imGoS9YiXm&sig=ryhPnc1p8GrrbHTbVyWmqG78Tv4&redir_esc=y#v=onepage&q=koenig%20power%20of%20prayer&f=false (Accessed 08 April 2022).

Torbjörnsson, E., Ottosson, C., Boström, L., Blomgren, L., Malmstedt, J. and Fagerdahl, A. M. 2020. Health-related quality of life and prosthesis use among patients amputated due to peripheral arterial disease– a one-year follow-up. *Disability and Rehabilitation*, 44(10): 1-9. Available: https://www.tandfonline.com/doi/pdf/10.1080/09638288.2020.1824025 (Accessed 18 February 2022).

Treloar, L. L. 2002. Disability, spiritual beliefs and the church: the experiences of adults with disabilities and family members. *Journal of Advanced Nursing*, 40(5): 594-603. Available: https://onlinelibrary.wiley.com/doi/epdf/10.1046/j.1365-2648.2002.02417.x (Accessed 25 November 2020).

Trevelyan, E. G., Turner, W. A. and Robinson, N. 2016. Perceptions of phantom limb pain in lower limb amputees and its effect on quality of life: a qualitative study. *British Journal of Pain*, 10(2): 70-77. Available: https://www.researchgate.net/profile/Warren-Turner/publication/281197656_Perceptions_of_phantom_limb_pain_in_lower_limb_amputees_and_its_effect_on_quality_of_life_A_qualitative_study/links/5616425308ae0f2140066c4f/Perceptions-of-phantom-limb-pain-in-lower-limb-amputees-and-its-effect-on-quality-of-life-A-qualitative-study.pdf (Accessed 19 January 2021).

Turner, S., Belsi, A. and McGregor, A. H. 2021. Issues faced by people with amputation(s) during lower limb prosthetic rehabilitation: a thematic analysis. *Prosthetics and Orthotics International*, 46(1): 61-67. Available:

https://journals.lww.com/poijournal/Fulltext/2022/02000/Issues_faced_by_people_with_amputation_s__during.12.aspx (Accessed 03 February 2022).

Unwin, J., Kacperek, L. and Clarke, C. 2009. A prospective study of positive adjustment to lower limb amputation. *Clinical Rehabilitation*, 23(11): 1044-1050. Available: https://www.proquest.com/docview/200677242?accountid=10612 (Accessed 21 August 2020).

Uytman, C. L. 2014. *Living with limb loss: individuals' and prosthetists' perceptions of amputation, prosthesis use and rehabilitation*. PhD, Queen Margaret University. Available: https://eresearch.qmu.ac.uk/bitstream/handle/20.500.12289/7354/7354.pdf (Accessed 31 August 2020).

van der Stelt, M., Grobusch, M. P., Koroma, A. R., Papenburg, M., Kebbie, I., Slump, C. H., Maal, T. J. J., Brouwers, L. and Masanga 3D Prosthesis Printing Research Group. 2021. Pioneering low-cost 3D-printed transtibial prosthetics to serve a rural population in Sierra Leone– an observational cohort study. *EClinicalMedicine*, 35: 1-9. Available: https://ris.utwente.nl/ws/files/254855380/Van_der_stelt_2021_Pioneering_low_cost_d_printed_trans.pdf (Accessed 15 March 2022).

Van Netten, J. J., Jarl, G., Postema, K. and Williams, A. E. 2020. A toolkit for prosthetists and orthotists to facilitate progress in professional communication over the next 50 years. *Prosthetics and Orthotics International*, 44(6): 408-415. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364620962325 (Accessed 20 May 2022).

Varga, S. and Gallagher, S. 2020. Anticipatory-vicarious grief: the anatomy of a moral emotion. *The Monist*, 103(2): 176-189. Available: https://d1wqtxts1xzle7.cloudfront.net/63227860/Varga_and_Gallagher_-_AV_Grief_2020-with-cover-page-v2.pdf?Expires=1655160851&Signature=awjH37u5SFeaBEDyr-b2Tc8SjG1Goyr00EloTvohw76QsG0lKCRuc1B9mGt6hrUW-hPmFEUNhtswRjdXs4StonfyPLrrtef6tacW783kCY31kl~ifNMqU-DlYTjA8u7JSjCMmrdl~mm~-O~5llOaaACRnRBkypHruKinmPoM91eIuDqcj4q8r-ad5YPB56yIzNFrWaHqNe799fXOFvze~mREFc8Oi3KBRS954ZSzc483IXo4Bv~~KvYA28UqUNZvGWkaXDScGbR2saSKzT~wZU9CLNsmAYeberUzhhTug5l~64KBLNCuhstN8c

vkobUG8IP43qWfx9CSFjcHpEa4xQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (Accessed 17 January 2022).

Vivar, C. G., McQueen, A., Whyte, D. A. and Armayor, N. C. 2007. Getting started with qualitative research: developing a research proposal. *Nurse Researcher (through 2013)*, 14(3): 60-73. Available: https://www.proquest.com/docview/200845498/fulltextPDF/BE0FAF345F3742A3PQ/2?accountid=10612 (Accessed 28 January 2021).

Washington, E. D. and Williams, A. E. 2016. An exploratory phenomenological study exploring the experiences of people with systemic disease who have undergone lower limb amputation and its impact on their psychological well-being. *Prosthetics and Orthotics International*, 40(1): 44-50. Available: https://journals.sagepub.com/doi/pdf/10.1177/0309364614556838 (Accessed 17 January 2021).

Weisberg, H., Krosnick, J. and Bowen, B. 2016. *An introduction to survey research, polling, and data analysis*. 3rd ed. United States of America: SAGE Publications.

Wen, P. S., Randolph, M. G., Elbaum, L. and De la Rosa, M. 2018. Gender differences in psychosocial and physical outcomes in Haitian amputees. *The American Journal of Occupational Therapy*, 72(3): 1-8. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5915231/pdf/7203205090p1.pdf (Accessed 18 March 2022).

Whiting, L. S. 2008. Semi-structured interviews: guidance for novice researchers. *Nursing Standard (through 2013)*, 22(23): 35-40. Available: https://www.proquest.com/docview/219839081/fulltextPDF/CF01717873CD4CDEPQ/1?accountid=10612 (Accessed 21 November 2021).

Williams, D. A. 2018. *Amputee social support: a quantitative investigation of peer-to-peer and group influence*. PhD, Walden University. Available: https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=6715&context=dissertations (Accessed 25 January 2022).

Wing, Y. T. 2017. Participation restrictions and vocational needs amongst persons with a lower limb amputation in Cape Town, South Africa. MSPT, University of the

Western Cape. Available: https://etd.uwc.ac.za/bitstream/handle/11394/6299/Wing_MSC_CHS_2017.pdf?sequence=1&isAllowed=y (Accessed 20 January 2021).

Wolf, C., Joye, D., Smith, T. W. and Fu, Y. C. eds. 2016. *The SAGE handbook of survey methodology*. SAGE Publications.

Wong, L. P. 2008. Focus group discussion: a tool for health and medical research. *Singapore Med J*, 49(3): 256-260. Available: http://www.smj.org.sg/sites/default/files/4903/4903me1.pdf (Accessed 08 February 2021).

World Health Organization. 1996. *WHOQOL-BREF: Introduction, administration, scoring and generic version of the assessment.* Geneva: World Health Organization. Available: https://apps.who.int/iris/bitstream/handle/10665/63529/WHOQOL-BREF.pdf?sequence=1 (Accessed 25 August 2020).

World Health Organization. 2001. *International Classification of Functioning, Disability and Health: ICF.* Geneva: World Health Organization. Available: http://apps.who.int/iris/bitstream/handle/10665/42407/9241545429.pdf;jsessionid=1C69AD48706B8D7878BAAC4A14A8508B?sequence=1 (Accessed 25 August 2020)

World Health Organization. 2002. *Towards a common language for functioning, disability and health: ICF.* Geneva: World Health Organization. Available: https://cdn.who.int/media/docs/default-source/classification/icf/icfbeginnersguide.pdf (Accessed 25 August 2020).

World Health Organization. 2013. *How to use the ICF: a practical manual for using the International Classification of Functioning, Disability and Health (ICF)*. Geneva: World Health Organization. Available: https://www.medbox.org/pdf/5e148832db60a2044c2d4d88 (Accessed 25 August 2020).

World Health Organization. 2015. *WHO global disability action plan 2014-2021: Better health for all people with disability*. Geneva: World Health Organization. Available: https://apps.who.int/iris/bitstream/handle/10665/199544/?sequence=1 (Accessed 25 August 2020).

World Health Organization. 2017. *WHO standards for prosthetics and orthotics*. Geneva: World Health Organization. https://apps.who.int/iris/bitstream/handle/10665/259209/9789241512480-part1-eng.pdf (Accessed 25 August 2020).

Yang, G. M., Tan, Y. Y., Cheung, Y. B., Lye, W. K., Lim, S. H. A., Ng, W. R., Puchalski, C. and Neo, P. S. H. 2017. Effect of a spiritual care training program for staff on patient outcomes. *Palliative & Supportive Care*, 15(4): 1-10. Available: https://www.singaporecancersociety.org.sg/images/contents/about-research/Grant-2013-publication_Dr-P-Neo.pdf (Accessed 17 May 2022).

Yarwood-Ross, L. H. 2019. *Facing losses in combat-related limb-loss: a classic grounded theory study*. PhD, Manchester Metropolitan University. Available: https://e-space.mmu.ac.uk/626068/1/FINAL%20THESIS%20%282%29.pdf (Accessed 25 September 2021).

Yildirim, M. and Kanan, N. 2016. The effect of mirror therapy on the management of phantom limb pain. *Agri*, 28(3): 127-134. Available: https://jag.journalagent.com/agri/pdfs/AGRI-48343-EXPERIMENTAL_AND_CLINICAL_STUDIES-YILDIRIM.pdf (Accessed 17 January 2022).

Yosuf, N. M., Ahmad, A. C., Sulong, A. F., Adnan, M. J. M., Rahman, J. A. and Musa, R. 2019. Quality of life of diabetes amputees following major and minor lower limb amputations. *Med J Malaysia*, 74(1): 25-29. Available: https://www.e-mjm.org/2019/v74n1/quality-of-life-of-diabetes-amputees.pdf (Accessed 07 February 2022).

Yu, T. W. and Ennion, L. 2019. Participation restrictions and vocational rehabilitation needs experienced by persons with a unilateral lower limb amputation in the Western Cape, South Africa. *African Journal of Disability,* 8: 1-7. Available: http://www.scielo.org.za/pdf/ajod/v8/17.pdf (Accessed 15 February 2021).

Zaborna, D., Szmelcer, B., Krakowska, N., Fortuna, A., Wszelaki, P., Florczak, A., Wilczyński, M., Gajos, M., Skierkowska, N., Porada, M. and Wąsicki, M. 2019. Review of the methodology of lower limb prosthesis. *Journal of Education, Health*

and Sport, 9(5): 392-403. Available: https://repozytorium.umk.pl/bitstream/handle/item/5873/6942%2CZaborna%2CSzmelcer%2CKrakowska_et_al.pdf?sequence=1 (Accessed 03 February 2022).

Zhu, X., Goh, L. J., Chew, E., Lee, M., Bartlam, B. and Dong, L. 2020. Struggling for normality: experiences of patients with diabetic lower extremity amputations and post-amputation wounds in primary care. *Health Care*, 21(e63): 1-10. Available: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/09DD8C07C1C8FF7A605B0FDC728276A5/S146342362000064Xa.pdf/div-class-title-struggling-for-normality-experiences-of-patients-with-diabetic-lower-extremity-amputations-and-post-amputation-wounds-in-primary-care-div.pdf (Accessed 17 January 2022).

Appendix A1: Request for Permission (HOD Medical Facility)

18 March 2020

HR/Department of Orthotics and Prosthetics Manager at

Request for Permission to Conduct Research

Dear Manager

My name is Riyona, a Master of Health Sciences student at the Durban University of Technology. The research I wish to conduct for my master's dissertation involves exploring the biopsychosocial influence of a prosthesis and the contribution of the prosthetist on the quality of life of transtibial amputees.

I am hereby seeking your consent to interview approximately 14 transtibial amputees and 16 prosthetists that meet my inclusion criteria. Additionally, I seek your consent to perform these interviews in one of the consultation rooms available at your department.

I have provided you with a copy of my proposal which includes copies of the data collection tools and consent and/ or assent forms to be used in the research process, as well as a copy of the approval letter which I received from the Institutional Research Ethics Committee (IREC).

If you require any further information, please do not hesitate to contact me on or riyonac@icloud.com. Thank you for your time and consideration in this matter.

Yours sincerely,

Riyona Chetty

Durban University of Technology

Appendix A2: Request for Permission (KwaZulu-Natal Department of Health)

20 July 2020

Department of Health

Province of Kwa-Zulu Natal

Request for Permission to Conduct Research

Dear Management

I am pursuing a Master of Health Sciences Degree at Durban University of Technology. My research study focuses on understanding the biopsychosocial influence of a prosthesis and the contribution of the prosthetist on the quality of life of transtibial amputees.

The research proposal will be closely scrutinized and reviewed by the Institutional Research Ethics Committee who will grant provisional ethics approval only if they are satisfied that there will be no harm to participants and that anonymity and confidentiality is maintained. will also be anonymised in the study. Then only will the application be submitted to the Department of Health.

Once the study is over, I will be forwarding a copy of my results to the Department of Health and creating a presentation to the prosthetists with regards to findings made. The research findings have tremendous value as I hope to improve patient care in this area.

I have provided you with a copy of my final research proposal which includes copies of the data collection tools and consent and/ or assent forms to be used in the research process, as well as the approval letters which I received from the Facility Manager at and Institutional Research Ethics Committee (IREC).

I look forward to your support of my study.

If you require any further information, please do not hesitate to contact me on or riyonac@icloud.com. Thank you for your time and consideration in this matter.

Yours sincerely,

Riyona Chetty

Durban University of Technology

Appendix A3: Gatekeepers Permission (Medical Facility)

KWAZULU-NATAL PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

DIRECTORATE:

[redacted]

Date: 21 July 2020

Miss: Riyona Chetty.
[redacted]

Re: Permission to conduct research at Orthotic and Prosthetic Services (EThekwini District)

I have pleasure in informing you that permission and full support has been granted to Miss.R.Chetty by the Department of Orthotic and Prosthetic Services to conduct research study on "Exploring the impact of Prosthesis and the contribution of the Prosthetist on the quality of life of transtibual amputees".

Please note the ffg:

- Please ensure that you adhere to all the policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
- Research will only commence once this office has received confirmation from the Provincial Health Research Committee in the KZN
- This institution will not provide any resources for this research.
- Please ensure this office is informed before you commence your research.
- You will be expected to provide feedback on your findings to this institution.

Thank you.

[redacted]

[redacted] (Acting Director Orthotic and Prosthetic Services.)

21-07-20

GROWING KWAZULU-NATAL TOGETHER

Appendix A4: Gatekeepers Permission (Kwazulu-Natal Department of Health)

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Physical Address: 330 Langalibalele Street, Pietermaritzburg
Postal Address: Private Bag X9051
Tel: 033 395 2805/ 3189/ 3123 Fax: 033 394 3782
Email:
www.kznhealth.gov.za

DIRECTORATE:
Health Research & Knowledge Management

NHRD Ref: KZ_202012_014

Dear Ms R. Chetty
(DUT)

Approval of research

1. The research proposal titled '**The biopsychosocial influence of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees**' was reviewed by the KwaZulu-Natal Department of Health (KZN-DoH).

   The proposal is hereby **approved** for research to be undertaken at

2. You are requested to take note of the following:
   a. *All research conducted in KwaZulu-Natal must comply with government regulations relating to Covid-19. These include but are not limited to: regulations concerning social distancing, the wearing of personal protective equipment, and limitations on meetings and social gatherings.*
   b. *Kindly liaise with the facility manager BEFORE your research begins in order to ensure that conditions in the facility are conducive to the conduct of your research. These include, but are not limited to, an assurance that the numbers of patients attending the facility are sufficient to support your sample size requirements, and that the space and physical infrastructure of the facility can accommodate the research team and any additional equipment required for the research.*
   c. *Please ensure that you provide your letter of ethics re-certification to this unit, when the current approval expires.*
   d. *Provide an interim progress report and final report (electronic and hard copies) when your research is complete to* ***HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200*** *and e-mail an electronic copy to* ***hrkm@kznhealth.gov.za***
   e. *Please note that the Department of Health shall not be held liable for any injury that occurs as a result of this study.*

For any additional information please contact Mr X. Xaba on 033-395 2805.

Yours Sincerely

Dr E Lutgé
Chairperson, Health Research Committee
Date: 19/12/2020

Fighting Disease, Fighting Poverty, Giving Hope

Appendix A5: IREC Ethics Clearance

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

22 December 2020

Ms R Chetty

Dear Ms Chetty

The biopsychosocial influence of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees
Ethical Clearance number IREC 119/20

The Institutional Research Ethics Committee acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely

Prof J K Adam
Chairperson: IREC

2020 -12- 2

INSTITUTIONAL RESEARCH ETHICS CO

Appendix B1: Letter of Information- Sample 1

Dear reader, thank you for taking the time to consider participating and welcome to my research study.

Title of the Research Study:

The biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees.

Principal Investigator/s/researcher: Riyona Chetty (BHSc: Medical Orthotics and Prosthetics)

Co-Investigator/s/supervisor/s: Professor Raisuyah Bhagwan (PhD)
Dr. Nalini Govender (PhD)

Invitation to potential participant

Warm greetings! Trust you are well.
I am currently a Master of Health Science student at the Durban University of Technology. I have a Bachelor of Health Science in Medical Prosthetics and Orthotics. Ultimately this study aims at helping prosthetists to develop their skills and improve their knowledge in order to provide optimal care, guidance and prosthesis comfort to you.
I would like to invite you to participate in this study. Refreshments will be provided!

Brief Introduction and Purpose of the Study:

This study explores the emotional and physical experiences of transtibial amputees. Problems amputees face with their prosthesis for example not liking the way the prosthesis looks, excessive sweating, not fitting properly and feeling uncomfortable when walking or standing. The purpose of this study is to help the prosthetist become aware of these problems and fix them to help the amputee feel comfortable when using the prosthesis. If there are any emotional problems, the amputee should be able to talk to the prosthetist openly so that he/she may help the amputee in any way possible.

Outline of the Procedures:

There will only be one interview. There are no follow up appointments. The interview will take place at after your follow up appointment. If you are unable to visit the hospital, the interview may be held at your home or nearest public setting of your choice. Alternatively, a telephonic interview can be held. I will ask you around 15-20 questions which should take approximately 45 minutes. The interview will be voice recorded using a digital recorder. Refreshments will be provided. If you experience any emotional discomfort, a counsellor will be immediately available for you.

In order to participate in this study, you need to meet the following requirements:

- Have a transtibial amputation of one leg only
- Be within the age group of 25 years to 75 years old
- Using the prosthesis for more than one year
- Your amputation surgery was performed before January 2018
- No symptoms of Post-Traumatic Stress Syndrome

Risks or Discomforts to the Participant:

There are no major risks involved in this study. All information collected from you will be anonymous. Discomfort may be experienced when questions relate to your emotional and physical experiences as an amputee.

Reason/s why the Participant May Be Withdrawn from the Study:

It is important to note that you have every right to withdraw from this study at any stage without providing reason and you will not suffer any adverse consequences. You will continue to receive the appropriate standard of care.

Benefits:

This study will explore the emotional and physical challenges faced by transtibial amputees in order for the prosthetist to improve the quality of the prosthesis and care he/she will provide to amputees.

Remuneration:

You will not receive any money for participating in this study.

Costs of the Study:

This study does not require you to pay for anything.

Confidentiality:

All participant information is confidential and all results obtained will be used in this study for research purposes only. All information collected from you will be safely locked away and stored for five years. Thereafter, it will be shredded.

Results:

All findings from this research study may be sent to you via email or post if you wish to be informed about it. Once the study has reached completion, you will be invited by the researcher to a presentation for the findings.

Research-related Injury:

There are no anticipated research-related injuries.

Storage of all electronic and hard copies including tape recordings

All participant information is confidential and all results obtained will be used in this study for research purposes only. All information collected from you will be safely locked away and stored for five years. Thereafter, it will be shredded. The researcher is the only individual who will have access to the tape recordings and hardcopy information collected from the participant interviews.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher, Riyona Chetty

My supervisor, Raisuyah Bhagwan (031 373 2197) or co-supervisor, Nalini Govender (031 373 2796)

Institutional Research Ethics Administrator on 031 373 2375.

Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

Appendix B2: Letter of Information- Sample 1 (isiZulu)

Incwadi Yolwazi

Dear reader, thank you for taking the time to consider participating and welcome to my research study.
Mfundi othandekayo, ngiyabonga ngokuthatha isikhathi sakho ucabangele ukubamba iqhaza nokwamukela esifundweni sami socwaningo.

Title of the Research Study:
Isihloko Sesifundo Sokucwaninga:

The biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees.
Ithonya le-biopsychosocial imiphumela wokufakelwa kanye nezindima amaprosthetist ekuthuthukiseni ikhwalithi yempilo yama-transtibial anokuthula.

Principal Investigator/s/researcher *(Umphenyi oyinhloko / umcwaningi):*
Riyona Chetty (BHSc: Medical Orthotics and Prosthetics)

Co-Investigator/s/supervisor/s *(Ukusekela Um/abaphenyeni/ Um/abapathi):*
Professor Raisuyah Bhagwan (PhD)
Dr. Nalini Govender (PhD)

Invitation to potential participant:
Isimemo kulowo ongaba umhlanganyeli:

Warm greetings! Trust you are well. Imikhonzo efudumele! Ngithemba ukuthi uyaphila
I am currently a Master of Health Science student at the Durban University of Technology. I have a Bachelor of Health Science in Medical Prosthetics and Orthotics. Ultimately this study aims at helping prosthetists to develop their skills and improve their knowledge in order to provide optimal care, guidance and prosthesis comfort to you.

Ukubingelela okufudumele! *Ngithemba ukuthi uyaphila. Njengamanje ngifundela iMaster of Health Science eDurban University of Technology. Ngine-Bachelor of Health Science ku-Medical Prosthetics ne-Orthotic. Ekugcineni lolu cwaningo luhlose ukusiza ama-prosthetist ukuthi athuthukise amakhono abo futhi athuthukise ulwazi lwabo ukuze banikeze ukunakekelwa okuphelele, ukuholwa kanye nokududuza umlenze wokufakelwa.*
I would like to invite you to participate in this study. Refreshments will be provided!
Ngingathanda ukukumema ukuthi ubambe iqhaza kulolu cwaningo. Iziphuzo zizohlinzekwa!

Brief Introduction and Purpose of the Study:
Isingeniso esifushane nenhloso yokufunda

This study explores the emotional and physical experiences of transtibial amputees. Problems amputees face with their prosthesis for example not liking the way the prosthesis looks, excessive sweating, not fitting properly and feeling uncomfortable when walking or standing. The purpose of this study is to help the prosthetist become aware of these problems and fix them to help the amputee feel comfortable when using the prosthesis. If there are any emotional problems, the amputee should be able to talk to the prosthetist openly so that he/she may help the amputee in any way possible.

Lolu cwaningo luhlola imiphumela engokomzwelo nengokomzimba yokunqunywa. Izinkinga abantu abanazo ngemilenze yabo yokufakelwa ngokwesibonelo abazithandi ukuvela kwezitho zokufakelwa, ukujuluka okweqile, ukungalingani nokuzizwa ungakhululekile lapho uhamba noma umile. Inhloso yalolu cwaningo ukusiza prosthetist ukuthi azi ngalezi zinkinga futhi azilungise ukuze isiguli sizizwe singcono lapho sisebenzisa prosthesis. Uma kunezinkinga ezingokomzwelo, isiguli kufanele sikwazi ukukhuluma prosthetist ngokukhululeka ukuze sikwazi ukusiza isiguli nganoma iyiphi indlela.

Outline of the Procedures:
Uhlaka Lwezinqubo:

There will only be one interview. There are no follow up appointments. The interview will take place at after your follow up appointment. If you are unable to visit the hospital, the interview may be held at your home or nearest public setting of your choice. Alternatively, a telephonic interview can be held. I will ask you around 15-20 questions which should take approximately 45 minutes. The interview will be voice recorded using a digital recorder. Refreshments will be provided. If you experience any emotional discomfort, a counsellor will be immediately available for you.

Kuzoba nomhlangano owodwa kuphela. Ngeke kube khona ukuqokwa kokulandelwa. Inhlolokhono izokwenzeka esibhedlela ngemuva kokuqokwa kwakho. Uma ungakwazi ukuvakashela isibhedlela, ingxoxo ingabanjelwa ekhaya lakho noma endaweni yomphakathi oyithandayo. Ngenye indlela, kungaxoxwa ngocingo. Ngizokubuza imibuzo eyi-15-20 okufanele ithathe cishe imizuzu engama-45. Inhlolokhono izorekhodwa ngomlomo kusetshenziswa irekhoda yedijithali. Iziphuzo zizohlinzekwa. Uma uhlangabezana nokucindezeleka ngokomzwelo, isazi sokusebenza kwengqondo sizotholakala ngokushesha kuwe.

In order to participate in this study, you need to meet the following requirements:
Ukubamba iqhaza kulolu cwaningo, udinga ukuhlangabezana nalezi zidingo ezilandelayo:

- Have a transtibial amputation of one leg only
- Be within the age group of 25 years to 75 years old
- Using the prosthesis for more than one year
- Your amputation surgery was performed before January 2018
- No symptoms of Post-Traumatic Stress Syndrome

- *Unqunywe umlenze owodwa kuphela (transtibial)*
- *Yiba phakathi kweminyaka yobudala engama-25 nengama-75*
- *Usebenzise isitho sokufakelwa ngaphezu konyaka*
- *Ukuhlinzwa kwakho ngokunqunywa kwenziwa ngaphambi kukaJanuwari 2018*
- *Azikho izimpawu ze-Post-Traumatic Stress Syndrome*

Risks or Discomforts to the Participant:
Ingozi noma ukungaphatheki kahle kumhlanganyeli:

There are no major risks involved in this study. All information collected from you will be anonymous. Discomfort may be experienced when questions relate to your emotional and physical experiences as an amputee.

Azikho izingozi ezinkulu ezihilelekile kulolu cwaningo. Yonke imininingwane eqoqwe kuwe ngeke idalulwe. Kungaba nokungakhululeki lapho imibuzo ihlobene nokuhlangenwe nakho kwakho ngokomzwelo nangokomzimba njengomuntu onqunywe isitho somzimba.

Reason/s why the Participant May Be Withdrawn from the Study:
Izizathu zokuthi kungani umbambiqhaza angahoxa ocwaningweni:

It is important to note that you have every right to withdraw from this study at any stage without providing reason and you will not suffer any adverse consequences. You will continue to receive the appropriate standard of care.

Kubalulekile ukwazi ukuthi unelungelo lokuhoxa kulolu cwaningo kunoma yisiphi isigaba ngaphandle kokubeka isizathu. Ngeke ube nomthelela omubi uma uhoxa ocwaningweni. Uzoqhubeka nokuthola izinga elifanele lokunakekelwa.

Benefits:
Izinzuzo:

This study will explore the emotional and physical challenges faced by transtibial amputees in order for the prosthetist to improve the quality of the prosthesis and care he/she will provide to amputees.

Lolu cwaningo luzohlola izinselelo ezingokomzwelo nezingokomzimba ezibhekene neziguli ze-transtibial abanqunywe izitho zomzimba amaprosthetist ikwazi ukwenza ngcono ikhwalithi yezitho zokwenziwa nokunakekelwa abazokunikeza labo abanqunywe izitho.

Remuneration:
Inkokhelo:

You will not receive any money for participating in this study.

Ngeke uthole imali ngokubamba iqhaza kulolu cwaningo.

Costs of the Study:
Imali yocwaningo/ izindleko zocwaningo:

This study does not require you to pay for anything.

Lolu cwaningo aludingi ukuthi ukhokhele noma yini.

Confidentiality:
Ubumfihlo:

All participant information is confidential and all results obtained will be used in this study for research purposes only. All information collected from you will be safely locked away and stored for five years. Thereafter, it will be shredded.

Yonke imininingwane yababambiqhaza iyimfihlo futhi yonke imiphumela yakho izosetshenziswa kulolu cwaningo ngezinjongo zocwaningo kuphela. Yonke imininingwane eqoqwe kuwe izokhiywa ngokuphepha futhi igcinwe iminyaka emihlanu. Ngemuva kwalokho, izobhujiswa.

Results:
Imiphumela:

All findings from this research study may be sent to you via email or post if you wish to be informed about it. Furthermore, you will be invited to a presentation at for the results of the study, hosted by the researcher.

Konke okutholakele kulolu cwaningo kungathunyelwa kuwe nge-imeyili noma ngeposi uma ufisa ukwaziswa ngalo. Ngaphezu kwalokho, uzomenyelwa kwisethulo esibhedlela sase ngemiphumela yocwaningo, ebanjwe ngumcwaningi.

Research-related Injury:
Ukulimala okuhlobene nocwaningo:

There are no anticipated research-related injuries.

Akukho ukulimala okuhlobene nocwaningo okulindelekile.

Storage of all electronic and hard copies including tape recordings:
Ukugcinwa kwerekhodi (amaphepha kagesi naphrintiwe):

All participant information is confidential and all results obtained will be used in this study for research purposes only. All information collected from you will be safely locked away and stored for five years. Thereafter, it will be shredded. The researcher is the only individual who will have access to the tape recordings and hardcopy information collected from the participant interviews.

Yonke imininingwane yabahlanganyeli iyimfihlo futhi yonke imiphumela etholakalayo izosetshenziswa kulolu cwaningo ngezinjongo zocwaningo kuphela. Yonke imininingwane eqoqwe kuwe izokhiywa ngokuphepha bese igcinwa iminyaka emihlanu. Ngemuva kwalokho, izobhujiswa. Umcwaningi ukuphela komuntu ozokwazi ukufinyelela kokurekhodwe kanye nolwazi oluqinile oluqoqwe ezingxoxweni.

Persons to Contact in the Event of Any Problems or Queries:
Xhumana nalabantu uma kunezinkinga noma imibuzo:

Please contact the researcher *(sicela uxhumane nomcwaningi)*, Riyona Chetty

My supervisor, Raisuyah Bhagwan (031 373 2197) or co-supervisor, Nalini Govender (031 373 2796)

Institutional Research Ethics Administrator on 031 373 2375.

Complaints can be reported *(Bika izikhalazo)* to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

Appendix B3: Letter of Information- Sample 2

Dear Prosthetist, thank you for taking the time to consider participating and welcome to my research study.

Title of the Research Study:

The biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees.

Principal Investigator/s/researcher: Riyona Chetty (BHSc: Medical Orthotics and Prosthetics)

Co-Investigator/s/supervisor/s: Professor Raisuyah Bhagwan (PhD)
Dr. Nalini Govender (PhD)

Invitation to potential participant

Warm greetings! Trust you are well.
I am currently a Master of Health Science student at the Durban University of Technology. I have a Bachelor of Health Science in Medical Prosthetics and Orthotics. Ultimately this study aims at helping prosthetists to develop their skills and improve their knowledge in order to provide optimal care, guidance and prosthesis comfort to patients.
I would like to invite you to participate in this study. Refreshments will be provided!

Brief Introduction and Purpose of the Study:

A plethora of indelible psychological, environmental and physical consequences accompany the adjustment process of adapting to limb loss, which significantly affect the quality of life and prosthetic outcome of an amputee. The intention of this study is to explore the effects of a prosthesis and the contribution of a prosthetist on the quality of life of transtibial amputees.
The prosthetist's relationship with the amputee is long term therefore they are able to disseminate information on services to seek suitable care. Programs need to be implemented to assist prosthetists to be proactive in improving their patient's psychosocial and physical health,
There is a growing consensus to address the gap in South African literature with respect to the pivotal role that a prosthetist can play to help diminish the psychological and physical challenges faced by amputees. The primary intention of this study is to provide beneficial direction for prosthetists to venture towards educating themselves to develop a closer affinity with and provide quality care to their patients, which may subsequently enhance patient adherence to prosthetic use.

Outline of the Procedures:

There will only be one focus group interview for approximately 16 prosthetists. The interview will take place at in August 2020. The interview consists of approximately 10 questions and may take up to 30-60 minutes. The interview will be audio-recorded. There are no follow up appointments/interviews.

In order to participate in this study, you need to meet the inclusion criteria:

- Age: 25-60 years old
- More than 3 years of experience as a certified HPCSA Medical Orthotist and Prosthetist
- Treated more than 20 transtibial amputees

Risks or Discomforts to the Participant:

There are no major risks involved in this study. All information collected from you will be anonymous. Discomfort may be experienced when questions relate to your emotional and physical experiences as an amputee.

Reason/s why the Participant May Be Withdrawn from the Study:

It is important to note that you have every right to withdraw from this study at any stage without providing reason and you will not suffer any adverse consequences. You will continue to receive the appropriate standard of care.

Benefits:

This study will explore the emotional and physical challenges encountered by transtibial amputees which will help you gain a deeper understanding of your patients' physical and psychological needs. You will be able to provide improved quality care and devices for your patients.

Remuneration:

You will not receive any money for participating in this study.

Costs of the Study:

This study does not require you to pay for anything.

Confidentiality:

All participant information is confidential and all results obtained will be used in this study for research purposes only. All information collected from you will be safely locked away and stored for five years. Thereafter, it will be shredded.

Results:

All findings from this research study may be sent to you via email or post if you wish to be informed about it. Once the study has reached completion, you will be invited by the researcher to a presentation for the findings.

Research-related Injury:

There are no anticipated research-related injuries.

Storage of all electronic and hard copies including tape recordings

All participant information is confidential and all results obtained will be used in this study for research purposes only. All information collected from you will be safely locked away and stored for five years. Thereafter, it will be shredded. The researcher is the only individual who will have access to the tape recordings and hardcopy information collected from the participant interviews.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher, Riyona Chetty

My supervisor, *Raisuyah Bhagwan* (031 373 2197) or co-supervisor, *Nalini Govender* (031 373 2796)

Institutional Research Ethics Administrator on 031 373 2375.

Complaints can be reported to the Director: Research and Postgraduate Support *Dr L Linganiso* on 031 373 2577 or researchdirector@dut.ac.za.

Appendix C1: Consent Form- Samples 1 and 2

CONSENT FORM

Full Title of the Study: The biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees

Names of Researcher/s: Riyona Chetty

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Riyona Chetty (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: IREC 119/20,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____	
Full Name of Participant	**Date**	**Time**	**Signature**	**/ Right Thumbprint**

I, Riyona Chetty (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Riyona Chetty	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signatur**

Appendix C2: Consent Form- Sample 1 (isiZulu)

CONSENT
IMVUME

Full Title of the Study: The biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees.

Isihloko Sesifundo Sokucwaninga: Ithonya le-biopsychosocial imiphumela wokufakelwa kanye nezindima amaprosthetist ekuthuthukiseni ikhwalithi yempilo yama-transtibial anokuthula.

Names of Researcher/s (igama lomcwaningi): Riyona Chetty

Statement of Agreement to Participate in the Research Study (Isitatimende Sesivumelwano Sokubamba iqhaza Esifundweni Sokucwaninga):

- I hereby confirm that I have been informed by the researcher, Riyona Chetty (name of researcher), about the nature, conduct, benefits and risks of this study – Research Ethics Clearance Number: IREC 119/20,
- *Ngiyaqinisekisa ukuthi ngazisiwe ngumcwaningi, Riyona Chetty (igama lomcwaningi), ngesimo, isimilo, izinzuzo nezingozi zalolu cwaningo – Research Ethics Clearance Number: IREC 119/20 ,*
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- *Ngithole, ngafunda futhi ngaluqonda ulwazi olubhaliwe olungenhla (Umhlanganyeli Incwadi Yolwazi) mayelana nesifundo.*
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- *Ngiyazi ukuthi imiphumela yocwaningo, kufaka phakathi imininingwane yomuntu mayelana nobulili bami, ubudala, usuku lokuzalwa, ama-initials kanye nokuxilongwa kuzobhekwa ngokungaziwa njengombiko wocwaningo.*
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- *Ngokuya ngezidingo zocwaningo, ngiyavuma ukuthi idatha eqoqwe phakathi nalolu cwaningo ingacutshungulwa ngekhompyutha ngumcwaningi.*
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- *Ngingahle, noma ngasiphi isigaba, ngaphandle kokubandlulula, ngihoxise imvume yami futhi ngingabambi iqhaza ocwaningweni.*
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- *Ngibe nethuba elanele lokubuza imibuzo futhi (ngokuzithandela) ngithi ngikulungele ukubamba iqhaza ocwaningweni.*
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.
- *Ngiyaqonda ukuthi okutholakele okusha okuphawulekayo okwenziwe phakathi nalolu cwaningo okungenzeka kuhlobene nokubamba iqhaza kwami kuzokwethulwa kimi.*

Full Name of Participant	Date	Time	Signature /Right Thumbprint

I, Riyona Chetty (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Riyona Chetty

Full Name of Researcher	Date	Signature
Full Name of Witness (If applicable)	Date	Signature
Full Name of Legal Guardian (If applicable)	Date	Signature

Appendix C3: Consent Form for Home Interview- Sample 1

CONSENT – HOME INTERVIEW

Full Title of the Study: The biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees

Names of Researcher/s: Riyona Chetty

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Riyona Chetty (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: IREC 119/20,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.
- I hereby provide full permission to the researcher to enter and perform the interview on my premises.

Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**	

I, Riyona Chetty (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Riyona Chetty **Full Name of Researcher**	**Date**	**Signature**
Full Name of Witness (If applicable)	**Date**	**Signature**
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix C4: Consent Form for Home Interview- Sample 1 (isiZulu)

CONSENT- HOME INTERVIEW
IMVUME- INGXOXO YEKHAYA

Full Title of the Study: The biopsychosocial effects of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees.

Isihloko Sesifundo Sokucwaninga: Ithonya le-biopsychosocial imiphumela wokufakelwa kanye nezindima amaprosthetist ekuthuthukiseni ikhwalithi yempilo yama-transtibial anokuthula.

Names of Researcher/s (igama lomcwaningi): Riyona Chetty

Statement of Agreement to Participate in the Research Study (Isitatimende Sesivumelwano Sokubamba iqhaza Esifundweni Sokucwaninga):

- I hereby confirm that I have been informed by the researcher, Riyona Chetty (name of researcher), about the nature, conduct, benefits and risks of this study – Research Ethics Clearance Number: IREC 119/20 ,
- *Ngiyaqinisekisa ukuthi ngazisiwe ngumcwaningi, Riyona Chetty (igama lomcwaningi), ngesimo, isimilo, izinzuzo nezingozi zalolu cwaningo – Research Ethics Clearance Number: IREC 119/20 ,*
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- *Ngithole, ngafunda futhi ngaluqonda ulwazi olubhaliwe olungenhla (Umhlanganyeli Incwadi Yolwazi) mayelana nesifundo.*
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- *Ngiyazi ukuthi imiphumela yocwaningo, kufaka phakathi imininingwane yomuntu mayelana nobulili bami, ubudala, usuku lokuzalwa, ama-initials kanye nokuxilongwa kuzobhekwa ngokungaziwa njengombiko wocwaningo.*
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- *Ngokuya ngezidingo zocwaningo, ngiyavuma ukuthi idatha eqoqwe phakathi nalolu cwaningo ingacutshungulwa ngekhompyutha ngumcwaningi.*
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- *Ngingahle, noma ngasiphi isigaba, ngaphandle kokubandlulula, ngihoxise imvume yami futhi ngingabambi iqhaza ocwaningweni.*
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

- *Ngibe nethuba elanele lokubuza imibuzo futhi (ngokuzithandela) ngithi ngikulungele ukubamba iqhaza ocwaningweni.*
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.
- *Ngiyaqonda ukuthi okutholakele okusha okuphawulekayo okwenziwe phakathi nalolu cwaningo okungenzeka kuhlobene nokubamba iqhaza kwami kuzokwethulwa kimi.*

- I hereby provide full permission to the researcher to enter and perform the interview on my premises.
- *Nginikeza imvume ephelele kumcwaningi ukuthi angene futhi enze inhlolokhono ekhaya lami.*

Full Name of Participant	**Date**	**Time**	**Signature /Right Thumbprint**

I, Riyona Chetty (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Riyona Chetty

Full Name of Researcher	**Date**	**Signature**
Full Name of Witness (If applicable)	**Date**	**Signature**
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix D1: Interview Guide- Sample 1

Patient: _____X_____ Age:_____ Gender: M / F

Cause of amputation: _____ Surgery date: __/__/__

Employment status: Pre-operatively: Y/N *(reason)*

Post-operatively: Y/N *(reason)*

Daily activities/hobbies pre-operatively	***Daily activities/hobbies post-operatively***

Challenges faced with prosthesis regarding:	
Home environment/surroundings:	
Public transport/ toilet/areas:	
Social challenges:	
Work environment:	
Walking/standing:	
Other:	

How did you meet your prosthetist? _____

How would you describe your **relationship** with your prosthetist? _____

Are you able to easily communicate any **physical/emotional discomforts** with him/her?

_____

How have they responded/reacted when you previously complained about physical/emotional discomfort/issues?

_____

How would you describe the **quality of your prosthesis** in terms of:

Fit:	
Weight:	
Colour/appearance:	
Noise:	
Hygiene procedures:	
Components:	
Changes you would make:	
Pain: *(phantom limb, edema, during activities)*	

Post-operative influences and prosthetic-use:

How did your family/friends/passers-by **respond** to your amputation and the use of a prosthesis:	
How did their **opinions** affected you:	
Rehabilitation program: What made you choose to use a prosthesis: How did you prepare the residual limb for it:	
Did you avoid any activities or areas after the amputation or with your prosthesis:	
Use of **mobility aids** *(when)* :	*Wheelchair, crutches(1/2), cane, walker*
How often do you use your prosthesis:	
When **do you not** use your prosthesis *(why)* :	
Emotional or mental feelings towards use of **prosthesis**:	
Emotional or mental feelings of **self** *(from amputation to now* :	
Energy levels with and without prosthesis:	
What skills would you like your prosthetist to improve on:	

Spirituality

Can you describe how your personal religion or spirituality helped you cope with this experience? _____

_____

What are some of the religious or spiritual activities you have used and are using to help you cope with the amputation? *(Prayer, reading spiritual literature, listening to spiritual music)* _____

_____

How does your faith community provide support to you?

_____

Appendix D2: Interview Guide- Sample 1 (isiZulu)

Isiguli: _____X_____ Iminyaka:_____ Ububili:_____

Imbangela yokunqunywa: _____ Usuku lokuhlinzwa: __/__/__

Isimo Sokuqashwa: Ngaphambi kokuhlinzwa: Y/C *(isizathu)*

Ngemuva kokuhlinzwa: Y/C *(isizathu)*

***Imisebenzi yansuku zonke/ izinto zokuzilibazisa (*Ngaphambi kokuhlinzwa)**	***Imisebenzi yansuku zonke/ izinto zokuzilibazisa (Ngemuva kokuhlinzwa)***

Izinselelo zomlenze wokufakelwa maqondana:	
Imvelo yasekhaya/ ingadi	
Izithuthi zomphakathi/ izindlu zangasese	
Izinselelo zomphakathi	
Emsebenzini	
Ukuhamba / ukuma	
Ezinye izinselelo	

Uhlangane kanjani amaprosthetist wakho?

_____

Chaza ubuhlobo bakho amaprosthetist wakho? _____

Ungakhuluma naye ngezinkinga zakho ezingokomzwelo nezingokomzimba?

_____

Basabela kanjani lapho phambilini ubukhalaza ngezinkinga zakho zomzimba nezingokomzwelo?

_____

Chaza ikhwalithi yomlenze wakho wokufakelwa maqondana:

Linganisa:	
Isisindo:	
Umbala / ukubukeka:	
Umsindo:	
Izinqubo zenhlanzeko:	
Izingxenye:	
Izinguquko ozozenza:	
Ubuhlungu: *(phantom limb, edema-ukuvuvukala, during activities)*	

Post-operative (ngemuva kokuhlinzwa) influences and prosthetic-use (ukusetshenziswa kwezitho zokufakelwa):

Uphendule kanjani umndeni wakho / abangane / abantu ongabazi ekuhlinzeni kwakho? How did your family/friends/passers-by **respond** to your amputation ukusetshenziswa kwezitho zokufakelwa (and the use of a prosthesis)	
Uthinte kanjani umbono wabo? How did their **opinions** affected you:	
Uhlelo lokuvuselela (**Rehabilitation** program): Yini ekwenze wakhetha umlenze wokufakelwa? What made you choose to use a prosthesis: Uwulungiselela kanjani umlenze osele? How did you prepare the residual limb for it?	
Ngabe uke wagwema noma yimiphi imisebenzi noma izindawo ngemuva kokuhlinzwa? Ngomlenze wakho wokufakelwa? Did you avoid any activities or areas after the amputation or with your prosthesis:	
Isihlalo esinamasondo/ izinduku/ Use of **mobility aids** *(when)*:	*Wheelchair, crutches(1/2), cane, walker*
Uwusebenzisa kangaki umlenze wakho wokufakelwa? How **often** do you use your prosthesis:	
Awusebenzisi nini umlenze wokufakelwa? When **do you not** use your prosthesis *(why)*:	
Imiphumela engokomzwelo nengokwengqondo yomlenze wokufakelwa (umlenze wokufakelwa). Emotional or mental feelings towards use of **prosthesis**:	
Imizwa yakho engokomzwelo ngawe Emotional or mental feelings of **self** *(from amputation to now*:	
Amazinga amandla ngomlenze wokufakelwa nangaphandle kwawo **Energy levels** with and without prosthesis:	

Imaphi amakhono ongathanda ukuthi amaprosthetist wakho awathuthukise? What skills would you like your **prosthetist** to improve on?	

Spirituality (ingokomoya)

Sengathi ungachaza ukuthi izinkolelo zakho noma ingokomoya lakho likusize kanjani ukuba ubhekane nokulahlekelwa umlenze? Can you describe how your personal religion or spirituality helped you cope with this experience?

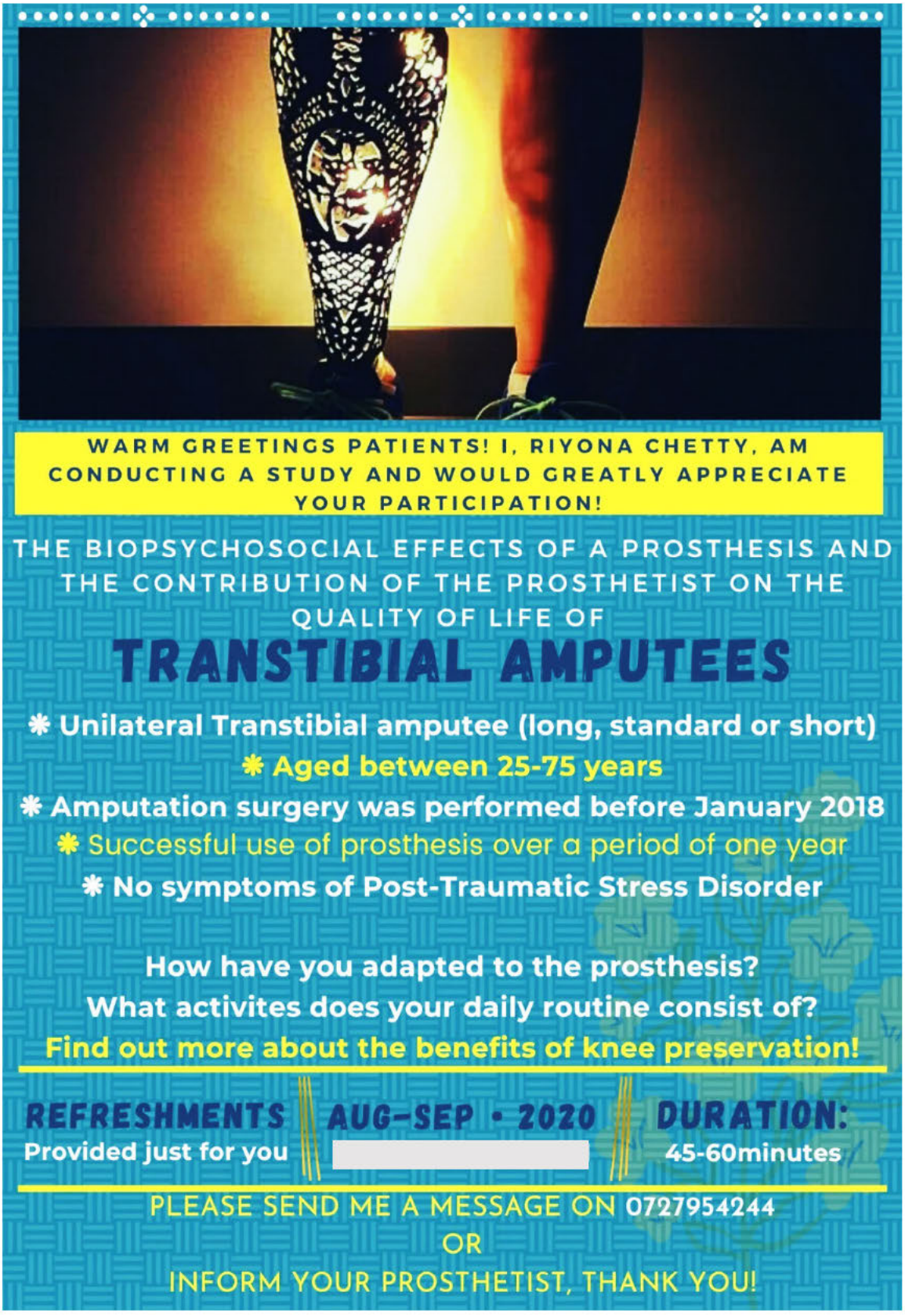
Yimiphi imisebenzi yezenkolo noma yokomoya oyisebenzisile futhi oyisebenzisayo ukukusiza ukubhekana nokulahlekelwa ngumlenze? *(Umkhuleko, ukufunda izincwadi ezingokomoya, ukulalela umculo wokomoya)* What are some of the religious or spiritual activities you have used and are using to help you cope with the amputation? *(Prayer, reading spiritual literature, listening to spiritual music)*

Umphakathi wakho wezenkolo ukuxhasa kanjani? How does your faith community provide support to you?

Appendix D3: Focus Group Interview Guide- Sample 2

1. How many years of prosthetic **experience** do you have?
2. Do you prefer consultations/ manufacturing and fabricating?
3. How would you describe your **relationship** with your patients?
4. Do you think that you are **approachable, intimidating, compassionate**? List.
5. Does the same prosthetist consult, manufacture, produce at first and final fitting and consult at follow-ups? Or are the roles shared?
6. If **programs** are introduced to help prosthetists develop their skills and expertise in order to **improve** the psychosocial well-being of amputees, would you **join**?
7. How would you describe the emotional and physical **well-being of transtibial amputees** that you have worked with over the years?
8. Do you ask the amputees if they have any **emotional issues**, how do you help diminish these issues?
9. Do you ask the amputees on the **quality of the prosthesis** during first and final fitting?
10. How do you **respond or react** if they have discomforts or require adjustments/modifications?
11. How do you contribute to the **psychosocial well-being** of your patient?
12. Have you ever **referred** your patients to another member of the multidisciplinary team? If yes, which medical professional/s and under what circumstances?
13. What are your thoughts on the **development of programs** to help prosthetists understand and improve the psychosocial well-being of their patients?

Appendix E1: Flyer



Appendix E2: Flyer (isiZulu)

Appendix F: Confidentiality Agreement

Title of the Research Study:

The biopsychosocial influence of a prosthesis and the roles of prosthetists in improving the quality of life of transtibial amputees.

Principal Investigator/s/researcher: Riyona Chetty (BHSc: Medical Orthotics and Prosthetics)

Co-Investigator/s/supervisor/s: Professor Raisuyah Bhagwan (PhD) and Dr. Nalini Govender (PhD)

I, _____ *(full name of isiZulu translator*), have been engaged as a research assistant and thereby agree to the following:

- Conducting specific tasks such as transcribing, interpreting, translating, entering data, and/or copying data for this research project.
- Undertake to communicate information fully and faithfully, to the best of my abilities.
- Keep all research information shared with me confidential by not discussing or sharing the information in any form or format (disks, tapes, transcripts) with anyone other than the researcher.

_____	_____	_____
Full Name of Translator	**Date**	**Signature**
_____	_____	_____
Full Name of Researcher	**Date**	**Signature**