Prevalence, risk factors and management of Carpal Tunnel Syndrome (CTS) amidst qualified Somatologists in the Western Cape

Submitted in fulfilment of the requirements
of the Degree of Master of Technology: Somatology
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By

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Dissertation submitted in fulfilment of the requirements for the

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ABSTRACT

Carpal Tunnel Syndrome (CTS) has been recognised for many decades across various industries and researched extensively in these domains. The practice of Somatology has greatly evolved from the beauty therapy industry of past years that simply focussed on aesthetic techniques of beautifying clients. The new techniques and general physical demands of the somatologist profession, however, raise concerns for the health and wellness of the somatologist.

This research was motivated by the lack of data available on musculoskeletal disorders generally, and specifically, the prevalence among somatologists in the Western Cape of carpal tunnel syndrome. The study objectives were to determine the general prevalence of CTS among qualified somatologists in the Western Cape, to identify risk factors that contribute to the development of CTS in somatologists, and to determine current preventative measures and management of CTS among somatologists.

A quantitative research approach was used to evaluate the objectives by collecting the data, using a questionnaire as the research tool. Various beauty schools and businesses within the field were contacted to determine the prevalence rate of qualified somatologists being diagnosed with CTS. A sample group of somatologists who had worked or were working in the Western Cape was recruited to the study and the questionnaire included open-ended questions to elicit more detailed responses beyond the statistical data.

The results of the study indicated CTS is generally prevalent in the beauty therapy industry and has debilitating long-term consequences for the health and career longevity of somatologists, many of whom have to prematurely leave their chosen career paths due to their development of CTS, or to divert income to treatment costs in an industry where earnings are typically low.

The study highlighted several issues that require further and wider study, such as compensation for injury, access to medical aid or employer subsidies,

inherent health risks in the nature of some treatments and the need for more education and possible adjustments to training to prevent or alleviate the onset of CTS. Such future studies should provide insight for companies within the industry to aid their revision of policies and procedures to better facilitate and support somatologists suffering from CTS.

DECLARATION BY THE STUDENT

I, Charné Kistoor, declare that this dissertation has been composed by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. This dissertation is submitted in fulfilment of the requirements for the Master's Degree in Technology: Somatology at the Durban University of Technology, KwaZulu-Natal.

Signature of Student/ Researcher:

Date: 16 March 2020

DEDICATION

This dissertation is dedicated to my loving husband for his continuous support in all aspects of life and especially this dissertation, who never grows tired of encouraging me to do more than I believe I am capable of doing.

To my son, who has brought so much joy and happiness into our lives, may you grow up to aspire only to the best in life for yourself and the people whose lives will be touched by yours.

To my parents for their contribution to my upbringing, rearing me to be the woman I am today, and for their continuous support in the ventures I undertake in life.

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Listen to advice and accept discipline, and at the end you will be counted among the wise – Proverbs 19:20.

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ABBREVIATIONS AND ACRONYMS

AAEM	The American Association of Electro-Diagnostic Medicine
CTS	Carpal Tunnel Syndrome
CT	Computerised Tomography
DML	Normal Distal Latency
DUT	Durban University of Technology
GSS	Global Symptom Score
MRI	Magnetic Resonance Imaging
MSD	Musculoskeletal Disorder
PCS	Pain Catastrophising Scale
SCV	Sensory Conduction Velocity
SF-MPG	Short Form of McGill Pain Questionnaire
SPSS	Statistical Package for Social Science
SWMF	Semmes-Weinstein Monofilaments
WEST	Weinstein Enhanced Sensory Test
WHO	World Health Organisation
WRULD	Work-Related Upper Limb Disorder
cf	Confer (used to refer to other information mentioned in the dissertation)

CHAPTER 1: INTRODUCTION

1.1 Introduction

The beauty therapy industry provides valued aesthetic and health benefits to the general population or those suffering certain medical conditions. According to Williams (2013), many people use their disposable income to improve their appearance and well-being. Because of the value attached to and paid for their services, it is incumbent on somatologists to attempt to ensure that the clients receive the best possible treatment for their conditions or injuries (Henrico, Maritz & Bezuidenhout, 2019:2). This requires a considerable input of technological, physical and psychological resources in providing exceptional services (Makhuza, Henrico K & Nel, 2018:11). For example, Norwegian spa therapists are reported to state that they do not just treat one area of the body, but delve deep into the body or the mind when working with an individual (Anderssen, 2016:35).

The industry provides a range of treatments such as massages, machine therapy, facials, manicures and pedicures. Every client comes with her[1] own requests and requirements and the therapist is expected to meet their needs. As a result, somatologists spend a lot of time perfecting and practicing their craft, often at a physical cost to themselves. One treatment in particular that requires a lot of stamina of a therapist is the massage. Additionally, somatologists use pulsing or vibrating electrical equipment during their treatments (Simmons, 1995:35; Nordmann 2007:193), which may add strain on the hands and wrists. Many end up with musculoskeletal disorders, in particular, carpal tunnel syndrome (CTS) (Niu, 2010:744–753). This often results in time off from work or having to find less strenuous work (Dahlin, Salö, Thomsen, & Stütz, 2010:4–5). It is important to note that these disorders do not occur as a result of incorrect use of machinery but occur because the long sessions of manual labour that cause strain to the elements that help these

[1] Clients, like somatologists themselves, are by no means only female. The assignment of the female or male pronoun in this study in reference to clients or somatologists is merely an arbitrary convenience unless the gender is explicitly indicated otherwise or contextually logical.

somatologists provide the necessary services (that is, fingers, hands and arms) are the norm for the industry (Jacquire, 2017:9; Kaur and Sachdeva 2018:152).

1.2 Research background

In sketching the background of the study, a brief description of the daily activities of the somatologist follows along with a short discussion of the key elements related to the problem of CTS that will be expanded upon in the study.

1.2.1 Conceptualising somatology

Somatology is referred to as the branch of anthropology that deals with human physical characteristics (Dictionary.com, n.d) in a holistic and health-related manner (Venter, 2012). In former years, a somatologist was known as a beauty therapist. However, the profession encompasses more than just aesthetics (Venter, 2012). A somatologist is interested in assisting others to improve their general wellness and aesthetic appearance by providing information pertaining to healthy lifestyle habits and product use in addition to conducting beauty treatments (Vosloo, 2009:4; Richter & Jooste, 2013:1; Ambrosio, 2018:7; Makhuza, Henrico K & Nel, 2018:11).

A somatologist receives skills training in order to address the well-being of the entire body (Vosloo, 2009: 8; Ambrosio, 2018:7). Furthermore, the training provided enables the somatologist to use a variety of electrical equipment and specialised massage techniques to address specific conditions. Specialised treatments such as reflexology, aromatherapy, manual lymph drainage and Swedish massage all form part of the scope of practice (Venter, 2012; Makhuza, Henrico & Nel, 2018:11). The industry offers many opportunities, but requires a somatologist to perform hard work and put in long hours (Venter, 2012; Makhuza, Henrico & Nel, 2018:17). On a day-to-day basis, she may be required to do treatments the entire day and often has to forgo lunch breaks to accommodate clients (Richter & Jooste, 2013:2). Somatology or beauty therapy can therefore not be considered as a passive job but requires

somatologists to perform strenuous labour, emotionally draining and including completing treatments (Makhuza, Henrico K & Nel, 2018:11)

1.2.2 Carpal tunnel syndrome

Carpal tunnel syndrome (CTS) is a medical condition described as a compression of the median nerve at the wrist (Conolly & McKessar, 2009:684; Echchaoui, Mourafiq, Ahmed, Hafidi, Mazouz, Gharib & Abbassi, 2016:39). Pranckevičienė, Dimšaitė, Budėnas and Radžiunas (2016:36) and Seomun, Sung-Bom, Eun-Jung and Wonjung (2016:910) agreed that "CTS is caused when the wrist is pressed or squeezed in local areas or when its nerves are stretched". According to the Compensation Commissioner's Guidelines for Health Practitioners and Employers (South Africa, Department of Labour, 2004:1), CTS is one of the musculoskeletal disorders caused by exposure in the workplace.

Tuller (2017) stated that a massage therapist can end up with CTS if too much pressure is applied through the wrist. Richardson (2019) stated that numbness and tingling or pain are experienced when the nerve becomes constricted. Medication is considered a first-line treatment when diagnosed with CTS.

CTS was identified in 1854, but the condition became widely known by 1950 and is generally classified as a work-related upper limb disorder (WRULD). In the 20th century, it was known among the general population due to its high prevalence rate (Dahlin *et al*., 2010:4). CTS peaks at the age of 46–60 with a prevalence rate of 50 per 1 000 individuals (Sevy & Varacallo, 2019), affects 3–4% of the general population (Zimmerman, Dahlin, Thomen, Andersson, Björkman & Dahlin, 2017:165) and is more common among women than men (Özdemir, Demir, Özel & Ulvi, 2014:278; Rakumakoe, 2019). In a large Dutch survey, the prevalence rate was 8% for women and 0.6% in men (Palmer, 2011:3). The Compensation Commissioner's Guidelines for Health Practitioners and Employers confirms that there are no available statistics for South Africa regarding the impact of WRULDs but on an international level, WRULDs have a high impact estimated to affect millions of employees

annually (South Africa, Department of Labour, 2004:9). This knowledge gap in the industry remains for further studies to be conducted.

CTS is not only caused by pressure at the wrist level and pregnancy (Aboong, 2015). Fractures of the wrists, dislocation of the carpal bones, ganglia, rheumatoid arthritis, amyloidosis, hypothyroidism, hyperparathyroidism and diabetes have all been described as predisposing factors for CTS (Dahlin *et al*., 2010:4). Repetitive hand movements in the same position are also considered a possible cause of CTS development (Rakumakoe, 2019).

This condition causes a variety of symptoms ranging from pain, numbness, tingling and burning sensations in the hand (Özdemir *et al.,* 2014:278), as well as weaknesses and difficulties in grasping small objects (Pranckevičienė *et al.* 2016:36). Dahlin *et al.* (2010), Özdemir *et al.* (2014) and Pranckevičienė *et al.* (2016) agreed that the abovementioned symptoms worsen during the course of the night. Night time wakening may occur as a result of various sleeping positions such as, sleeping on your arm or hand, which places pressure on a nerve causing the symptoms to worsen during the night (Santos-Longhurst, 2019). In an article written by Rubert (2014), a nail technician (who was diagnosed with CTS) explained how she would wake up with stiff hands after sleeping with her hands curled up under her pillow.

A CTS diagnosis depends on a collection of the symptoms, factors such as sleep, repetitive movement of the wrist, shaking the hands or changes in hand posture as well as neurological findings (Kuo, Lee, Liao, Chen, Hsu & Yeh, 2016:1).

The treatment for CTS may typically be non-surgical (nonsteroidal anti-inflammatory drugs, steroids, splinting or exercise) or surgical treatments such as open release or endoscopic release (Yunoki, Kanda, Suzuki, Uneda, Hirashita & Yoshino, 2017). However, the choice of treatment depends on the severity of the symptoms (Yunoki *et al.* 2017:177–178). Furthermore, the Compensation Commissioner's Guidelines for Health Practitioners and Employers includes reasonable job accommodation and psychological

evaluation as part of the treatment modalities to manage CTS (South Africa, Department of Labour, 2004:9).

1.3 Rationale for the study

Palmer (2011:6) states that in many countries, industrial diseases are compensable. In Britain, CTS is potentially compensable when using vibratory tools and those that cause repeated palmar flexion and dorsiflexion of the wrist, but only for those sufferers that are willing, knowledgeable, insured and have lodged a claim. In South Africa, as stated in the Compensation Commissioner's Guidelines for Health Practitioners and Employers, compensation for WRULDs caused by exposure to risk factors (rapid or repetitive motion, forceful exertion, excessive mechanical force concentration, awkward or non-neutral postures and vibrations) is covered in Circular Instruction 180 (South Africa, Department of Labour, 2004). Furthermore, the guideline indicates that documentation (employer's report or affidavit, notice of an occupational disease and claim for compensation, exposure history, first medical report and any other relevant reports) should be submitted to the Compensation Commissioner or the individually liable employer, or the mutual association concerned when a claim is to be submitted. The Compensation Commissioner will cover the reasonable costs for medical expenses, sick leave and compensation (South Africa, Department of Labour, 2004:10) once the case has been accepted.

CTS is predominant in certain occupations that involve repetitive manual labour (Jagga, Lehri & Verma, 2011; Newington, Harris & Walker-Bone, 2015; Sevy & Varacallo, 2019). Since a somatologist's scope of practice involves the execution of treatments which involves regular manual labour using primarily the hands, many somatologists may begin developing MSD (of which CTS from part of) which intensifies later during their employment in the industry (Jacquire, 2017). Richter and Jooste (2013:1–9) argued that the long, tedious working hours coupled with high labour-intensive treatments contribute negatively to the health of somatologists. This, in turn, results in decreased work productivity due to somatologists requiring work absences for surgery

and rehabilitation which have adverse effects on commission-based remuneration. These inherently poor working conditions may explain the poor retention rate of somatologists that currently exists within the industry in South Africa.

1.4 The purpose of the study

This study aims to establish the prevalence of CTS, risk factors and management of CTS among qualified somatologists in the Western Cape. Furthermore, the study seeks to illuminate aspects of current practice, including whether Western Cape somatologists diagnosed with CTS are compensated for injury or loss of income and whether they are allowed to continue working within the field after the diagnosis of CTS. Lastly, this study explores the issue of awareness of CTS among somatologists and business owners currently in the industry and prospective students who are considering a career as a somatologists. The latter will be explored by discussing the long-term consequences or implications and the throughput rates of somatologists diagnosed with CTS, by means of the literature review, data that has been collected and conclusions drawn from it.

1.5 Research objectives

The study has the following specific objectives:

- To determine the general prevalence of CTS among qualified somatologists in the Western Cape.
- To identify risk factors that contribute to CTS developing in somatologists.
- To determine current preventative measures for and management of CTS among somatologists.

1.6 Research methodology

This study includes a quantitative research approach. Quantitative research searches for facts (Barnham, 2015:837). Quantitative methods will assist in analysing data that is structured and can be presented in numbers (Goertzen,

2017:12). Biographical questions, the number of persons affected by CTS and the areas of the hands, fingers and wrists may accurately be measured, which allows for statistical analysis.

1.7 Structure of the dissertation

Chapter 1 introduces the nature of the study, the purpose thereof and the research objectives. CTS and somatology are introduced and the connections that exist between the two concepts are discussed.

Chapter 2 reviews the literature and discusses theory-based research in describing the practice of somatology, the nature of the workplace, the prevalence and effects of CTS and the responses and roles of the employer and employee in the work environment.

An adequate and in-depth discussion of the study design and methodology utilised provides the core of Chapter 3. The study involved a quantitative research approach and the chapter includes a discussion of the research criteria.

In Chapter 4, the findings from the quantitative study as well as the data analysis are presented.

Chapter 5 consists of an in-depth discussion of the findings.

The conclusions of the study and recommendations for possible future research are presented in Chapter 6.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In alignment with the objectives of the study, the literature review provides a comprehensive overview of the beauty therapist's career and industry and the link in the development of carpal tunnel syndrome, as well as how the work environment is affected by CTS.

"Somatology is a multi-disciplined profession where somatologists treat a variety of skin and body conditions in a holistic manner" (Cape Peninsula University of Technology, n.d). The approach of somatology is immersed in overall health, well-being and holistic science (Isa Carstens Academy, 2020). Merriam-Webster.com (2020) defined a therapist as an individual who specialises in therapeutic medical treatment of impairment, injury, disease or disorder. For the purpose of this study, the word somatology will be used interchangeably with therapist/s. A beauty therapist is defined as "a person whose job is to carry out treatments to improve a person's appearance, such as facials, manicures, removal of unwanted hair, etc." (Dictionary.com, n.d; Rammanhor, 2014:3). Beauty, health and wellness are terms often used in today's society, with each user having his own motive or interpretation thereof. According to the Oxford Advanced American Dictionary, beauty is defined as "the quality of being pleasing to the senses or to the mind" (n.d). The World Health Organisation (WHO) defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (Stoewen, 2015:983). Wellness is considered "an active process through which people become aware of, and make choices". According to the National Wellness Institute (Stoewen, 2015:983), health refers to physical, mental, and social well-being while wellness aims to enhance well-being.

In earlier years, a beautician performed waxes, manicures and pedicures and make-up applications, providing these treatments to the general public. In modern society, the term 'somatologist' has replaced beautician and the role encompasses much more than beauty treatments (Potchefstroom Academy,

2015). In South Africa, a somatologist is an individual involved in the beauty and wellness industry (Vosloo, 2009:1). “Somatology addresses the client’s overall health, well-being and appearance in a holistic manner” (Isa Carstens Academy, 2019). In scope, ‘cosmetology’, defined as the work of improving the appearance of a customer’s face, hair or skin using make-up and beauty treatments” (Cambridge English Dictionary, n.d), conforms more to the former understanding of ‘beauty therapy’.

2.2 Somatology

Somatology is referred to as the branch of anthropology that deals with human physical characteristics (Dictionary.com, n.d). The term was established by universities of technology to clarify the somatologist’s holistic scope of practice. Somatology is a multi-disciplined career with similarities to cosmetology, aesthetics and the beauty professions (Jonker, 2016:20). Furthermore, the somatologist is trained to use a variety of electrical equipment and specialised massage techniques to address different conditions (Rammanhor, 2014). Sliming treatments, skin preparations prior to surgery, scar revision post-surgery, hydrotherapies, pedicures, waxes and make-up all fall within the scope of practice of a somatologist (Jonker, 2016:21).

Gehret (2010:13) discussed the traits of a successful massage therapist. In summary, these include professionalism and enthusiasm in the way in which clients are handled while treatments are performed, strong communication skills, persistence and personal growth allowing for continuous learning, and striving for balance in her personal and professional life. These attributes or traits are just as imperative to a somatologist, as discussed by Rammanhor (2014:22). A somatologist with these traits will be able to successfully perform the treatments offered within the health and wellness industry, some of which are described below.

2.2.1 Treatments offered in the health and wellness industry

A somatologist's scope of work encompasses so much more than beautifying the nails, applying make-up and performing waxing treatments and training includes a wide spectrum of programmes or modules to treat the body in a holistic manner as opposed to a separate entity.

2.2.1.1 Facial treatments

A facial is a multi-step skin treatment that cleanses, exfoliates and nourishes the skin (Brown, 2018). It is one of the most common treatments performed by a therapist (Rammanhor, 2014:38). Due to various skin types, such as normal, oily, dry or combination (Rammanhor, 2014:41), the procedures and products used may differ (Covelli, 2019). "Facial regimes include a repertoire of cleansing, steaming exfoliating, extraction, moisturising, facial masks, peels and a massage" (Rammanhor, 2014:39).

2.2.1.2 Make-up

Make-up has been used for many different reasons, including ceremonial rituals (Kaddour, 2016). Make-up continues to evolve as cosmetic technology grows (Bennett, 2016), requiring concentration and skill (Jacquire, 2017:12). The overall objective is to minimise less attractive features using the best cosmetic formulations while keeping in mind the structure of the face, colour and size of the eyes, skin, hair, age and the client's wishes (Rammanhor, 2014:37).

2.2.1.3 Manicures and pedicures

Manicures existed 5 000 years ago in India where henna was applied to the nails (Maines, 2019). The word manicure stems from the Latin word "manus" meaning hand (Rammanhor, 2014:36). Rammanhor (2014:36) further elaborated that our hands are important and that well-groomed nails allow us to feel better and boosts our confidence. Manicures and pedicures are performed in a similar manner which involves: "nail filing, shaping, buffing, clipping, polishing, cuticle care, massage and the application of products to

exfoliate, moisturise, hydrate and nourish the skin and nail" (Jacquire, 2017:110.

Maines (2019) explained that the word pedicure stems from the Latin word "pes" which means foot and "curare" meaning to care for or attend to which is performed to rejuvenate tired and worn feet. It also prevents nail diseases and disorders and improves posture (Maines, 2019). The basic procedure includes removing any nail polish, shaping of the nails, the application of cuticle cream to soften the skin prior to pushing back the cuticles, and soaking of the hands or feet. A massage might accompany the treatment, ending with a nail paint (Adkins, 2018). They are generally performed in a seated position with little or no back support, increasing the risk of slouching and incorrect sitting positions that increase the risk of developing musculoskeletal disorders (MSD) (Jacquire, 2017:11).

2.2.1.4 Massage treatments

Massage is physiologically and psychologically beneficial and has been practised for thousands of years. Heat is created by the manipulation of soft tissue, stimulating the vascular and nervous system (Nordmann, 2007:192). Massage includes three basic movements: (i) Effleurage, which is light stroking, flowing movements; (ii) Petrissage, consisting of compression movements such as kneading, knuckling, lifting, rolling and pinching; and (iii) Tapotement, described as percussion movements such as tapping, hacking and whipping (Simmons, 1995:33; Rammanhor, 2014:26). A sound knowledge of the anatomy and physiology of the body is important. Table 2.1 was compiled with information adapted from Gehret (2010) and summarises the various forms of massage that exist within the industry.

Table 2.1: Forms of massages

Massage Type	How the massage works
Swedish massage	This is the most common form of massage including a variety of movements such as effleurage, petrissage, friction and tapotement (Brown, 2019) from the therapist's hands. This massage requires

Massage Type	How the massage works
	repetitive movements of the hand and wrist (Jacquire, 2017:9).
Deep tissue massage	Works very slowly into the fascia, muscle and connective tissue to break up adhesions. This massage type is used to treat musculoskeletal issues. It aids in breaking up scar tissue that forms following an injury and reduces muscle tension (Santos-Longhurst, 2018).
Sports massage	For recreational and professional athletes and active individuals. It involves stretching and resistance work to prevent injury and improve performance. The massage has holistic benefits, is relaxing and aims to improve physical performance (Jacquire, 2017:10).
Prenatal/ Pregnancy/ Perinatal massage	Tailored for pregnant clients, massage therapy can help a woman to approach her due date with less anxiety, as well as less physical discomfort (Osborne, 2018). A woman's body changes during pregnancy and adjustments are made before and during a massage. It aims to reduce discomfort, anxiety and depression to result in shorter labours (Salamon, 2018). Osborne (2018) stated that pregnancy massage can be beneficial in relieving oedema, postural changes and pain in the lower back, pelvis or hips.
Infant massage	Delicate massage to assist with the development of newborns and infants. Infant massage is a long-established mothering tradition, improving mother-infant interaction for mothers with post-natal depression (Cook, 2015). Tiret (2016) agreed that parents who massage their babies feel closer to their babies. The massage is not only beneficial for caregivers, but also assists with weight gain and overall growth of infants.
Shiatsu	An Asian type of massage that utilises acupressure and reflex points along the body's meridians. The practitioner uses her thumbs, forearms and elbows in applying rhythmic, firm, focussed pressure across the body.
Aromatherapy	Healing massage incorporating scented plant oils or blends. It brings about healing, relaxation and physical and psychological benefits such as stress relief and a reduction in anxiety (Jacquire, 2017:9). The term was initially used by Gattefossé (a French chemist). The oils or blends can be absorbed via the skin or the olfactory system (Chen, Scholz & Thomas, 2016).

Massage Type	How the massage works
Ayurvedic massage	Traditional Indian form of medicine that incorporates massage, herbs and dietary regimens as well as yoga. It addresses the vital parts where bones, muscle, joints and arteries come together.
Reflexology	Application of firm to deep pressure to the reflex points of the feet, hands or ears. Each point of pressure applied to the hands and feet is linked with different parts of the body. It improves blood and energy circulation, gives a sense of relaxation and maintaining homeostasis (Embong, Soh, Ming & Wong, 2015).
Rolfing/ Orthopaedic/ Medical/ Structured massage	Deep-style body work that delves into the tissues and realigns the body at a structural level. Often accompanied by physical therapy, rehabilitation, sports medicine or chiropractic treatments.
Hot stone massage	The use of warm, smooth stones in massage. Hot stone therapy is a native Indian medicine practice involving hot lava stones (Parot-Monpetit, Mironnet & Monpetit, 2015).
Esalen	Nurturing style of massage using flowing, continuous strokes, emphasising a constant connection to the client. Esalen massage is known for its healing and nurturing properties, by focussing on energy exchange and psychological well-being (Cutler, 2019).
Thai massage	Performed on a floor mat, and aligning the body's energy by applying firm pressure to specific meridians and points while the therapist moves the client in a variety of postures and stretches.
Cranio-sacral massage	Manipulating the cranio-sacral system. Gently working with the spine, neck and cranial bones. Reduces stress, neck and back pain, headaches and chronic pain conditions such as fibromyalgia.
Lomi-Lomi	Hawaiian massage characterised by rhythmic sweeping strokes. Incorporates the use of hands, fingers, forearms, knuckles, elbows and occasionally the feet.
Lymphatic massage	A gentle process that enhances the natural circulation of lymph through the body, assisting in detoxification and strengthening of the immune system.
Myofascial release	Using hands or rolling instruments, compressing and stretching to release adhesion.
Tui Na	Chinese-style massage; vigorous and energising, characterised by pulling, pinching and kneading.

Massage Type	How the massage works
Watsu	Shiatsu-style massage performed under water. Pressure is applied to pressure points and meridians.
Energy work	Reiki, polarity and healing touch are examples. Energy flows through the practitioners' hands to the client's body when touched.
Animal massage	Also known as equine massage, in which techniques are adapted to be performed on animals.

Source: Gehret (2010).

Tuller (2017) stated that one has to use gravity and body weight rather than the wrist and fingers when providing a massage. There is a likelihood of developing CTS if too much pressure is applied through the wrist.

2.2.1.5 Electrical therapy

Electrical therapy involves repetitive movements of the upper limb as well as concurrent support of electrical equipment by the therapist. Such therapists are at a higher risk of developing work-related injuries (Jacquire, 2017:11). Table 2.2 outlines the various electrical equipment used in daily treatments by a therapist.

Table 2.2: Electrical equipment used by a somatologist or therapist

Machine Type	Explanation
Vibro-massagers	Manual massage may be combined with electrical appliances to enhance the effect of the massage, such as: Mechanical Gyratory Massage – a hand-held electrical massage treatment making use of a vibratory head to which different applicator heads are attached. Also known as the 'G5' (Simmons, 1995:35). Audiosonic – a hand-held electrical vibratory machine which compressors and decompresses the soft tissue (Nordmann, 2007:193).
Vacuum suction	Vacuum suction simulates the manual movement known as cupping. The machine

Machine Type	Explanation
	consists off a vacuum pump connected via a flexible tube. The effect of the machine causes the underlying tissues to be lifted and stretched, causing dilation, increased secretion from sweat and sebaceous glands and the breaking up of fatty cells (Simmons, 1995:44).
Galvanic therapy	The galvanic treatment makes use of a direct current of electricity that passes through the body. Two main effects result, namely: desincrustation: the removal of excess sebum from the skin; and skin peeling: removal of layers from an excessively thick stratum corneum (Simmons, 1995:59).
Faradic therapy	The faradic therapy is named after Michael Faraday (Simmons, 1995:77). The machine causes muscle stimulation and is used to improve skin and muscle tone (Nordmann, 2007:231) resulting in a tightening and toning effect (Hargreaves-Norris, 2014).
Interferential therapy	Interferential therapy makes use of a medium frequency alternating current (Kim, Yang, Kim, Lee, Kim, Lee, Park, Lee, Noh, Shin & Kim, 2018:437). This may be an alternative to muscle stimulation, causing almost no sensation in the skin (Simmons, 1995:92).
High frequency	Two treatment methods exist: (i) direct method, where the therapist holds the electrode in contact with the client's treatment area and glides it over the skin; (ii) indirect method, where the client holds the saturator electrode while the therapist massages over the skin (Simmons, 1995:107).
Hair removal techniques	Depilation is the process of removing hair from the surface (O'Lenick, 2009). Depilation is only temporary (Simmons, 1995:111), comprising of threading, shaving and the use of depilatory creams (Jacquire, 2017:12). Epilation is the removal of the entire hair focussing on removing or destroying the hair follicle. Comprises of waxing, sugaring, epilation devices, lasers, threading or intense pulsed light or electrical means (O'Lenick, 2009). Galvanic epilation makes use of the direct current of electricity in an attempt to destroy the growing part of the hair follicle. Shortwave epilation makes use of a high frequency alternating current to destroy the growing part of the hair follicle through a heating effect (Simmons, 1995:112).

The next part of this chapter delves into CTS – what it entails, its risks, prevalence, as well as the treatment and management of CTS.

2.3 Carpal tunnel syndrome

The carpal tunnel is defined by the pisiform and hook of the hamate medially and the tuberosities of the scaphoid and trapezium radially (Newington, Harris & Walker-Bone, 2015). Covering these four bony prominences is thick connective tissue (the flexor retinaculum) which creates a tunnel through which the long flexor tendons (flexor digitorum profundus, flexor digitorum superficialis and flexor pollicis longus) run, maintaining them in place during wrist flexion. The carpal tunnel protects the median nerve and flexor tendons that bend the fingers and the thumb. As illustrated in Figure 2.1, which shows the carpal tunnel in transverse section, the carpal tunnel is tightly packed and any condition that might increase the volume of the structures leads to compression of the median nerve (Ghasemi-Rad, Nosair, Vegh, Mohammadi, Akkad, Lesha, Mohammadi, Sayed, Davarian, Maleki-Miyandoab & Hasan, 2014:285).

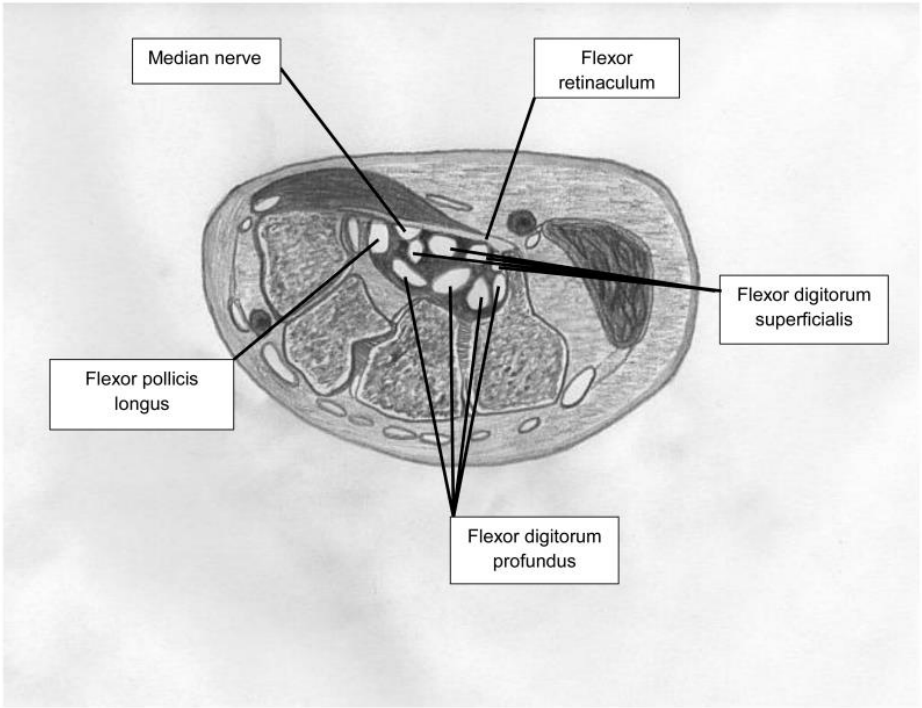


Figure 2.1: Anatomical diagram of the carpal tunnel in transverse section

Source: Newington, Harris and Walker-Bone (2015).

CTS is characterised by a traction of the median nerve of the wrist (Conolly & McKessar 2009:684; Chammas, Boretto, Burmann, Ramos, Dos Santos Neto & Silva, 2014:430). Kozak, Schedlbauer, Wirth, Euler, Westermann and Nienhaus (2015:231) described CTS as a pathophysiological peripheral mononeuropathy. It was first recognised in 1854 by Sir James Paget (Bekkelund *et al.* 2001, cited in Dahlin *et al.* 2010:4). Numbness and tingling are symptoms of CTS (Rouq, Ahmed, Meo, Al-Drees & Meo, 2014:30; Healthline, 2017; McCallum, Damms, Sarrigiannis & Zis, 2019). McCallum *et al.* (2019) described symptoms of pain, muscle cramps and a burning sensation. Symptoms are common during the night, with patients being woken by tingling and pain symptoms. According to LeBlanc & Cestia (2011), the pain may radiate into the forearm and into the arm and shoulder. Loss of grip strength may be accompanied by swelling (Rakumakoe, 2017).

CTS usually starts with numbness in the middle and index finger, with worsening of symptoms during the night or during repetitive or static moments, and with nocturnal acroparaesthesia being the most frequent complaint (Sadeli, Kurniani & Gunadharma, 2009:121). Dahlin *et al.* (2010:4) stated that the cause of CTS is often unknown or spontaneous, but certain conditions may predispose individuals to CTS. Conditions such as fractures of the wrist, dislocation of the carpal bones, ganglia, amyloidosis, hyperparathyroidism, haemodialysis, rheumatoid arthritis, hypothyroidism, diabetes mellitus, pregnancy and obesity may be associated with CTS (Sadeli *et al.* 2009:121; Uzkeser, Karatay & Melikoğlu, 2011:430). According to Rakumakoe (2019) individuals who present with smaller carpal bones are more prone to develop CTS. Alterations with the balance of body fluids, such as fluid retention, may cause additional pressure within the carpal tunnel leading to CTS. Ghasemi-Rad *et al*. (2014:290) highlight that Colles' fracture, acromegaly, amyloidosis, adiposity, myxoedema, chronic polyarthritis or the use of corticosteroids and oestrogens have all been connected with CTS.

2.3.1 Prevalence and risk factors of carpal tunnel syndrome

CTS is more common in woman than men (Dahlin *et al*. 2010:4; Uzkeser, Karatay & Melikoğlu 2011:430; Özdemir, Demir, Özel & Ulvi, 2014:278; Shiri, 2016:344), predominantly affecting individuals over 40 years of age (Dahlin et al. 2010:40). Newington, Harris and Walker-Bone (2015) indicated that the gender differences may be due to hormonal factors as pregnant and breastfeeding women have increased risk of CTS as do women in their first menopausal year, taking the oral contraceptive pill or taking hormone replacement therapy. Uzkeser, Karatay and Melikoğlu (2011: 430) noted that an increased BMI and wrist ratio represent important risk factors for developing CTS. "Body mass index and obesity are strongly associated with CTS, with an increase in every 1 unit in body mass increasing the risk of the condition by 8%" (Newington, Harris & Walker-Bone, 2015). Other possible risk factors for CTS include narrowing of the carpal tunnel canal through trauma or inflammation due to wrist fractures and inflammatory rheumatic disorders. MSDs, which include CTS, cause major economic losses (Niu, 2010:744–753). Yazdani and Wells (2018) explained that the need for the development of a prevention programme for MSD should not be taken lightly, as the barriers and challenges in the development of these programmes need to be assessed. Dahlin *et al.* (2010) noted the impact on the health economy of society including cases where patients are unable to return to work after their treatment for CTS relief (Dahlin *et al*. 2010:4–5).

Obesity, rheumatoid arthritis and hypothyroidism have been identified as possible risk factors for CTS (Shiri, 2016:339). According to Shiri (2016:344), age and gender are also risk factors for CTS. Pranckevičienė *et al. (*2016:37) indicated that a high level of pain catastrophising should be considered as a risk factor for acute and long-term pain-related outcomes. Pain catastrophising and pain behaviour predict days lost from work. Hormone-related and/ or hormone supplementation (Riccò, Cattani & Signorelli, 2016) and cigarette smoking (Guan, Lao, Gu, Zhao, Rui & Gao, 2018) have also been implicated as potential risk factors.

The risk factors of a working therapist developing an MSD include repetitive movement in non-neutral positions, varied amounts of force and strength of the upper extremity, poor ergonomic setting, inadequate working environments, performing excessive number of treatments, insufficient rest between treatments and standing for long periods (Jacquire, 2017:9; Kaur & Sachdeva, 2018:152).

2.3.2 Causes of carpal tunnel syndrome

CTS occurs when the median nerve becomes compressed (Pranckevičienė *et al.* 2016:36). Rostkowski and Singh (2015:253–265) stated that CTS is an example of a cumulative trauma disorder or repetitive stress injury. Tsigonia, Tanagra, Linos, Merekoulias and Alexopulos (2009:2968) elaborated on a few factors, such as exposure to manual labour, usual or restricted posture, repetitive/ static work and vibrations that increase the prospect of developing an MSD. Wooten (2019:217) stated that CTS is a common MSD resulting from repetitive movement. This is supported by Shannon and Rizzolo (2012:22) who stated that people in occupations involving forceful movements of the hand and wrist or that use hand-held, powered vibratory tools are at a higher risk of developing CTS. The literature thus exhaustively confirms that the treatments typically offered by a somatologist or therapist could very well be linked with the development of CTS as they make use of vibratory tools as well as the repetitive and forceful movements of the hands during treatments.

In a systematic review conducted by Shiri (2016:344) it is noted that rheumatoid arthritis or osteoarthritis causes a higher prevalence rate in patients with CTS. CTS affects 5% of the general population (Pranckevičienė *et al.,* 2016:36). Özdemir *et al.* (2014: 278) noted a prevalence rate of 8% of the general population. CTS is rarely known as a hereditary condition nor is it common in children, with fewer than 1% of patients having CTS before the age of 20 (Senel, Ceylaner, Yuksel, Erkek & Karacan, 2010:453).

In a study conducted by Petit, Bodin, Rigouin, Descatha, Brunet, Goldberg and Roquelaure (2015:1–10), an association is highlighted between CTS and

occupational factors such as forceful manual exertion, bending or twisting of the wrist and a combination of these factors. These occupational disorders could be the result of over-exertion or repetitive movements.

Due to insufficient insulin or an improper response to insulin, diabetes could result in an increase in the blood glucose levels which leads to nerve damage by injuring the walls of the capillaries that nourish them (Huizen, 2019). This makes diabetes mellitus a possible cause of nerve compressions which could lead to CTS (Huizen, 2019).

CTS may be caused as a result of fibrolipomatous hamartoma, a rare, benign process that results in a fusiform enlargement of the nerve (Hankins, 2012:124). This is due to an increase in the mature fatty and fibrous tissue within the perineural interstitium (Hankins, 2012:124). Uzkeser, Karatay and Melikoğlu (2011:427) agreed that rheumatoid arthritis, haemodialysis and thyroid disease may all be contributing factors in developing CTS.

2.3.3 Classification of carpal tunnel syndrome

The typical presentation of CTS involves pain and/ or dysaesthesia of the fingers which can diffuse throughout the hand and can radiate proximal to the wrist (Newington, Harris & Walker-Bone, 2015). The symptoms and signs of CTS manifest in three stages (Ghasemi-Rad *et al*. 2014:290; Yunoki *et al*. 2017). The first stage recognises symptoms of night-time wakening due to the pain, numbness, tingling, stiff and swollen hands. Shaking the hand brings relief from the symptoms. The second stage involves night-time symptoms experienced during the day, with decreased grip strength and difficulty holding small objects becoming apparent. The third and final stage occurs when there is atrophy of the thenar eminence muscles and diminished grip strength. When this stage is reached, sensory symptoms may no longer be felt and are replaced with increased motor symptoms.

2.3.4 Diagnosis of carpal tunnel syndrome

Depending on the severity of the condition, various diagnostic tools or methods exist in order to successfully diagnose CTS. Birth control pills, menopause, vitamin deficiencies, insufficient water consumption, exposure to cold weather conditions, incorrect sleep patterns, smoking, knitting, playing musical instruments and recreational activities have been identified as possible complications for the successful diagnosis of CTS (Miller, 2000).

According to Ghasemi-Rad *et al*. (2014:290), a classical or probable diagram exists to indicate the presence of CTS (sensitivity = 64%; specificity = 73%). Furthermore, the use of nerve conduction studies increases the accuracy and sensitivity of diagnosis, with a sensitivity of 80%–92% and a specificity of 80%–99% (Ghasemi-Rad *et al*. 2014:291).

The following test are used as diagnostic tools and are each discussed below: Pain Catastrophising Scale, McGill Pain Questionnaire, Global Symptom Score, Tinel's percussion test, Phalen's compression test, the flick sign, wrist flexion proactive test, electromyography, electrodiagnostic investigation, magnetic resonance imaging, ultrasonography, symptom severity scale, Durkan's Test, the hand elevation test, the tourniquet test, quantitative sensory testing and computed tomography and conventional X-ray.

i. Pain Catastrophising Scale (PCS)

"The Pain Catastrophising Scale (PCS) is widely used to measure trait pain catastrophising" (Darnell, Sturgeon, Cook, Taub, Roy, Burns, Suvllivan & Mackey, 2017). In a study conducted by Pranckevičienė *et al*. (2016:35), the conditions were assessed using PCS as well as the short form of the McGill Pain Questionnaire (SF-MPG). PCS consists of thirteen items rated in a 5-point scale, 0 being 'not at all' to 4 being 'all the time' as well as three sub-scales; rumination, magnification and helplessness (Pranckevičienė *et al*. 2016:39; Darnell *et al*. 2017). The scale instructs respondents to consider how they react to painful situations.

ii. McGill Pain Questionnaire (SF-MPG)

The SF-MPG questionnaire contains 15 descriptions of pain that are rated on a four-item intensity scale ranging from 0 indicating ‘none’, to 3 indicating ‘severe’ (Pranckevičienė *et al*. 2016:39). SF-MPG remains one of the most commonly used pain assessment questionnaires. This is understandable considering the convenience in administration, easy scoring by hand and it being inexpensive (Fernandez, 2001). It includes four main measures, namely pain location, pain intensity, pain quality and pain patterns (Nqamkham, Vincent, Finnegan, Holden, Jim-Wang & Wilkie, 2012).

iii. Global Symptom Score (GSS)

GSS assesses the intensity of pain, paraesthesia, numbness, weakness and night-time awakening due to pain. The scores range from 0 being ‘no symptoms’ to 10 indicating the most symptoms (Sadeli *et al*. 2009:122). A score of 50 and above is rated as severe symptoms of CTS (Blumenthal, Herskovitz & Verghese, 2006).

iv. Tinel’s percussion test

“Tinel’s sign is performed by percussion over the median nerve at the wrist to elicit a pins and needles sensation in the distribution of the median nerve from the wrist to the hand” (Shannon & Rizzolo, 2012:23). The sensitivity of this test ranges between 67–83% and a specificity of 40–98% (Yunoki *et al.* 2017). When pain is felt or an increase in pressure in the median nerve distribution develops in one minute, a positive result is reached and CTS may be suspected (Ghasemi-Rad *et al*. 2014:291).

v. Phalen’s compression test

Phalen’s manoeuvre is performed by resting both elbows on a table or other flat surface and placing the wrist in a volar flexion for at least one minute (Ghasemi-Rad *et al.* 2014:290; Human, 2016:16). “The production of wrist paraesthesia indicates a positive result” (Shannon & Rizzolo, 2012:24). The sensitivity of this test is between 48–73% with

a specificity of 30-94% (Yunoki *et al.* 2017). When tingling, prickling, chilling, burning or numbness on the skin is felt or an increase in pressure in the median nerve distribution develops in one minute, a positive result is reached and CTS may be suspected (Ghasemi-Rad *et al.* 2014:291).

vi. The flick sign

The flick sign is an observational diagnosis. Individuals are asked to demonstrate what they do when they experience symptoms during the night. Patients who demonstrate a "shaking out" movement by flicking the wrist (Yunoki *et al.* 2017) are indicative of CTS with a sensitivity of 93% and specificity of 96%. When pain is felt or an increased pressure in the median nerve distribution develops in one minute, a positive result is reached and CTS may be suspected (Ghasemi-Rad *et al.* 2014:290).

vii. Wrist flexion proactive test

The wrist flexion proactive test is performed by flexing the wrist and compressing the median nerve simultaneously. A positive result is indicated by the reproduction of patient's symptoms within 20 seconds (Shannon & Rizzolo, 2012:24). Wrist flexion may be measured by a goniometer. This will indicate how many degrees' flexion of the wrist is able to occur. A normal wrist flexion is between 75 and 90 degrees. Wrist flexion can be improved by constant stretching and exercise such as wrist flexion with support or no support, wrist bending with a clenched fist, flexor stretch and side to side wrist bending (Hersh, 2019).

viii. Electromyography

Electromyography is performed by inserting a fine needle into a muscle and viewing the electrical activity of the muscle. Prolonged sensory and motor latency confirms CTS (Shannon & Rizzolo, 2012:24). It is often accompanied by nerve conduction studies to separate primary muscle conditions from muscle weakness (LeBlanc & Cestia, 2011). Electromyography serves to diagnose nerve compression or injuries such as CTS, nerve root injury and other concerns with muscles and

nerves. Minimal discomfort emerges from the procedure and no risk of infection should occur as disposable needles are used for the insertion (Huff, 2019). Electrical signals are transmitted to the muscles to assist contraction and relaxation, translating the signals into graphs or numbers, and assisting with diagnosis (Morisson, 2018).

ix. Electrodiagnostic investigation

Nerve conduction studies use electrodes on the extremity to deliver electric shocks to a nerve to determine the speed with which the nerve transmits impulses. CTS is confirmed if the median nerve conductional velocity is less than 50m/s (Shannon & Rizzolo, 2012:24). Nerve conduction studies may also be used to determine the severity and detect improvement of CTS (Sadeli *et al*. 2009:121). Ghasemi-Rad *et al.* (2014:291) identified the presence of CTS with a damaged median nerve inside the carpal tunnel.

The American Association of Electro-Diagnostic Medicine (AAEM) classifies the severity of CTS as follows: (1) negative CTS: normal findings on all tests; (2) minimal CTS: abnormal findings on comparative or segmental; (3) mild CTS: sensory conduction velocity (SCV) is slowed in the finger-wrist tract with normal distal motor latency (DML). (4) moderate CTS: SCV is slowed in the finger-wrist tract with increased DML; (5) severe CTS: absence of sensory response in the finger-wrist tract with increased DML; and (6) extreme CTS: complete absence of a thenar motor response. This test may not be used for every patient presenting with CTS signs or symptoms as it can be costly and inefficient (Ghasemi-Rad *et al.* 2014:291).

x. Magnetic resonance imaging (MRI)

MRI is used for recurrent CTS, assessing the size of the carpal tunnel and adequacy of the release and to determine the position of the median nerve and leading flexor tendon within the carpal tunnel (Shannon & Rizzolo, 2012:24). MRI makes use of strong magnetic radio waves, creating images of body organs and tissues. It is a non-

invasive and painless procedure (Lam, 2018). An MRI can take between 10 minutes to over an hour with no known side effects. It is a useful procedure that can provide images of most parts of the body in any direction (McIntyre & Goergen, 2019).

xi. Ultrasonography

Ultrasound has emerged as a diagnostic method. It is a non-invasive and cost-effective method for CTS diagnosis (Sarraf, Malek, Ghajarzadeh, Miri, Parhizgar & Razavi, 2014:613). The patient is seated with the arm extended, the wrist in a supine position and fingers semi-extended. The median nerve is visualised, assessing for the presence of nerve oedema (Ghasemi-Esfe, Khalilzadeh, Mazloumi, Vaziri-Bozorg, Niri, Kahnouji, & Rahmani, 2011:192). Ghasemi-Rad *et al.* (2014:292) stated that ultrasonography is able to detect "changes in the flexor retinaculum, perineural and intraneural vascularisation of the median nerve in idiopathic" CTS.

Ultrasonography measures the size of the median nerve in patients with suspected CTS (Shannon & Rizzolo, 2012:24). Ultrasonography with high-frequency transducers is a valuable diagnostic tool in the assessment of patient eligibility for surgery and in post-operative assessments of the treatment efficacy (Kapuścińska & Urbanik, 2015).

xii. Symptom severity scale

The symptom severity scale consists of 11 items that inquire about the severity and frequency of symptoms, with five responses for each item where 1 refers to no symptoms, to 5 which refers to most severe symptoms (Atroshi, Lyrén & Gummesson, 2009:349). The Boston carpal tunnel questionnaire symptom severity scale is a self-administered questionnaire that assesses the severity of symptoms and the functional status of CTS (Uzkeser, Karatay & Melikoğlu, 2011:428), with a higher score indicating a greater symptom severity (Chung, Ho, Liu, Chong, Leung, Yip, Griffiths, Zee, Wu, Sit, Lau & Wong, 2016:870).

xiii. Monitoring symptoms

Faour-Martín, Martín-Ferrero, Castrillo, Almaraz-Gómez, Valverde-García, Liñares and De la Red-Gallego (2013:263) described the specific questionnaire of Lewin which is determined by 11 questions regarding attributes of pain, tingling and numbness. Each answer scores between 1 (normal) to 5 (most abnormal). It takes into account eight daily activities and indicates the ability to perform each from 1 (normal) to 5 (most abnormal). A practitioner may also inspect for thenar muscle atrophy by checking thumb opposition. This is performed with the arm in supination while the patient moves the thumb towards the palm, with the practitioner adding resistance (Shannon & Rizzolo, 2012:24).

xiv. Durkan's Test

During this test, the patient's hand is supported in 20-degree wrist flexion and supination by the practitioner. Pressure is applied with the practitioner's opposite thumb or finger over the distal flexion crease of the wrist. The onset of pain, paraesthesia or numbness is a positive result (Human, 2016:15).

Durkan's test is also known as carpal compression and has a sensitivity of 64% and specificity of 83%. The test is administered when the physician presses on the proximal edge of the carpal ligament with her thumb, compressing the median nerve. When pain develops or increased pressure in the median nerve distribution in one minute, a positive result is reached and CTS may be suspected (Ghasemi-Rad *et al.* 2014:290).

xv. Hand elevation test

"The hand elevation test (sensitivity = 75.5%; specificity= 98.5%) is done by asking the patients to raise both of their arms, along with their elbows and shoulders, and hold the position for up to two minutes" (Ghasemi-Rad *et al.* 2014:291). When pain develops or an increased pressure in the median nerve distribution in one minute, a positive result

is reached and CTS may be suspected (Ghasemi-Rad *et al.* 2014:291). Neural tension may be added by keeping the arm over the head and flexing the neck to the opposite side. This creates additional tension on the median nerve (Lowe, 2008:154). Simple and cost-effective, no formal training is required by the physician to perform this test (Ma & Kim, 2012).

xvi. Tourniquet test

The tourniquet test is also known as the Gillet test (sensitivity = 21%–59%; specificity = 36%–87%). The physician raises a blood pressure cuff placed on the patient's arm to the level of his systolic blood pressure. When pain develops or an increased pressure in the median nerve distribution in one minute, a positive result is reached and CTS may be suspected (Ghasemi-Rad *et al.* 2014:291).

xvii. Quantitative sensory testing

Semmes-Weinstein Monofilaments (SWMF) also referred to as Weinstein Enhanced Sensory Test (WEST) (sensitivity = 59%–72%; specificity = 59%–62%): a five-piece SWMF/ WEST set is used and the filaments are applied onto digit pulps. Positive results of this test are deemed as a threshold greater than 2.83 (Ghasemi-Rad *et al*. 2014:292).

In the two-point discrimination test (sensitivity = 6%–32%; specificity = 64%–99%), the patient is asked to differentiate between the touch of prongs as they are applied until the skin blanches. Positive results (an abnormal finding) of this test are > 5 mm on the pulps. Testing for the vibration threshold is measured with either a tuning fork (sensitivity = 55%; specificity = 81%) or vibrometer (sensitivity = 50%; specificity = 73%) (Ghasemi-Rad *et al.* 2014:292).

xviii. Computed tomography and conventional X-ray

Almeida, Pinheiro, Salineiro, Mendes, Neto, Cavalcanti, & Pannuti, (2017:2) defined "computed tomography as an imaging modality that

uses X-ray equipment to make cross-sectional images of the human body". The computerised tomography (CT) scanner emits a number of narrow beams, compared to an X-ray machine that sends one radiation beam. The information is sent to a computer, building a 3D cross-sectional picture of the body part (Nordqvist, 2018). Conventional radiography has a limited role in the diagnosis of CTS as it cannot identify the soft tissue of the carpal tunnel. It is best used when there has been trauma to the hand or limitation in the range of wrist movement (Ghasemi-Rad *et al*. 2014:292).

2.3.5 Management of carpal tunnel syndrome

Good body mechanics, body awareness and mindful injury prevention will allow a massage therapist (who does repetitive work) to enjoy a long and injury-free career (Braun & Simonson 2014:169). Early symptoms can be relieved with enough rest and avoiding activities that cause pain (Pranckevičienė *et al.* 2016:36). Tai chi helps massage therapists to work with the torso in an upright position; therefore, it helps the individual not to experience discomfort in the nerves stretching from the neck and shoulder to the arms, forearm and hand (Tuller, 2017).

Rising costs may limit access to medical treatment. According to Johnson (2016), healthcare cost increases are likely to continue. This will restrict access to promising new treatments and indicates that, increasingly, fewer people will be able to afford medical treatment to relieve the symptoms of CTS or to be cured completely. According to the General Household Survey produced by Statistics South Africa, only 9.4 million South Africans have access to private medical care and approximately 47 million South Africans do not have any medical aid cover (Stats SA, 2018:26). In this study, the questionnaire required respondents to indicate whether they had received treatment and the reasons if not.

Palmer (2011:7) provided some details on the management and/ or prevention of the symptoms of CTS. He indicated that job rotation or job enlargement

should be considered as this will allow the individual to rotate and not use the same muscles and tendons continuously. He stressed the importance of taking rest breaks. A better design of tools and equipment should be considered as some of the equipment used by somatologists are strenuous on the hands and arms. It is advisable to ensure that the training of somatologists takes place to ensure better working practices. It has been recommended to allow new employees to start at a slower pace. Rehabilitation programmes to ease CTS-afflicted workers back into the work environment should be introduced in the workplace.

The initial treatment or management of CTS is of a conservative nature. Conservative treatment causes fewer complications than surgical treatment options. Wrist splinting may be used for mild cases and cases that do not benefit from therapy, as well as moderate-severe cases, should be referred to surgery (Özdemir *et al.* 2014:278). When medical treatment for the condition fails or cases are severe, surgical treatment may be the only option (Petrover & Richette, 2018). With surgical intervention, the symptoms are relieved preventing further clinical deterioration. In France, surgical treatments of CTS are among the most frequently performed procedures with close to 140 000 patients operated on annually (Petrover & Richette, 2018). Klokkari and Mamais (2018) noted that surgical treatment outweighed conservative treatment in all outcomes. Treatment options for CTS, therefore, include conservative or non-surgical treatment and surgical treatment options (Shannon & Rizzolo, 2012:25). These are discussed below.

2.3.5.1 Conservative treatments for carpal tunnel syndrome

The following treatment options provide a less-invasive approach in treating CTS. Various treatment options are available within the scope of conservative treatments for CTS. Steroid injection, corticosteroids, physical therapy and hand/ occupational therapy, non-steroidal anti-inflammatory drugs, wrist splinting, manual therapies, acupuncture, ultrasound and low-level laser treatment are outlined below.

i. Steroid injection

A short-term treatment approach involving local steroid injections is effective in relieving the symptoms associated with CTS. Various approaches have been used regarding the injection site: injection through the wrist crease using a distal (comfortable alternative approach) or proximal approach; intercarpal injections have been proven to be safe; and an effective and risk-free approach known as the ulnar approach to the palmaris longus tendons. "There is a risk associated with the injections and the possible compression of the median nerve" (Ghasemi-Rad *et al.* 2014:295). Procaine hydrochloride has been proven to be as effective as steroid injections in the treatment of CTS (Ghasemi-Rad *et al.* 2014:295).

The results of a study by Özdemir *et al.* (2014:277–278) showed that pain severity and neural improvement decreased after steroid injection of patients with CTS. However, it does not eliminate the potential risk of nerve damage due to its invasive procedure.

ii. Corticosteroids

Methylprednisolone, triamcinolone and β-methasone are the common corticosteroids used in the treatment of CTS. Corticosteroids can relieve the early signs of CTS (Carlson, Colbert, Frydl, Arnell, Elliot & Carlson, 2010). Conflicting findings emerged in a study by Sadeli *et al.* (2009:121) on the use of corticosteroids; while some studies proved that it may be effective, others showed no improvement through the use of corticosteroids. Patients may find relief with a combination of corticosteroids (dexamethasone) and local anaesthetic (mepivacaine) administered directly into the carpal tunnel to reduce the swelling (Shannon & Rizzolo, 2012:25). These have been proven to be effective only for short-term treatment of CTS. Methylprednisolone (40 or 80mg) was used in a study conducted by Atroshi, Flondell, Hofer and Ranstam (2013:11) whereby a reduction in symptom severity at 10 weeks with 80mg methylprednisolone and a reduced risk of surgery at one year were evident.

iii. Physical therapy and Hand/ Occupational therapy

Physical therapy and occupational exercises may be used to stretch the upper extremities (Shannon & Rizzolo, 2012:25). Ischemic compression therapy provided positive results in a study conducted by Hains, Descarreaux, Lamy and Hains (2010:161). In the United Kingdom, 89% of chiropractors consider CTS to be within their scope of practice which involves manipulation of the joints and soft tissue that extend from the wrist to the cervical spine, making use of low-amplitude, high-velocity thrusts to the indicated joints (Hunt, Hung, Boddy & Ernst, 2009:90). In a study conducted by Žídková, Nakládalová and Štěpánek (2019), the effects of exercise and enzyme therapy in early occupational CST were explored. The results were favourable for both exercise and oral enzyme therapy as treatment options for incipient CTS.

iv. Non-steroidal anti-inflammatory drugs

Vahi, Kals, Kõiv and Braschinsky (2014:105) concluded that treatment with local steroid injections improved the clinical symptoms of CTS in the short term. In their study, the individuals who had received a greater number of steroid injections pre-operatively were at an increased risk of suffering from pain, paraesthesia and nocturnal awakening. Chung *et al.* (2016:867) confirmed that patients who had repetitive steroid injections are more likely to have post-operative symptoms of CTS if they opted for surgery. Medications such as naproxen or celecoxib decreased the swelling in the carpal tunnel resulting in decreased pressure in the carpal (Shannon & Rizzolo, 2012:25).

v. Wrist splinting

The wrist is immobilised in a neutral position with a removable cock-up wrist splint/ volar splint, reducing pressure on the median nerve. Night-time splinting is effective but only in the early stages of CTS (Shannon & Rizzolo, 2012:25) or low/ moderate cases of CTS (Halac, Demir, Yucel, Niftaliyev, Kocaman, Duruyen, Kendirli & Asil, 2015:993). Their findings showed lower pain levels in individuals who used night splinting

only. Splinting may be used as a first-line treatment for CTS. However, reports confirm that symptoms were slightly improved at four weeks (Chung *et al.* 2016:867). The findings indicate that splinting alone was inadequate for relieving symptoms and improving functions that are impeded due to CTS.

vi. Manual therapies

Kinesio tape was used on pregnant women suffering from CTS which provided a significant improvement following an electrodiagnostic assessment of the median nerve motor distal latency response (El Kosery, Elshamy & Atta Allah, 2012:116). Yoga has been proved to reduce the pain of carpal tunnel syndrome, as noted by Pizer (2018). Pizer asserts that any body weight that rests on the wrist should be avoided by completing the exercises with a closed fist rather than with an open palm. Yoga and naturopathy are effective treatment modalities for MSD (Arankalle, 2013:120). Interestingly, Arankalle explained that the latter are grouped together as a separate system of medicine and the Indian government has constituted a Central Council for Research on Yoga and Naturopathy for its research.

vii. Acupuncture

Acupuncture is used to manage pain and neuropathy in Chinese medicine (Chung *et al.* 2016:868). Compared to steroid injections, it was found to be slightly better at reducing symptoms associated with CTS. However, there have also been reports of no difference in improvement of symptoms using acupuncture compared to splinting. Patients who were treated with electroacupuncture combined with splinting treatment improved more than those in the splinting alone group (Chung *et al.* 2016:871). Electroacupuncture has been reported to be more effective than manual acupuncture (Chung *et al.* 2016:868). Ghasemi-Rad *et al.* (2014:295) stated that acupuncture is effective in the treatment of CTS and it is as effective as night splinting. Khosrawi, Moghtaderi and Haghighat (2011:4) reported that acupuncture can relieve the symptoms of CTS.

viii. Ultrasound and low-level laser

Ultrasound is administered while the patient is sitting across from the examiner while the wrist is extended to 10–20 degrees. A generous amount of gel is applied from the distal arm to the wrist before the ultrasound is administered (Chen, Scholz & Thomas, 2015). Ultrasound therapy has been shown to have positive effects on the short-term treatment of CTS (Ghasemi-Rad *et al.* 2014:195).

In a study conducted by De Pinho Teixeira Alves and De Araújo (2011), "the treatment was performed in 10 daily consecutive sessions, with an interval of two days (weekend), using a total of three joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel)". The laser equipment used was the aluminium gallium arsenide Ibramed laser pen, with a wavelength of 830nm, and power of 30mW. The outcome of the study provided patients with better functional outcomes (De Pinho Teixeira Alves & De Araújo, 2011).

Low-level laser was used in a study conducted by Jiang, Chang, Wu, Lai and Lin (2011:662), resulting in a significant reduction in Phalen's manoeuvre and Tinel's sign. The stimulation of nerve regeneration on nerve conduction with the use of ultrasound therapy or low-level laser may facilitate recovery from nerve compression. Reports of the therapeutic benefits of low-level laser or ultrasound therapy have also been noted (Bakhtiary & Rashidy-Pour, 2004:147). Li, Wang, Zhang, Ma, Tian and Huang (2016) reported that low-level laser improved hand grip after three months of follow-up treatment for CTS.

2.3.5.2 Surgical treatments for carpal tunnel syndrome

CTS may be identified as mild, moderate and severe and appropriate surgical treatment options will be determined accordingly. Sadeli *et al.* (2009:121) explained that surgical treatment is considered the most effective treatment

method. Pain and paraesthesia are generally improved through surgery. However, improvement of the motor skills may not be satisfactory when a patient has atrophied thenar muscles (Dahlin *et al.* 2010:4–5). Up to 10% of patients were unable to return to work after treatment commenced as they required several weeks off during the recovery phase.

The results from a study by Faour-Martin *et al.* (2013:263) indicated that a common complication of classical neurolysis of the median nerve (surgery) was persistent weakness of grip and pain in the thenar and hypothenar areas. Atroshi *et al*. (2013:309) stated that pain, hand weakness and complications of surgery may lead to absence from work, resulting in low income. A 44-year-old male was successfully treated with surgery to relieve the nerve compression symptoms (Razik, Avisar & Sorene, 2012:452). Surgical treatment remains more effective in the treatment of CTS even though conservative treatment causes fewer complications (Klokkari & Mamais, 2018:105). The two surgical treatments for CTS are open surgery and endoscopic surgery, which are outlined below:

i. Open surgery

Open surgery consists of the standard open release method and modified methods. The modifications include new incision techniques, such as mini-open release and other additions such as epineurotomy (Ghasemi-Rad *et al.* 2014:295). The standard open release makes use of a longitudinal skin incision about 3–4 cm long at the base of the hand to cut the transverse carpal ligament and palmar fascia (Petrover & Richette, 2018:547). Risks include bleeding, infection, scar tenderness, loss of grip strength and pillar pain (Shannon & Rizzolo, 2012:25). The incision area is closed with stitches of a resorbable or non-resorbable thread (Petrover & Richette, 2018:547).

Mini-open carpal tunnel release consists of a longitudinal incision ranging from 1.5 to 3 cm, which is placed in line with the radial border of the ring finger (Ghasemi-Rad *et al.* 2014:295). Epineurotomy is aimed at minimising the nerve compression occurring after the standard open

carpal release (Ghasemi-Rad *et al*. 2014:296). The procedure is performed when there is an obvious constricting band (Slater, 1999). Mixed results have been reported in the use of epineurotomy with open carpal tunnel release. Duman, Sahin, Sofu, Camurcu and Ucpunar (2017) provided controversial results of the use of epineurotomy with open carpal tunnel release. The findings of their single-blind study indicate an improved grip strength in the flexor tenosynovectomy and microsurgical epineurectomy group after open surgery. However, Crnković, Bilić, Trkulja, Cesarik, Gotovac, and Kolundžić (2012) stated in their findings that epineurotomy provided no benefit in the nerve volume or clinical outcomes after carpal tunnel release.

ii. Endoscopic surgery

Endoscopic surgery was designed by Okutsu and colleagues in 1986 (Ghasemi-Rad *et al.* 2014:296). Two techniques exist, namely the single portal – involving the release of the transverse carpal ligament by using a single incision at the wrist, and the dual portal technique – consisting of two incisions, one at the wrist and one at the palm of the hand (Ghasemi-Rad *et al.* 2014:296). Endoscopic surgery makes use of an endoscope through which instruments are inserted to cut the transverse ligament, together with one or two smaller transverse incisions about 1 cm in length that may shorten recovery time. Shannon and Rizzolo (2012:25) emphasised the risks of paraesthesia of ulnar and median nerves, injury to the superficial palmar arch, reflex sympathetic dystrophy and laceration of the flexor tendons. Patients present fewer complications in endoscopic than open surgery. Making use of the endoscopic method reduces the morbidity rate and the post-operative recovery time, which allows for a reduction in post-operative pain, faster recovery of grip strength and a quicker return to work (Petrover & Richette, 2018:347).

A two-part endoscopic release was performed on a 56-year-old woman with a medical history of non-insulin-dependent diabetes mellitus and hypertension (Hankins, 2012:124). The post-operative results provided

complete relief from her symptoms and pain, according to Hankins (2012:124). Endoscopic carpal tunnel release has been shown to have positive results in muscle strength and overlying skin, with an increased risk of nerve or artery injury due to the limited vision inside the carpal tunnel (Ghasemi-Rad *et al.* 2014:296).

2.4 Ergonomics

Ergonomics, according to Karwowski (2006:5, after Sanders and McCormick 1993 and Helander, 1997), "discovers and applies information about human behaviour, abilities, limitations and other characteristics to the design of tools, machines, systems, tasks, jobs, and environments for productive, safe, comfortable, and effective human use". Ergonomics is used to improve the efficiency of the workers and productivity of the company by ensuring that the workplace poses no risk to health and safety (Niu, 2010:744–753) and its application is an indication that management is concerned about the employees' safety. Higher productivity in employees leads to improved salaries, better working conditions and favourable employment (Hanaysha, 2016:61). In order for ergonomics to work, the job must fit the worker. Should an imbalance exist between the job description/ operations and the employee, an MSD can result (Wertz and Bryant, 2001:215). Jacquire (2017) stateed that "Performing beauty treatments regularly may result in a hunched-over posture, tilted head, incorrect sitting ergonomics as well as twisting and flexion to reach tools which may lead to altered body mechanics and muscle impulses as well as wear and tear" (2017:11).

In South Africa, all employers must prepare a written policy concerning the protection of the health and safety of its employees at work, including a description of the organisation and the procedures for implementing and reviewing the policy (South Africa, Department of Labour, 1993:8). A copy of this written policy should be available to the employees in the workplace. Furthermore, each employee should take reasonable care of his/ her health and safety and follow the rules set out by his employer. Maghsoudipour, Moghimi, Dehghaan and Rahimpanah (2008:152) stated that CTS is one of

the common causes of occupational disabilities. Jacquire (2017:2015) noted that safety and precautionary measures should be established through communication and cooperation between employers and employees. There is a gap in the literature regarding the application of guidelines and regulations pertaining to workplace safety in beauty establishments in South Africa.

Tsigonia *et al.* (2009) reported that hand/ wrist and lower back complaints resulted more frequently in self-reported consequences. It is also stated that, of the very few studies identified in the international literature on work-related MSD disorders in the cosmetic industry, none focussed on cosmetologists, otherwise known as beauty therapists. In their discussion of the implications of work-related MSD, Wertz and Bryant (2001:215) posit that MSD accounts for 34% of all lost-work day injuries and afflicted workers may face severe or permanent disability that prevents them from returning to the workplace.

2.5 Compensation

Work-related injuries in South Africa are regulated through the Compensation for Occupational Injuries and Diseases Act, Act 130 of 1993, commonly known as COIDA. The Act provides for compensation for disability caused by work-related injuries, for which employers are required to make regular contributions to the Compensation Fund. This fund is used to compensate workers for injuries incurred in the work environment (Landman & Buchanan, 2010:2).

As stated, only 9.4 million South Africans have access to private healthcare while the rest rely on public healthcare systems. Jacobs (2018) estimated that 10% of one's salary must be kept aside for medical provision. Janse van Rensburg (2018) questioned whether "someone who earns R12 000 a month [should] pay the same contribution as another who earns R35 000 for the month". With the above in mind, it is hard to see how a beauty therapist could afford private healthcare. In South Africa, a beauty therapist typically earns R6 377 per month (Indeed, 2019) although remuneration will differ according to whether the workplace is an upscale spa that attracts high-paying clients or a community-based salon. BusinessTech (2018b) outlines various medical aid

options available and identifies the cost of a low-income entry-level plan at around R450 per month on a salary of up to R4 000. This would be a significant financial commitment for an individual, particular one who was the sole breadwinner in the family. Somatologists access to public medical care may improve with the launch of the National Healthcare Insurance (NHI) scheme but it is likely that South Africa's medical aid industry will see higher costs regardless of the implementation of the NHI and thus remain difficult for somatologists to access.

South African somatologists are not alone in dealing with the financial and physical impacts of CTS and other workplace-related injuries. Davis (2006:1130–1131) stated that highly traumatic jobs increase the incidence of CTS. Not only does CTS affect businesses/ industries and individuals negatively, but it also has financial impacts on society. Not all workers are covered by compensation schemes which, in the long term, indicates more problems for the worker. Work-related MSDs result in decreased productivity, chronic absenteeism and early retirement (Jacquire, 2017:12). In a study conducted by Rostkowski and Singh (2015:253–265), participants felt excluded from the workplace due to CTS. Petit *et al*. (2015:1–10) noted that salaries are determined by the number of hours worked or the number of tasks completed. Echchaoui *et al.* (2016:39) agree that CTS is a multi-factorial syndrome with a high incidence rate, making the prevention and management an occupational health and safety priority. Chung *et al.* (2016:867) affirmed that CTS is a work-related syndrome and that it carries significant economic impacts which lead to compensation claims.

In Massachusetts, USA, a state-wide surveillance system is in place for work-related CTS wherein the data is retrieved from physicians and workers' compensation claims (MacFarlane, 2001:1146). In Africa generally, rheumatology is neglected and underfunded, competing for resources and other disorders or diseases. Therefore, Gcelu and Kalla (2015:1070) emphasised that there is a need for change when referring to MSDs as this affects the quality of life.

In South Africa, employment and financial security are threatened when employees are injured at work (Landman & Buchanan, 2010:3). According to Nuckols, Harber, Sandin, Benner, Weng, Shaw, Griffen and Asch (2011:101), more time should be given to injured workers and ensuring that they receive the basic essential medical care processes involved in diagnosis, reducing symptoms and addressing activities and functional limitations. Nuckols *et al.* (2011) suggested that quality measures should be considered to assess the association of patient symptoms and how occupational activities should be modified accordingly. Adetiba (2017) reported a 12-month prevalence rate of 90% for MSD in dental technicians in South Africa. The risk factors are mainly due to age, prolonged standing and vibration (Adetiba, 2017). Further research is required to establish the prevalence rate of MSD and specifically for CTS among somatologists in South Africa.

2.6 Conclusion

In this literature review, the focus was to provide substantial evidence of the scope of practice within the somatology environment, what CTS entails and how this relates to the working environment. Extensive research is required within the South African population with regards to the prevalence of CTS. Whether workers are adequately compensated for their injuries also needs further investigation. The next chapter outlines the methodology that was used in the study to test its aims and objectives.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The main purpose of research is to inform action, prove a theory and contribute to the developing knowledge in a field of study (Zarah, 2018). This, in essence, encapsulates the objectives of this study. This chapter outlines the research approach, data collection methods as well as statistical analytical methods used in the study in accordance with the ethical standards.

3.2 Research approach

Quantitative research provides insight on how people think, feel or behave in a certain way (by utilising surveys or analytics to quantify behaviours, perceptions, attitudes and interests) versus qualitative research that focuses on what people think, feel and do (by relying on one-on-one interviews, focus groups and discussion forums) (Mander, 2017).

Rahman (2017:104) explained that qualitative research is the study of individual cases or events. It therefore is concerned with the issue involving generalizability (Rahman, 2017:105). This study has utilised a quantitative research approach in order to include a larger population size resulting in more generalised results. By adopting this pattern, the researcher may be able to identify the prevalence, risks and management of CTS amongst somatologists in the Western Cape. Quantitative research allows the researcher to build accurate and reliable measurements for statistical analysis (Goertzen, 2017:12). Bryman, Hirschsohn, Dos Santos, Du Toit, Masenge, Van Aardt and Wagner (2016:51) explained that quantitative research focusses on testing theory and concepts.

When using quantitative research, general patterns of a population are investigated rather than an individual (Seers & Critelton, 2001:487). Furthermore, the quantitative approach allows for structured and reliable data collection aiming to provide a generalised overview of the population used for this study. Therefore, a quantitative study design allows for investigation into

a particular health phenomenon (Jack, Hayes, Scharalda, Stetson, Jones-Jack, Vallerie, Kirchain & LeBlanc, and 2010:164) – in this case, for a study involving somatologists who may suffer from CTS. Quantitative research's focus is on measuring something or variables that exist in the social world (Rahman, 2017:105).

"The term positivism was used to express the scientific approach to the world" (Pawlikowski, Rico & Van Shell, 2018). Dr Nel (2019) elaborated that positivism is a philosophy of epistemology that is gained through observations that should be quantifiable so that statistical analysis can be done. The researcher had no impact on the objective being observed (Nel, 2019) (being the prevalence rate of CTS). The limitation that exists with quantitative research is that the positivism cannot elucidate how social reality is shaped and maintained and how the actions of individuals are interpreted (Rahman, 2017:106). For the mere purpose of the study, the latter is overcome due to generalizability. The research is therefore focused on the numbers or facts as opposed to how people think, feel or behave. Another limitation of using quantitative research is that the gathered information gives an overall picture of the variables at a specific moment in time (Rahman, 2017:106). The collection of data occurred over a period of 2018-2019. This indicates that during the write-up of the dissertation there may have been more somatologists diagnosed with CTS. Although the latter may pose as a limitation to this research, it may in turn provide a basis for further research.

For the purpose of this study, a questionnaire was used. Survey research allows for a variety of methods of instrumentation (Ponto, 2015).

3.3 Recruitment Process

A literature search was completed to establish the various businesses and institutions within the scope of health and wellness in the area of the Western Cape to obtain contact information. A letter of participation (Appendix A) was emailed to potential participants (somatologists that have graduated), various businesses and institutions within the field of the research as well as published

on social media platforms (Instagram, Facebook and WhatsApp). Potential participants were contacted (via email or telephonically) with the contact information obtained from the various beauty institutions that willingly provided information of qualified somatologists. This letter (Appendix A) was explained telephonically when calls were made to potential participants, various businesses (within the scope of health and wellness) and beauty schools within the Western Cape. The aim was to attract male and females within the beauty industry diagnosed with CTS who would willingly participate in the study. The letter explains the nature and purpose of the study.

A letter of information (Appendix B) and consent form (Appendix C) was sent to the voluntary participants. This letter served as permission for the researcher to use the data solely for the purpose of the study and emphasised that all information used would be confidentially displayed. All participants were required to read and sign the letter of information in keeping with the ethical principle of confidentiality. Anonymity is defined as "the situation in which someone's name is not given or known" (Cambridge English Dictionary, n.d). A confidentiality agreement is defined as a nondisclosure agreement (Merriam-Webster.com, n.d). The recruitment process that was followed allowed the researcher access to names and contact information. Participants' were ensured of the confidentiality that was followed in participating in the study that no names neither contact information was made available during the write up or publication of the dissertation. Participants' inclusion in the study was voluntary and no gratuity or benefit was awarded. Participants were given the opportunity to withdraw from the study at any point if they so wished.

A gatekeeper letter asking for permission to conduct research (Appendix D) was sent via email to universities, colleges and businesses within the field, allowing the researcher to use the participants from various platforms. This letter was used in cases where the researcher was not able to locate somatologists individually by telephone calls, social media platforms or email. The completed letters were returned via email or the researcher collect the letters that were in close proximity. Confidentiality was maintained as no personal information is displayed in the write up of the dissertation. The

researcher is the only individual who has access to the letters that was obtained during data collection and the storage thereof.

3.4 Study population and sampling

Across the Western Cape, 22 beauty schools were contacted to establish the number of graduates for the past 10 years. Based on the research findings, the seven schools that were willing to share their information regarding their total number of graduates and qualified somatologists reported that collectively 1 543 qualified somatologists had passed through their institutions.

Research was done to determine the CTS prevalence rate among somatologists within the Western Cape area. An advert (Appendix F) was circulated on social media and therapists/ somatologists were contacted within the industry. In addition, telephone calls, social media, company websites and emails were used to contact 212 salons, spas or clinic facilities within the beauty industry. Only 99 companies responded, leaving 109 who did not respond to any form of communication or a combination of the aforementioned platforms. In addition, the South African Association of Health Professionals was contacted but did not respond. The findings were as follows:

- 10 confirmed somatologists emerged while contacting the salons, which resulted in another five due to referral from the salon, spa or clinic. Of these 10, one therapist was excluded as she failed to complete the consent form and asked to be removed from the study due to personal reasons. Another therapist also failed to complete the consent form and was excluded from the study.
- 81 salons reported that they did not have any somatologists employed with CTS and that everyone had a clean bill of health.
- Two somatologists indicated that they do present the symptoms of CTS, but had not been diagnosed medically or had not returned for medical confirmation and were therefore excluded from the study.
- Another confirmed therapist emerged but stated that she did not wish to be part of the study due to personal reasons.

- Five beauty facilities were unsure of whether their somatologists had been suffering the condition or experiencing symptoms as no one had mentioned anything.
- Two other cases, of tendonitis and compartment syndrome, were identified during the research, but were not considered for this study.
- One product house stated that it was unable to provide any details of its employed therapists, thus leaving a gap in the research.

For this particular study, a total of 12 therapists were included who met all the inclusion criteria. The participants were asked to sign the consent from, giving permission for the data to be used for the sole purpose of this study. Somatologists working within the industry were required to submit a gatekeeper permission letter giving the researcher permission to use them as participants (Appendix D).

3.5 Sample design

Sampling methods can be divided into probability sampling (random sampling), where every individual in a population has an equal chance of being selected, and non-probability sampling, where the probability of an individual being chosen is unknown (Jack *et al*. 2010:164). Non-probability sampling was used for the study due to the type of participants selected which did not involve calculations (Glen, 2017). The research relied on consecutive sampling where each consecutive available participant who was diagnosed with CTS was approached (Mathieson, 2014). The researcher was well aware that participants diagnosed with CTS were difficult to reach as this information was not available from the various institutions contacted. With regard to the latter, snowball sampling was incorporated where an initial individual or set of individuals who met the criteria was utilised to find and contact or refer others for the purpose of the study (Mathieson, 2014).

3.5.1 Inclusion criteria

- Qualified full-time somatologists employed by the various institutions or the head of the Somatology department.

- Qualified somatologists, male and female, in the Western Cape, with a relevant diploma or higher qualification within the field of the study.

3.5.2 Exclusion criteria

- Somatologists still in the process of completing their studies.
- Somatologists not medically diagnosed with CTS.
- Individuals who did not complete their studies, whether diagnosed with CTS or not.

3.6 Data collection tool: questionnaire

Surveys provide an organised manner of data collection, which allows the attraction of information from a large number of participants. Showkat and Parveen (2017) identified the considerations when choosing a research type as access to potential participants, literacy, resources available, and the subject matter. Cook and Cook (2008:99) stated that perceptions, attitudes, behaviours or characteristics of a group are often measured by the use of a survey. Ponto (2015:168) described survey research as "the collection of information from a sample of individuals through their responses to questionnaires". Utilising an online questionnaire is cost effective (does not require printing or transcribing), flexible for the researcher and participant (participant can answer in their own time and space), fast and accurate (data can be loaded directly into data analysis software) (Georgia, Research LifeLine, 2012). Therefore, since all participants indicated they have access to electronic media, the latter was used as a readily accessible tool.

3.6.1 Questionnaire design

Participants were asked to complete an online questionnaire (Appendix E), consisting of open and closed-ended questions which allowed the researcher to obtain quantitative information regarding biographical information, duration of employment, treatment types and durations as well as rest patterns. Closed-ended questions have preselected options for the respondents to choose from, which makes statistical analysis easier, whereas open-ended

questions allow the participants to express their views in their own words (Farrell, 2016). Some questions enabled the researcher to answer questions such as prevalence and risk factors relevant to the condition. Other questions employed the Likert-style format which measured attitudes using a 5-point scale. Thus, quantitative data is obtained, making data analysis less complicated (McLeod, 2008). All questionnaires were coded to ensure the confidentiality of each participant.

3.7 Data analysis

Quantitative data was analysed using the Statistical Package for the Social Sciences (SPSS) software to help to determine the prevalence of CTS in diagnosed participants within the work environment (Grecu & Ciobanica, 2014:369; Foley, 2018). Foley (2018) explained that SPSS was launched in 1968, created for the management and statistical analysis of social science data. For the purpose of the study SPSS was used for its descriptive statistics such as frequencies, cross tabulation and descriptive ratio statistics (Foley, 2018). Qualitative data was analysed based on the data collected and common themes were drawn up using the information from the diagnosed individuals. Due to its ability to manipulate and decipher survey data (Foley, 2018), the researcher was able to transport the collected data via Survey Monkey to SPSS for detailed analysis. Therefore, univariate analysis was used for the purpose of this study. Univariate analysis allowed the researcher to describe the variable distribution in one sample (Canova, Cortinovis & Ambrogi, 2017). The results of the data were placed in charts and bar graphs, with conclusion drawn from it.

3.8 Validity and reliability

Validity [concerns] “the extent to which a concept is accurately measured in a quantitative study” (Heale & Twycross, 2015:66). Reliability “measures the accuracy of the instrument used” (Heale & Twycross, 2015:66). The measurement tool was constructed in such a way that it would be easy for follow up studies to make use of it. In order to test the validity of the research, Jack *et al*. (2010:164) explained that validity captures what the research claims

to measure, which may take the form of questions contained in a survey, questionnaire or instruments, meaning how well the collected data covers the area of investigation (Taherdoost, 2016:28) and making use of content validity where the content is measured against the known literature. As previously discussed, the research was centred on a questionnaire, asking each participant to answer the same questions pertaining to CTS. The validity of the questionnaire was assessed by a number of people consisting of the researcher, supervisors and approved by the Institutional Research Ethics Committee of the Durban University of Technology. During the early stages of the research the questions were assessed by the Institutional Research Committee to ensure that it would cover the area of investigation, the necessary amendments were made before data collection proceeded.

3.9 Study setting

The researcher allowed two months for participants to be approached and questionnaires to be completed. Individuals were asked to complete an anonymous questionnaire in their personal capacities in order to express their views on CTS and how their conditions have affected their professional careers. The link to the online questionnaire was emailed to participants (universities, colleges and businesses within the Western Cape) who willingly consented to participate in the study. All the participants had access to email on an electronic device therefore, a courier service was not used to transport the questionnaires to and from the researcher.

The data obtained from the study was utilised by the researcher, the research supervisor and the co-supervisor only. The data was locked in safe storage throughout the duration of the research process. The DUT Somatology Department will keep the research data in storage for approximately five years. Thereafter, all data will be disposed of by means of shredding (printed copies) or deleting (electronic copies).

3.10 Research expenses

Postgraduate funding was provided by the Durban University of Technology (DUT). The bulk of the expenses related to payment for the online questionnaire and telephone calls. Survey Monkey was used as the platform in order to make the questionnaire available to participants as the study was focused on the Western Cape Area. Each participant indicated that they had internet access therefore, no questionnaires needed to be couriered and the use of funding for this purpose was excluded.

3.11 Ethical considerations

“Ethics is considered the branch of philosophy which deals with the conduct of people and guides the norms or standards of behaviour of people and relationships with each other” (Akaranga & Makau, 2016:1). According to Pawar (2007) cited by Rammanhor (2014:62), stated that data should be collected according to a set of ethical standards, such as “honesty, truthfulness, privacy and confidentiality, self-determination and voluntary involvement, zero physical and psychological harm, dignity and worth of human beings, accountability, right to know on the part of respondents, fairness, impartiality on the part of researchers and informed consent”. All the aforementioned were carefully considered throughout the research period.

Akaranga and Makau (2016:2) stated that research ethics is important and that the dignity of the participants and that the information researched is published correctly. Yip, Han and Sng (2016) agreed that it is the researcher’s duty to protect the life, health, dignity, integrity, right to self-determination, privacy and confidentiality of personal information of the participants. Participants were able to complete the questionnaire in their own space and time. The questionnaire was self-administered, which eliminated any bias influences from the researcher. The researcher received signed consent forms (Appendix C) from the participants, ensuring them that their confidentiality is secured especially during the write up of the dissertation and analysis of the collected data. The printed consent form is locked in a storing cabinet and the electronic versions are kept password protected of which the researcher is the

only one who has access to them. The formulation of the questionnaire did not require any personal identification to be documented, which ensured the protection of the participants' identity. Participants were also informed when they received the letter of information (Appendix B) that participation is voluntary and there will be no adverse consequences should they choose to withdraw from the study. The letter of information also stated that the participants would receive no remuneration for their participation and all costs related to the study will be covered by the researcher.

Ethical clearance (reference number: REC 94/19) was obtained from the Institutional Research Ethics Committee of the Durban University of Technology. Appendix G provides a copy of DUT's ethical approval letter. The participants were assured that no harm would come to them should they agree to participate, meeting the principle of beneficence and non-maleficence in research (Avashti, Ghosh, Sarkar & Grover, 2013). All literature work, citations or references used has been acknowledged using DUT's Harvard referencing guide.

3.12 Privacy

No individually identifiable information about the participants, or provided by the participants during the study, was shared with others without written permission. All the information gathered was used in a secure manner as the participants, businesses and beauty schools remained confidential. No business name or beauty school name has been mentioned during the write up and discussions of this thesis. As stated in 3.11, participants were ensured of the confidentiality when using the data gathered from the questionnaire.
All documentation concerning this study that contains personal identification of business, institutions or companies is locked in storage cabinet and password protected on an electronic device to which only the researcher has access. All information that was gathered during this dissertation process has been used solely for the purpose of this study.

3.13 Limitations

The following posed as limitations to the study even with careful planning. Access to participants with CTS was one of the main limitations as this information was not known by the beauty schools where somatologists obtained their qualifications nor were the product houses able to provide any details of CTS. Therefore, with the lack in the availability of using a large sample size for this study, the results failed to show a true reflection of the prevalence of CTS amongst somatologists within the beauty industry due to various factors discussed in chapter 3. Another area which left a gap in the research was the companies that did not respond to any form of communication. Thus the total number of somatologists presumed diagnosed with CTS did not participate in the study, which would have benefitted from having a larger sample more representative of the population.

3.14 Conclusion

This chapter outlined the research methodology used for the purpose of the study by providing detailed descriptions of the research design, sample design, research tools and costs, analysis and limitations of the study and considering the limitations and gaps within the research that allow for further exploration.

Chapter 4 focusses on the findings emanating from the sample that was analysed.

CHAPTER 4: DATA ANALYSIS

4.1 Introduction

Evidence brought forward from the sampling was analysed. The findings will be discussed below in relation to the objectives of the study.

4.2 Analysis of the collected data

All the information brought forward during the data collection was analysed. A total of 12 participants were asked to complete a questionnaire. All the questions of the questionnaire were analysed and the findings are detailed below.

4.2.1 Gender profile

A total of 12 participants completed the questionnaire and all participants were females, as illustrated in Figure 4.1.

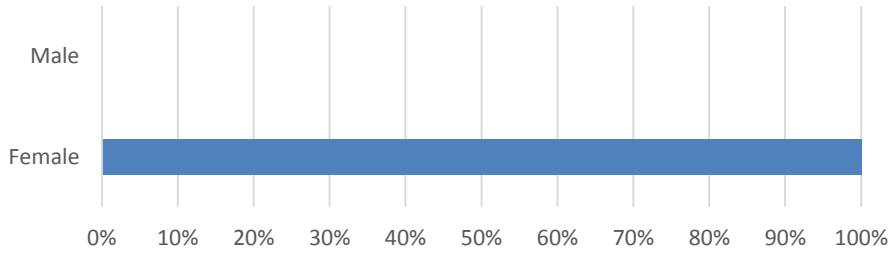


Figure 4.1: Gender profile of the sample

4.2.2 Age profiles

The majority of the participants (91.67%) ranged between the ages of 26–35 years with 8.33% of responses obtained from participants between the ages of 36–45 years of age, as shown in Table 4.1.

Table 4.1: Age composition of the participants

Answer choices	Response	Sample number
18–25	0.00%	0
26–35	91.67%	11
35–45	8.33%	1
45 and older	0.00%	0

4.2.3 Demographic profile

Table 4.2 provides an indication of the demographic makeup of the sample participant group[2].

Table 4.2: Demographic profile of the participants

Answer choices	Response	Sample number
White	25.00%	3
Coloured	75.00%	9
Black	0.00%	0
Asian	0.00%	0
Indian	0.00%	0
Other (Please specify)	0.00%	0

4.2.4 Presence of diabetes mellitus

Diabetes mellitus has an influence on the development or existence of CTS (cofer (cf) 2.3.2). Figure 4.2 indicates that 8.33% of the participants were diagnosed with type 2 diabetes mellitus. This could have been established before the onset of CTS, making it a risk factor as stated in the literature.

[2] South Africans largely still tend to self-identify or identify others according to various 'racial' nomenclature, although 'race' has no official or legal status and no scientific validity. The identification categories used by the author in Table 4.2 are commonly understood notional identity groups used here only to indicate demographical differences relevant to the discussion.

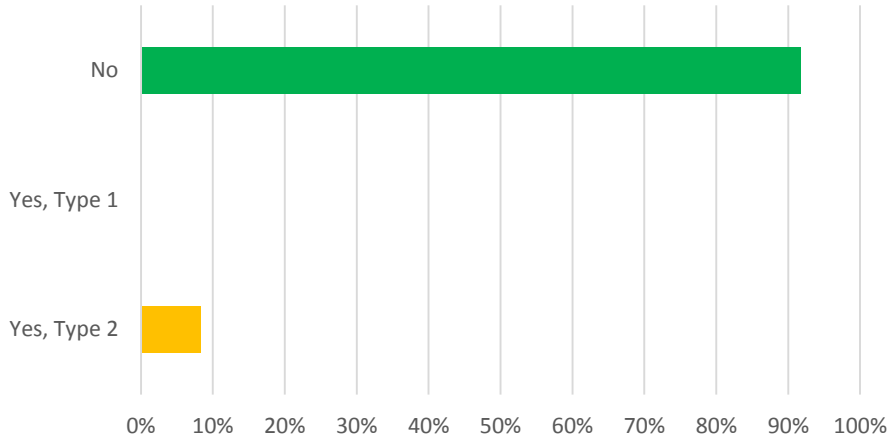


Figure 4.2: Presence of diabetes mellitus in participants

4.2.5 Injuries to the hand or wrists

Injuries affect the proper functioning of the body with wrist fractures and dislocations being risk factors in the development of CTS. Table 4.3 indicates that 75.00% of the participants experienced no injuries to the hands or wrists compared to 25.00% of participants who experienced some form of injury to the hand or wrist. Even with the limited sample size used for this study, injuries to the hand or wrist is still prevelent amongst individuals diagnosed with CTS. This finding could be further elaborated in future studies to determine to onset and risks of hand or wrist injuries and the correlation (if any) to CTS.

Table 4.3: Injuries to the hand or wrists

Answer choices	Response	Sample number
Yes	25.00%	3
No	75.00%	9

4.2.6 Job title

The beauty industry provides various options of skills proficiency. Table 4.4 indicates the job titles of the participants in the study. The majority of participants (75%) were qualified somatologists, one participant was a cosmetologist, one participant was a nail technician and one was a lash and nail technician.

Table 4.4: Job titles of the sample

Answer choices	Response	Sample number
Somatologist	75.00%	9
Cosmetologist	8.33%	1
Masseuse	0.00%	0
Other (Please specify)	16.67% Comment: *"Nail Technician"* *"Lash and Nail Technician"*	2

4.2.7 Number of years worked in the industry before diagnosis

The aim was to determine whether a correlation could be made between the number of years exposed to performing treatments and the development of CTS. Table 4.5 indicates the number of years the participants worked in the industry before diagnosis. The majority of participants (58.33%) have worked for a period of 0 to 5 years, while 25% of the participants have worked in the industry for 6 to 11 years and only 16.67% of participants have worked for 12 to 17 years.

Table 4.5: Number of years worked in the industry before diagnosis

Answer choices	Response	Sample number
0–5 years	58.33%	7
6–11 years	25.00%	3
12–17 years	16.67%	2
18–24 years	0.00%	0
25 years or longer	0.00%	0

4.2.8 First thoughts upon diagnosis

Being diagnosed with a condition can create a whirlwind of emotions for some individuals, especially if this could lead to uncertainty about the future career path. Participants were asked to indicate their first thoughts upon diagnosis.

Table 4.6 indicates the various emotions and what the respondents felt at that moment. Furthermore, they were asked to indicate why they felt this type of emotion. It is evident that the emotion felt by 91.67% of participants upon receiving the initial diagnosis was frustration. This was followed by feelings of disappointment indicated by 58.33% of participants, anxiousness and irritation which were indicated by 50% of participants as the emotions experienced upon diagnosis of CTS. Other emotional responses experienced by participants included confusion, sadness, fear, anger, blame, disbelief, denial, tearful, shame, relief and guilt – listed as indicated by participants.

Table 4.6: First thoughts upon diagnosis

Answer choices	Responses	Sample number
Happy	0.00%	0
Sad	33.33%	4
Confused	41.67%	5
Tearful	16.67%	2
Angry	25.00%	3
Anxious	50.00%	6
Irritated	41.67%	5
Disappointed	58.33%	7
Frustrated	91.67%	11
Relief	8.33%	1
Denial	16.67%	2
Guilt	8.33%	1
Disbelief	16.67%	2
Blame	25.00%	3
Fear	33.33%	4
Withdrawal	0.00%	0
Shameful	8.33%	1
Not Sure	0.00%	0

4.2.9 Reasons for the emotions experienced at diagnosis

The respondents were asked to explain why they felt the type of emotions listed in Table 4.6. The responses from participants for the reasons for the emotions they experienced at diagnosis are indicated below.

> *"Sad because how would it affect my work and daily life, anxious 'cause they hurt so I worried about my job. Frustrated 'cause I be limited in the things I do at work. Guilt 'cause when they're hurt clients don't understand why you're home. Guilty for not being able to help in daily activities and helping people."*
>
> *"I felt anxious and confused as I did not know what else I would do as being a therapist was my form of employment. I felt frustrated because after the diagnosis I could not return to work."*
>
> *"It was a big shock to me that it happened. I also knew it would affect my income as I work on commission. I was disappointed and devastated. It is my career and my passion."*
>
> *"Was afraid I would not be able to work as somatologist and massage or be limited."*
>
> *"You just never expect it to happen to you and when it does it hits home with pain all the time and uncomfortable to do things."*
>
> *"The reason for me studying and working in this field was because I found great joy in working with the human body. Massage gave me reassurance of this as I could treat the muscles directly. This diagnosis prevented me from doing what I love."*
>
> *"We have to do so many treatments using our hands without being taught of other ways to maybe do massage techniques instead of only using hands."*
>
> *"I wasn't sure if I would be able to work in the beauty industry as long as I hoped. Initially, the plan was to further my studies within the beauty industry."*
>
> *"Regret doing massages because straight after that my right hand felt always in pain."*
>
> *"Not knowing what the future holds, being restricted to certain treatments as I love my industry and massages specifically."*
>
> *"Because I wasn't working long and had so many dreams and plans for my future. I was still paying for my studies. I was totally*

destroyed because I loved what I did so much and felt like I let my parents down."

"I have been experiencing pain for a very long time and was frustrated by the fact that my daily job I do to earn money caused this."

4.2.10 Employers' reaction to the news about CTS diagnosis

Employers play a pivotal role in the maintenance of a therapist's career. They can either overwork their staff or not utilise their employees' full potential. It was important to understand what they felt about the diagnoses of their employees. The responses from employers (as reported by the respondents) upon learning about the diagnosis of employees with CTS are outlined below.

"Insensitive. It will always be there. You are too young not to work or slow down with work."

"She understood and accepted the fact that I could no longer work."

"My employer was disappointed, but understood it could happen."

"Did not inform them."

"Not a care in the world."

"My employer limited my column to treatments that would cause too much pain. Eventually, I stopped doing therapy altogether and moved onto reception-based work."

"Very understanding as she was a therapist herself. I didn't do massages and a lot of pedicures for some time to relieve pain."

"I was referred to a physiotherapist."

"Not impressed. Labour law was involved and I left my job. No sympathy from my manager was shown."

"They didn't care much to be honest. They were more irritated and just wanted to know what I was going to do."

"They were angry and in denial. Refused to accept it was from work."

4.2.11 Level of compassion with the type and number of treatments performed

Figure 4.3 illustrates that 60.00% of the participants were accommodated in the workplace with the number of treatments they performed upon diagnosis. The remainder of the participants, 40.00% of them, were not accommodated in the workplace which could have resulted in them leaving the workplace and industry.

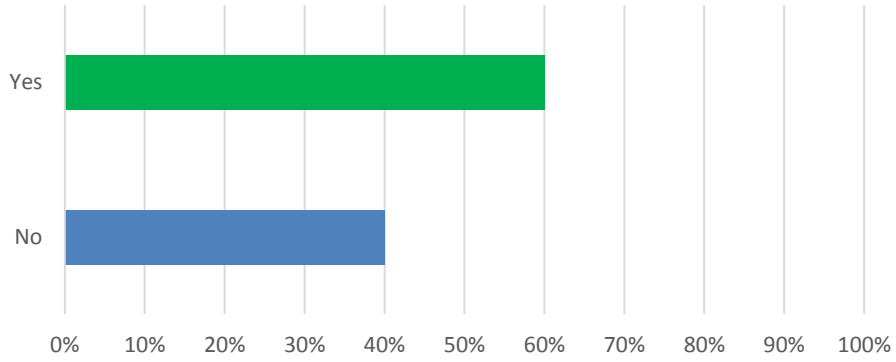


Figure 4.3: Somatologists being accommodated with the number of treatments performed on a daily basis

4.2.12 Dominant hand used during treatments

Table 4.7 indicates which hand is predominantly used during treatments. This hand, in most cases, exerts more pressure or requires more focus during treatments. It is evident that 83.33% of participants were right-hand dominant.

Table 4.7: Dominant hand used during treatments

Answer choices	Response	Sample number
Left-handed	16.67%	2
Right-handed	83.33%	10

4.2.13 Symptom presence in performing treatments

Performing treatments where one hand exerts more pressure results in more symptoms experienced in that hand. This affects the daily functioning of the hand, especially if most of the symptoms are experienced in the dominant

hand. Table 4.8 outlines the severity of symptoms experienced in the hands. The results indicate that 58.34% of participants experienced symptoms in both hands in performing treatments.

Table 4.8: Symptom presence in performing treatments

Answer choices	Response	Sample number
Left predominantly	8.33%	1
Right predominantly	33.33%	4
Both hands	58.34%	7

4.2.14 Severity of the condition at diagnosis

Table 4.9 indicates what the severity of the condition was at diagnosis. Participants were asked about their rating of the severity of symptoms. From the results, 41.67% indicated that the severity of the symptoms was moderate and 41.67% of participants indicated that the severity of the symptoms was severe.

Table 4.9: Severity of symptoms experienced in the hands

Answer choices	Response	Sample number
Mild	16.66%	2
Moderate	41.67%	5
Severe	41.67%	5

4.2.15 Time off from work due to severity of the symptoms

Being unable to use one's hands can be severely incapacitating. As depicted in Figure 4.4, most of the respondents (91.67%) needed time off from work in order to recover while 8.33% of participants were able to continue their daily activities without requiring time off from work.

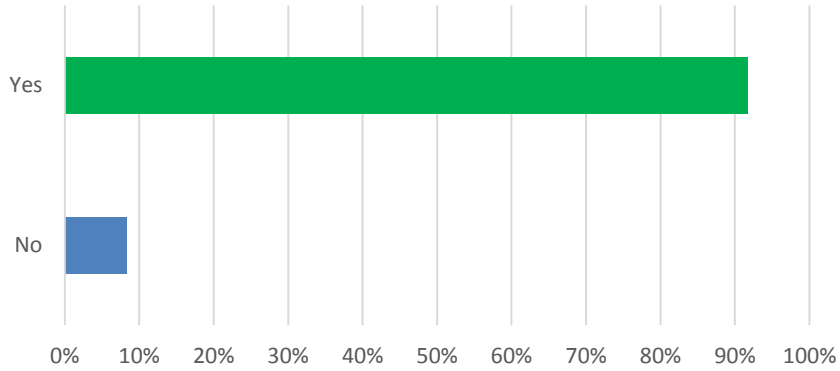


Figure 4.4: Time off from work due to severity of the symptoms

Respondents were also provided with an open-ended question on the reason for their needing time off from work. The responses from participants are captured below.

"Had an operation in both hands. Was down for six weeks."

"Had to stop working. However, I tried to do less treatments per day as a mobile therapist."

"I had to undergo surgery and was unable to do any massage. After the surgery, it took a very long to recover and I am still struggling with certain tasks."

"Hands had to rest and were in wrist guards."

"Had the operation done on two parts of the wrist and hand."

"I was limited to doing massages and nail work. Nail work needed a firm grip on equipment to perform effectively such as painting, etc. This would cause my wrist to pain."

"No massages for some time."

"I would shift clients when my symptoms were bad. As a result, I started losing clients."

"I once had to be rushed to the emergency room due to pain and it kept me out of sleep and my muscles felt very weak. There were days that I could not even use my hand due to muscles feeling weak."

"I could not use my hands for a few days, so I could not do any treatments."

"I was put off from work by my house doctor for a week just to rest my hands and see if it was going to get better but it didn't."

"Had to operate both hands."

4.2.16 Type of symptoms experienced

Various types of symptoms can be experienced when diagnosed with CTS. These symptoms may appear individually or several simultaneously. Table 4.10 outlines the symptoms experienced by participants in a period of 12 months. The types of symptoms experienced included mild to severe pain, numbness, decreased strength, tingling, tendency to drop things, prickling, and difficulty manipulating small objects and swelling. Decreased sensation and loss of movement were documented by 33.3% of participants. One participant had felt a loss of feeling in the left hand for five to 15 seconds.

Table 4.10: Type of symptoms experienced in the last 12 months

Answer choices	Responses	Sample number
None	0.00%	0
Tingling	75.00%	9
Numbness	75.00%	9
Mild to severe pain	100.00%	12
Decreased sensation	33.33%	4
Decreased strength	75.00%	9
Loss of movement	33.33%	4
Swelling	50.00%	6
Prickling	58.33%	7
Tendency to drop things	66.67%	8
Difficulty manipulating small objects	58.33%	7
Other (Specify)	8.33% Comment: *"Loss of feeling in my left hand for 5–15 seconds"*	1

4.2.17 Waking up due to symptoms of CTS at night

One of the symptoms of CTS is awakening at night due to the intense pain it causes sufferers. The majority of participants (75.00%) indicated that they had experienced awakening at night due to the pain, compared to 25.00% who enjoyed a peaceful sleep at night, as illustrated in Figure 4.5.

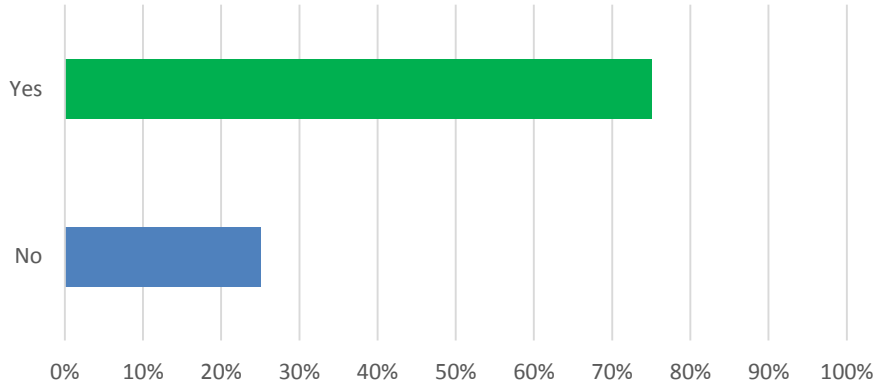


Figure 4.5: Waking up due to symptoms of CTS at night

4.2.18 Level of discomfort experienced during the night

The aim was to assess the severity of the pain experienced at night. The findings are displayed in Table 4.11 and indicate that the level of discomfort experienced varied between participants with 41.66% indicating a level 3, 16.67% of participants indicated a level 4 and 16.67% of participants experienced the highest level of discomfort, level 5.

Table 4.11: Level of discomfort experienced during the night

	Answer choices				
	Highest level of discomfort = 5	**4**	**3**	**2**	**Lowest level of discomfort = 1**
Responses	16.67%	16.67 %	41.66 %	8.33 %	16.67%
Sample number	2	2	5	1	2

4.2.19 Areas of the hand experiencing pain

Figure 4.6 provides an indication of where the participants may experience pain on the palmar and dorsal surfaces of the hands. The classic pattern as indicated in (A) is where symptoms affect at least two digits. However, it may permit symptoms in the fourth and fifth digits, wrist pain and radiation of pain proximal to the wrist, but it does not allow symptoms on the palm or dorsum of the hand. The probable pattern in (B) has the same symptom pattern as the classic pattern, except palmar symptoms are allowed unless confined solely to the ulnar aspect. (C) is the unlikely pattern; no symptoms are present in digits 1, 2 or 3.

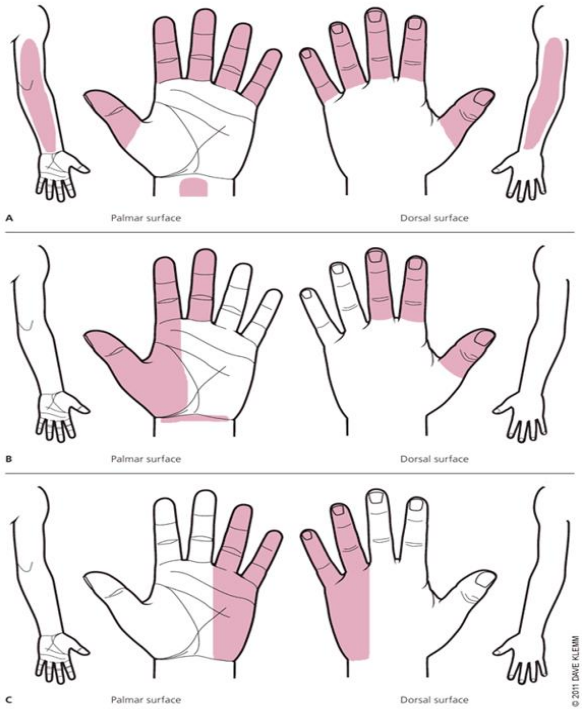


Figure 4.6: A hand system diagram to guide proper diagnosis

Source: LeBlanc and Cestia, 2011:954.

The majority of participants (58.33%) indicated the classic pattern of pain with 41.67% of participants indicating a pattern B for areas of pain in the hand. One participant indicated A and B and these are recorded in both responses. There was one participant who indicated that pain was experienced in all areas at different times. The responses from participants to indicate the areas of pain on the hands are as follows.

"All areas at different times if not all at once. Thumbs and ring, pinky finger to elbow mostly."

"A."

"B."

"B."

"A and B."

"A."

"Pain and numbness in my arms, pain and swelling in my thumb areas as in picture B."

"A."

"Mainly A, but only with my right side."

"A."

"A."

"B."

4.2.20 Treatments received to alleviate symptoms

A total of n=11 (91.67%) participants received intervention to alleviate the symptoms of CTS as indicated in Figure 4.7.

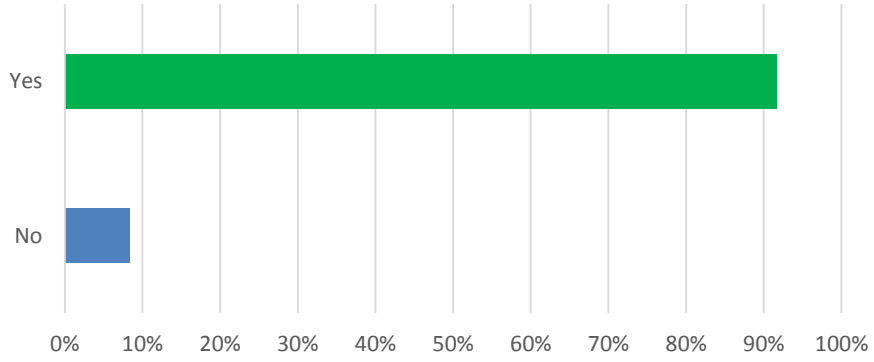


Figure 4.7: Treatments received to alleviate symptoms

4.2.21 Reason for not having treatment

The aim of the question was to determine what the reasons were for not having treatment. Based on the previous question, one respondent indicated that no treatment was received. However, she failed to provide a reason, leaving a gap within the findings of this study.

4.2.22 Treatment received to alleviate symptoms

With all the treatment options available, there is a multitude of options to choose from to find relief from the symptoms of CTS. The treatment options do not provide a guarantee that there will be no symptoms after the treatment. Non-steroidal anti-inflammatory drugs are a common variable, with a total of 66.76% of the participants making use of this treatment option, as indicated in Table 4.12. Furthermore, 50% of participants indicated wrist splinting as a treatment option, 33.33% of respondents received corticosteroids, physical therapy or open surgery. Hand/ occupational therapy, retraining or acupuncture where treatment options adopted by 16.67% of participants. Wrist splint bandage, natural injection and strapping or taping were other treatment options listed by participants.

Table 4.12: Treatment received to alleviate symptoms

Answer choices	Responses	Sample number
None	0.00%	0
Corticosteroids	33.33%	4
Physical therapy	33.33%	4
Hand/ Occupational therapy	16.67%	2
Non-steroidal anti-inflammatory drugs	66.67%	8
Open surgery	33.33%	4
Endoscopic surgery	0.00%	0
Wrist splinting	50.00%	6

Answer choices	Responses	Sample number
Manual therapies (mobilisations)	0.00%	0
Retraining (new ways of working)	16.67%	2
Acupuncture	16.67%	2
Yoga	0.00%	0
Ultrasound therapy	16.67%	2
Other (Specify)	16.67% Comment: *"Wrist splint bandages for support, supportive strapping/ taping"* *"natural injection"*	2

4.2.23 Alleviation of symptoms after treatment

Various treatment modalities exist to alleviate the symptoms of CTS. Respondents indicated how long their symptoms lasted after they received the treatment, as indicated in Table 4.13. The most common periods for each time frame (18.18% of respondents) were between 1–2 days, 1–3 weeks and 1–3 months before symptoms were experienced again. One participant (9.09%) experienced relief between 3–5 days, another participant between 4–7 months, and 1–3 years were also indicated as a symptom-free period, making the one comment even more pertinent that the only treatment that helped was surgery.

Table 4.13: Alleviation of symptoms after treatment

Answer choices	Responses	Sample number
1–2 days	18.18%	2
3–5 days	9.09%	1
1–3 weeks	18.18%	2
1–3 months	18.18%	2
4–7 months	9.09%	1
8–11 months	0.00%	0
1–3 years	9.09%	1
4–7 years	0.00%	0
8–12 years	0.00%	0
13–17 years	0.00%	0
18–23 years	0.00%	0
More than 24 years	0.00%	0
No symptoms experienced after therapy	0.00%	0
Other (Specify)	18.19% Comment: *"Lasted until I started any form of massage"* *"Nothing helped except surgery"*	2

4.2.24 Longevity within the beauty industry after being diagnosed with CTS

Symptoms of CTS make it difficult for those affected to complete their daily activities and often these somatologists are faced with a reduction in their daily activities or disengagement from the career. In the findings of the study as presented in Table 4.14, 45.45% of participants indicated a longevity of between 1–2 years as the time frame they remained in the industry following

diagnosis of CTS. The percentage of participants that remained in the industry following the diagnosis of CTS for a period of less than one year was 27.72%, with 18.18% of participants in the industry for a period of 3–5 years. Only one participant remained in the industry for more than five years.

Table 4.14: Longevity within the beauty industry after being diagnosed with CTS

Answer choices	Responses	Sample number
Less than a year	27.27%	3
1–2 years	45.45%	5
3–5 years	18.18%	2
More than 5 years	9.10%	1

4.2.25 Somatologists still working in the industry since diagnosis

Figure 4.8 illustrates that 66.67% of the somatologists still remain active in the industry. The remaining 33.33% of participants are no longer working in the field, which may be as a result of CTS.

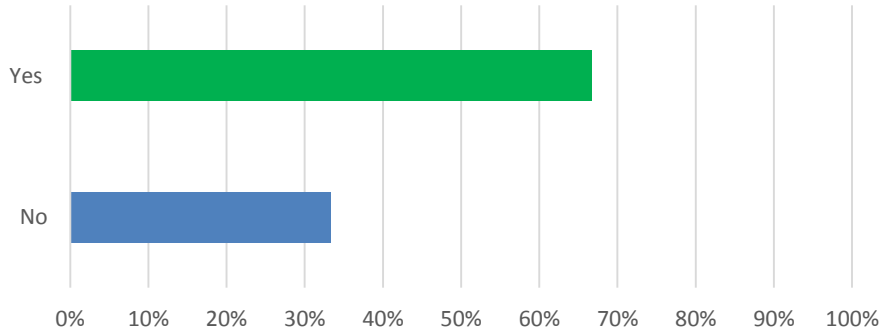


Figure 4.8: Somatologists still working in the industry since diagnosis

4.2.26 Hours of manual work per day

A total of 71.43% of the respondents worked between 6–10 hours per day and 28.57% of respondents indicated they were working between 0–5 hours per day, as illustrated in Figure 4.9. The responses may be cross-referenced with the minimum and maximum working hours as per labour law.

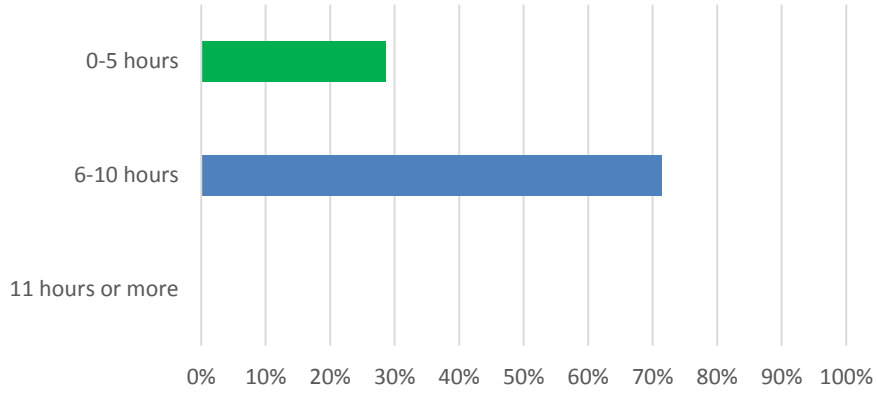


Figure 4.9: Hours of manual work per day

4.2.27 Hours of overtime

The majority of the respondents indicated they worked between 0–5 hours' overtime, 11.11% of the respondents worked between 6–10 hours and 11.11% of respondents indicated they worked 11 or more hours' overtime per month. Figure 4.10 illustrates the hours of overtime per month.

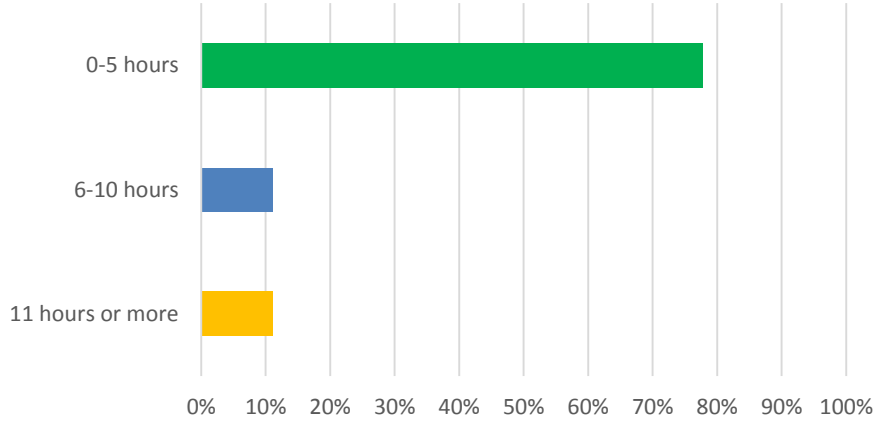


Figure 4.10: Hours of overtime

4.2.28 Overtime worked and still active in the industry

Respondents indicated how many hours of overtime they worked while they were still active in the industry, as indicated in Table 4.15. This additional time could have led to more strain on the wrist and hands, which was already experienced during the normal working hours. The majority of participants

(60%) indicated that they worked 0–5 hours' overtime, 20% of participants indicated that they worked 6–10 hours' overtime and a further 20% of participants indicated that they worked 11 or more hours' overtime per month.

Table 4.15: Overtime worked and still active in the industry

Answer choices	Responses	Sample number
0–5 hours	60.00%	6
6–10 hours	20.00%	2
11 hours or more	20.00%	2

4.2.29 Treatments performed on a weekly basis

The treatments listed below were performed on a weekly basis by the therapists/ somatologists. Table 4.16 outlines how often these treatments were being performed during the course of the week. Additionally, eyelash extensions and nail treatments were also commonly performed. The most common treatments performed in the industry are facials, followed by massages, pedicures and waxing. Spa treatments, manicures, gel treatments, nail and eyelash extensions were the least-performed treatments.

Table 4.16: Outline of treatments performed on a weekly basis

Answer choices	Responses	Sample number
None	16.67%	2
Facials	66.67%	8
Waxing	41.67%	5
Massage	50.00%	6
Spa treatments	33.33%	4
Pedicures	50.00%	6
Manicures	25.00%	3
Other (Specify)	25.00% Comments: " *"Gel treatments"*	3

Answer choices	Responses	Sample number
	"Nails and Eyelashes" *"I stopped doing things that can strain my hands"*	

4.2.30 Hand-intensive tasks outside of working hours

Participants were asked to note any activities that were weight-bearing on the wrist. These activities were performed outside of working hours and may not necessarily relate to beauty treatments. The participants' responses were to an open-ended question and the responses are noted below.

"No."

"I perform 20-minute massages on family members. However, even that short duration leads to the commencement of symptoms."

"Vacuuming, cleaning at least once a week, 2–4 hours."

"No.'

"No."

'Cooking (45 minutes–1 hour) Attending to my baby (lifting, etc.) 24 hours as I am a stay-at-home mom since his birth."

"Yes, I still do nail treatments after my daily work."

"Yes, admin work 4–6 hours most days."

"None."

"Gym."

"When I used to work in the industry I used to do people's hair and acrylic nails after hours at my house."

"No."

4.2.31 Techniques used during the training phase

Table 4.17 indicates the responses from participants regarding techniques used during their training phase before employment in the beauty industry. Half of the participants indicated that the training they had received was barely acceptable. 33.33% of the participants indicated that the training they had received was above average and only one participant indicated the training had been excellent.

Table 4.17: Techniques used during the training phase

	Answer choices				
	Excellent = 5	**4**	**3**	**2**	**Poor = 1**
Responses	8.33%	33.34%	50.00%	8.33%	0.00%
Sample number	1	4	6	1	0

4.2.32 The role of training in the development of CTS

The participants were asked whether their training had any influence on their development of CTS. The findings were rated on 'yes' or 'no' variables leading to an open-ended question to allow them to elaborate. 41.67% of participants answered "yes", indicating that the training they had received had a possible influence on the development of CTS, while 58.33% of participants indicated that they did not feel training had been a contributing factor to their development of CTS. The responses to the open-ended question are stated below.

> *"We should be warned of the dangers of carpal tunnel and trained on how to use our hands without damaging our wrists."*

> *"People only learn different ways of performing massage techniques without using their hands too much when they go on the boats but by then it's too late if they have worked on land before."*

> *"Applying lashes, you work with your hands, mainly wrist movements, etc."*

“I had early signs on high school already but it just got worse after I started working in the beauty trade.”

4.3 Conclusion

The findings of the study have been presented in this chapter. Each question of the questionnaire has been analysed and the responses graphically depicted to provide a clear view of what the data produced in the sample. Chapter 5 provides a deeper discussion of the findings.

CHAPTER 5: DISCUSSION

5.1 Introduction

The analysed data was discussed in relation to the objectives of this study. The collected data from the research tool has been taken into consideration in discussing whether the objectives were met. CTS development is present within the work environment (McFarlane, 2001; Wertz & Bryant, 2001; Rupert, 2014; Gcelu & Kalla, 2015; Jacquire, 2017), yet limited literature is available on various professions. Extensive research was done to source related articles within the field of somatology. However, none was found in South Africa concerning the prevalence of CTS among somatologists.

5.2 General prevalence of CTS among qualified somatologists in the Western Cape

Although various communication platforms were accessed in order to determine the prevalence rate of CTS among qualified somatologists in the Western Cape it should be taken into account that there are gaps in the research as not every company that was contacted responded with substantial information regarding somatologists diagnosed with CTS.

Pillay (2012:37) conducted a study using 200 garment workers in the province of KwaZulu-Natal. The results indicate that 63% of the participants presented with symptoms of CTS (Pillay, 2012:58). The author indicated that the prevalence of CTS could be linked to repetitive work with minimal rest breaks as 67% of the participants were among those that operated machinery. One hundred percent of the participants in this study were females. Pillay's (2012:37) results indicated a high prevalence rate in women, with the majority being of African descent. Riccò and Signorelli's (2017:201) study indicated a predominance of CTS in males, the sample size selected was 236 males and 198 females for the study. All the participants in the present study were women, which strongly supports the findings in the literature that CTS is more common in women. However, taking into account the number of participants

used for this study, the latter may not be regarded as conclusive evidence of the gender predominance of CTS among somatologists in the Western Cape. Similarly, although the results of the present study indicate a predominant coloured prevalence, due to the small number of participants, the results of the present study could conflict with future studies.

The average prevalence age in a study of poultry-processing employees was 39 years, with the majority of participants being African American women (Musolin, Ramsey, Wassell & Hard, 2014). Musolin and Ramsay (2017) reported an average prevalence age of 40 in Hispanic females. A negative correlation exists with the age which could be an indication that the older the person is, the less severe the condition would be. Older individuals could have stronger hands over time. However, Pillay's (2012:37) result indicated a higher prevalence in individuals over the age of 50. The latter is confirmed by Yunoki *et al.* (2017) who indicated that CTS occurs within a peak range of 40-60 years. They have also noted that older adults tend to present with more severe, long-term nerve entrapment. The majority of the participants in the present study were between 26 and 35 years of age, which does not conform with what has been stated in the literature (about the age of those afflicted with CTS). See also 1.2.2 (Sevy & Varacallo, 2019) and 2.3.1 (Dahlin *et al.* 2010:40).

The findings of this study indicate that most of the participants developed CTS within the first five years of working in the industry and almost all had developed it within the first decade. There is therefore clearly a strong possibility of developing CTS in the first few years of working in the industry. With the condition already moderate to severe at diagnosis, this indicates that the lack of information that exists in the industry regarding CTS may lead to somatologists experiencing symptoms of CTS long before diagnosis. By the time the condition is formally diagnosed time off from work is a necessity as indicated in the results of this study as somatologists need time to recover from surgery and require rest breaks from their daily tasks. The majority of the somatologists in this study only managed to work for between less than a year to two years in the field after diagnosis with CTS before needing to leave the industry in the interest of their health. Only one therapist was able to work for

five years before quitting. This indicates two possibilities for future investigation: working conditions do not allow effective early treatment of CTS and/ or training institutions are not providing somatologists with ergonomical techniques to prevent or ameliorate the onset of CTS. Given the current condition present in the sample, a third conclusion – that CTS is an inevitable consequence of the nature of the work – has significant serious implications for the industry and how it is organised. Salapatek (2015) and Salamon (2017) discussed how important self-care is especially if career longevity is dependent on it. Conolly and McKessar (2009:686) concluded that CTS is a constitutional condition: in some cases, work activities generate increased force and pressure within the carpal tunnel, also prolonged work in cold conditions and prolonged work with vibrating equipment may also be a contributing and substantial factor in the production of CTS. The work performed by beauty therapists and the manner in which it is performed increased the chances of developing MSD, thereby having a significant impact on beauty therapist's ability to complete their work (Jacquire, 2017).

Moodley and Naidoo (2015:98) conducted research on the prevalence of MSD among dentists in KwaZulu-Natal. These authors report that 109 dentists responded to a questionnaire, of which the majority were male. A third of the respondents were aged between 30–39 years and nearly two-thirds of the dentists considered that they were in good health and reported no medical conditions. However, 18 dentists had hypertension, 15 were diabetic, five reported having arthritis and only two dentists reported carpal tunnel syndrome. It was recommended in their study that dentists should work with two assistants in order to reduce strain on the hands. In the beauty industry, salon owners could consider employing more staff to reduce the strain on therapists. This could prevent over-use of the hands that can lead to CTS (see Chapter 6).

Accidents and injuries in the workplace are more common in men and younger individuals, those who have less experience, less educated workers as well as individuals with long working hours (Alali, Braeckman, Van Hecke, De Clercq, Janssens, & Wahab, 2017:178). Salamon (2017) elaborated the importance of

preventing injury to support career longevity. The article further explains that improper alignment of wrists, hands and especially the thumbs pose the biggest potential for injury. In a study by Bena, Giraudo, Leombruni and Costa (2013), the relationship between experience accumulated prior to the start of a new job and the risk of work injuries was investigated. Lesser work experiences were associated with a decreased injury rate. In the present study, most participants were working for only one to two years in the industry before they ended up developing CTS, regardless of the amount of overtime worked, level of education and amount of prior experience of the work.

5.3 Risk factors that contribute to CTS developing in somatologists

Zimmerman *et al.* (2017:165) found there is a relationship between diabetes mellitus and the severity of CTS. CTS and diabetic sensorimotor polyneuropathy often co-exist, causing difficulty in detecting the symptoms of CTS (Kaiser, Alvi, Ali, Ibrahim & Qadar, 2018:484). In a study by Tony, Tony, Selim and Saad (2018), a higher prevalence of CTS in non-diabetic individuals was evident, in line with the findings of this research that the majority of the sample has not been affected by CTS. Oktayaglu, Nas, Killinc, Tasdemir, Bozkurt and Yildiz (2015) concluded that a higher presence of CTS in individuals with diabetes mellitus existed. However, the diagnostic process of CTS is not influenced by whether individuals present with diabetes mellitus or not (Penkins, Olaleye & Bril, 2002:567). These conflicting results indicate that the possible link between diabetes and CTS requires further investigation.

The findings of this study indicated that diabetes mellitus and the development of CTS could indicate a risk factor as only one participant (the oldest person in the sample) had been affected by diabetes mellitus. This study excluded the onset of diabetes mellitus and the link in the development of CTS. The results could indicate a link with the development of CTS but this should be further investigated with a bigger sample size than was used for the study.

The literature outlined the scope of practice of a somatologists (cf 2.2.1). As all the participants were somatologists or therapists used in this study, the

development of CTS exists within the scope of practice. Somatologists who work with vibratory tools, completing treatments with minimal rest breaks and, as indicated by the sample, those who work as nail or lash technicians, are predisposed to develop CTS as the wrists remain in a flexed position for long periods of time while executing treatments. Being a masseuse predisposes the individual to higher severity of CTS when compared to somatologists and cosmetologists. This could be the result of more strain placed on the masseuse's hands during treatments. Salamon (2017) elaborates on the usage of the thumb during massage. Salamon (2017) explained that for every amount of pressure applied by the thumb, more pressure is created in the area of the wrist. Furthermore, injuries among massage therapists falls into categories of overuse or misuse. Thus, it is paramount to ensure the correct training principles even at the early onset of a somatologists career. The longer the individuals work in the industry, the higher the chance of developing CTS. As discussed in the literature, one has to use gravity and body weight rather than the wrist and fingers when providing a massage. Furthermore, there is a likelihood of developing CTS if too much pressure is applied through the wrist (Tuller, 2017). The most common treatments performed, based on the findings of this research, are facials and pedicures which are generally performed in a seated position. This leaves very little room to involve body weight and performing the treatment leads to increased risk of developing work-related injuries (cf 2.2.1.3 and 2.4). Occupational factors play a role in CTS, particularly work which involves exposure to the repetitive movements and/ or hand-held vibratory tools utilised by somatologists (Simmons, 1995:35; Nordmann 2007:193). Symptoms of CTS prevent individuals from completing tasks pertinent to their job descriptions and the pain associated with it may have a negative impact on the quality of life (McCallum *et al*. 2019). Jennifer Hathaway, a California-based massage therapist performed eight massages in one day, precipitating what she called a "massage hangover" which eventually led to the decision of working half-day (La Plante, 2013). Moving from a position of full-time employment to half-day implies reduced remuneration which has financial implications. Fewer massage treatments connote to less work being completed in a day, coinciding with less repetitive movements of the hands (cf.1.2.2) (Rakumakoe, 2019).

The four-day work week has been mooted for many companies around the world (Hinsliff, 2019). In some cases, it has worked and in others, it has merely been trialled. The aims of the four-day work week were to minimise the costs spent on the companies' utilities, to reduce employees' travelling costs and to increase their quality of life (Hinsliff, 2019). This has not been positive for all countries. In 2015, a Treehouse company in the United States implemented a 32-hour work week. After a year the policy was abandoned and the company was working even longer hours (BusinessTech, 2018a). Furthermore, with South Africa's high unemployment rate as noted by Pace (2019) sitting at 37% and Chutel and Kopf (2018), this might not be an ideal market for this policy, although somatologists would greatly benefit from this as it might give them time to recover and have sufficient rest for their hands. Furthermore, Pace (2019) discussed that the Congress of South African Trade Unions has made a motion that work hours be reduced. The Union claims by reducing the working hours may create more jobs. Therefore, the amount of work not performed by one person may create an opportunity of employment for another. In an article written by Chutel and Kopf (2018), South Africans may be some of the hardest workers in the world, as they are three times more likely to work 60 hours a week than Americans. However, given that almost all the participants in the sample had been diagnosed with CTS within 10 years, and considering that individuals in South Africa expect to work until at least 55 to 65 years, if the high prevalence of CTS among the participants is indicative of the industry, it would be bound to cause job insecurity, anxiety, disappointment or frustration among somatologists, with the future of their careers and roles as breadwinners uncertain.

In this study, the results indicate that the participants are predominantly right-handed with the presence of CTS symptoms in the fingers, forearms and wrists of both hands. This led to mild to severe pain, decreased strength, tingling, numbness, swelling and a tendency to drop items. The right hand was indicated as the predominant hand among the participants. Even though both hands experienced symptoms, somatologists experienced more pain in their right hands. This may indicate that training modalities and techniques are not

being followed as the pain symptoms are not evenly distributed or experienced throughout the hand. Most symptoms are experienced in the thumb. This indicates that the somatologists may rely on their thumbs as the main source of pressure application when completing treatments heightening the risk of incurring CTS when one area of the hand is being overused (Salamon, 2017). Luchau (2018) explained that hyperextension of the thumb may feel stable but it relies on stretching the articular ligaments and joint capsules, causing them to weaken or become sensitised over time leading to less stability and pain.

The additional hours spent doing tasks or treatments as indicated by the sample could be a contributing factor in CTS development. Using a vacuum machine for 2–4 hours after the working day as indicated in the sample would likely contribute to CTS development. Pillay (2012:63) indicated in her findings that participants spent additional hours on tasks outside of working hours that may serve as contributing factors in the development of CTS. Pillay (2012:64) elaborated that participants had no access to a health and safety officer relating to the health risks of CTS. This corresponds with indications in the literature that health and safety in all aspects are important to act as preventative measures. Furthermore, the risk of CTS development as shown in this study may be linked to limited rest breaks or inadequate time left for recovery. CTS is not restricted to one hand as both are required for the execution of tasks (Musolin *et al.* 2014). This is confirmed in this study, as both hands are typically used to perform treatments, which is why the symptoms among the respondents were experienced in both hands.

5.4 Current preventative measures and management for CTS in somatologists

As shown in this study, CTS exists in the beauty industry and impacts on functions and the quality of life. The best treatment options should be considered to optimise effectiveness and improve the quality of life of the individuals. Beauty therapy already weighs heavily on the wrist of the somatologist, and the additional work done after hours or the additional treatments may not be beneficial for full-time working therapists. The

existence of CTS suggests that there is not sufficient rest breaks for the wrists or hands in the daily practice. This indicates a general need for a preventative strategy that integrates ergonomical work conditions with a progressive approach to employee wellness. Given that CTS is developing early in the somatologist's career as the findings show, it is important that the preventative strategy includes following correct training principles.

Many extant studies show the need for wellness programmes and their efficacy and contribution to the success of companies if well-designed (Walters, 2008; Hanaysha, 2016; Tandon, 2018, to name a few). Walters' (2008) study in Australia and New Zealand also found that 56% of professionals believed that their organisations did not do enough to support their health and well-being as employees. Similarly, in the current study, 40% of the participants indicated that they had received no support or compassion from their employers, which negatively affected their quality of life or careers. The findings from this research indicate not only that individuals should be informed about the dangers of CTS, but preventative techniques could be incorporated in training and supported in a wellness programme that may improve the treatment quality of somatologists and the longevity of their careers.

The somatologists included in this study had feelings of confusion, disappointment, frustration, anxiety, denial, irritation or even blaming themselves as responses to CTS. Employers were reportedly frustrated with the employees developing CTS or unsympathetic which could become detrimental to employees' mental and psychological state. Somatologists indicated in this study that they had concerns about their job security and future careers. No participant reported a referral system in place in the business for access to a psychologist and only one somatologist in this study was referred to a physiotherapist by the employer.

It was noted in this research that somatologists have to do many treatments with their hands without the option of other ways to complete treatments such as massages. This indicates that employers are not ensuring an optimal

environment for growth or the advancement of skills in the working environment that might relieve the physical strain that leads to CTS.

The study established that the training received had no influence on the development of CTS. However, emerging somatologists should be informed of the dangers of CTS and what measures and strategies can be adopted to prevent or minimise CTS.

As shown in the study, somatologists are already exposed to feelings of frustration, anxiety and irritation pertaining to the longevity of their careers, and a diagnosis of CTS must be followed by additional support in the workplace to accommodate somatologists with CTS, especially when it is work related. Somatologists afflicted with CTS experience mild to severe pain, are unable to fully use their hands and, according to McCallum *et al.* (2019), may have higher levels of anxiety and depression. As the condition worsens, they may require absences from work for treatment or recuperation and may be forced to leave their employment prematurely. All of these consequences imply negative impacts on customer service and profitability. Yet, despite this, there was little evidence in the sample of employers investing seriously in the welfare and wellness of their employees. One participant indicated that they did not inform employers of their condition. Somatologists may be less forthcoming as they are unsure of the health and safety procedures of the workplace or what assistance they would receive after disclosing their condition. This has a negative effect on the relationship between employers and employees. Simultaneously, the lack of communication affects the productivity of the therapist and the treatment quality that the business aims to offer and could lead to detrimental consequences for both the business and the therapist, including job losses (cf 4.2.10). The results obtained may suggest the need for better relationship building with the employees and sympathy for what they are enduring. This may in tern reduce some of the feelings experienced by somatologists (mentioned earlier) when they have more support by the industry.

In Canada, a study was conducted to establish coping mechanisms after job losses (Landman & Buchanan, 2010:7). The results indicated that injury in the workplace can have many negative effects including divorce, lack of empathy from family and friends and being shunned by former friends and co-workers. However, the issue of the consequences of job losses was not a focus of the study and are unknown for the sample surveyed. Landman and Buchanan (2010:7) presented findings related to the Cape Metropole, where one individual experienced feelings of disillusion because he was under the wrong impression of the support he might have received in the compensation process. This left him feeling anxious about the possibility of returning to work and whether he would be able to support his family.

The most common treatments in this study population were wrist splints and non-steroidal anti-inflammatory drugs, which are some of the less expensive treatment types. However, the effects only lasted from a day or two or up to three months. Even though these are less expensive treatments, it can become financially debilitating if constant medication is to be bought to alleviate the symptoms being experienced. Given the lack or minimal medical aid support in the beauty industry and increasing cost of medications, having the condition of CTS is bound to cause feelings of anxiety and frustration. Wrist splinting is accepted as an effective first-line treatment (Albalawi, Alrahman, Althagafi, Alrahili, Alqahtani, Almutairi, Alajmi, Aljohani, Abualnassr, & Sabah, 2018), but only in the early stages of CTS (Shannon & Rizzolo, 2012:25). According to Chung *et al.* (2016:867), wrist splinting alone may not be an effective treatment to relieve symptoms. In this study, the participants who used wrist splinting found relief for short periods of time. Non-steroidal anti-inflammatory drugs also form part of short-term treatment strategies for CTS (Vahi *et al.* 2014:105). The results obtained by Shannon and Rizzolo (2012:25) showed that anti-inflammatory drugs decreased the pressure in the carpal tunnel. While these and other treatments and exercise may be effective in the management of CTS among somatologists, further exploration and a study more focussed on treatment are required to inform management and treatment strategies for somatologists to avoid acquiring CTS.

5.5 Conclusion

Considering the findings of this research, a sound relationship exists between the development of CTS and work-related therapy or treatments executed. It is imperative that the correct training techniques are exercised to act as a preventative measure. Beauty schools should enforce strict measures with exercise routines in order to prevent the earlier onset of CTS and prolong productive careers within the industry. However, the high prevalence of CTS in the sample, supported by the similar prevalence reported in studies elsewhere indicates a high probability that CTS is an occupational hazard and that beauty therapy is a high-risk occupation for CTS and possibly other MSDs. Rupert (2014) reported that a student at the Chris Beauty College in Gulport, already experienced symptoms of CTS four weeks into training. The symptoms became more apparent as she was filling artificial nails (Rupert, 2014). In a study conducted by Kruger, Khumalo and Houreld (2017), it was reported in their results that the osteoarthritic symptoms experienced by massage therapists are responsible for placing strain on their ability to perform daily tasks. Vallet (2019) discussed that massage therapists are to adopt good self-care habits to maintain a fruitful career. Furthermore, Vallet (2019) explained how a massage therapist had to leave the industry for a year after her osteoarthritis got worse. Manicures and pedicures (cf 2.2.1) executed by a nail technician (job title) are at high risk of developing CTS and could cost the ending of a career within the scope of practice (Sparlin, 1996).

Employers should, therefore, consider their management role in regard to CTS as it not only affects the therapist but the growth and sustainability of the industry at large. By ensuring that the type, frequency and number of treatments performed by the therapist are considered, along with ergonomical, environmental and service conditions in which they work, managers can increase the quality of the treatments and services provided while simultaneously inhibiting the development of CTS.

The results of this study indicate many opportunities for deeper exploration and future studies due to the nature and size of the population group. Specific conclusions and recommendations are offered in Chapter 6.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

Somatologists attempts to ensure that clients receive the best possible treatment for their conditions or injuries (Henrico, Maritz & Bezuidenhout, 2019). The industry offers various treatments, with a somatologists hands being the most prominent tool used in executing these treatments. With the present condition (CTS), the latter may become difficult as discussed in the literature (cf 2.3) and results obtained from this study (cf chapter 4).

This study aimed to identify the risk factors, prevalence and management of CTS amongst somatologists. In order to determine this, a questionnaire was completed by qualified somatologists who have been medically diagnosed with CTS. With the lack in the availability of using a large sample size for this study, the results failed to show a true reflection of the prevalence of CTS amongst somatologists within the beauty industry due to various factors discussed in chapter 3. Alternatively, risk factors that were identified from the collected data may be used as a guideline for future studies (cf 1.1.3 and 5.3).

This study has eliminated any correlation between the training received by somatologists and the onset of CTS development (cf 4.2.32). No conclusive evidence indicated that the training received by somatologists in training had an influence in the development of CTS. However, the management of the condition and financial constraints linked to CTS is important in maintaining a career. Suffering with the condition of CTS may be difficult to execute treatments, as the results indicate (cf table 4.14), therapists leave their place of work after being diagnosed with CTS. The industry at large may have a beneficial influence in this regard (cf 5.3) as the need for wellness programs within the industry exists and may assist both employer and employee in creating a sustainable working environment.

This chapter draws conclusions from the findings presented in the study. With this study's quantitative approach recommendations are highlighted for future research.

6.2 Conclusion

CTS among therapists/ somatologists has not been adequately researched and this study provides further evidence that there is a lack of published information that currently exists on this topic. Vosloo (2009) agreed that the need for investigation into the success of the profession in South Africa is paramount. The results have shown that the repetitive use of the hands/ wrists places tremendous physical strain on a somatologist which can lead to developing CTS. This physical strain not only affects their daily duties, which have to be amended in some cases, but also causes emotional stress and insecurity as many somatologists may need to reconsider what they thought would be a lifelong career path.

Due to the low remuneration characteristic of the industry (cf 2.5), the risks of developing CTS increases as individuals are required to work long hours to sustain a healthy income for basic necessities. The working environment is not always adjusted ergonomically to minimise the risk of CTS (cf 2.4). This may negatively affect the quality of treatments provided by somatologists within the beauty industry and, therefore, employers should prioritise addressing the health and wellness concerns of their somatologists to sustain the profitability of their businesses (cf 5.4). In the present study, somatologists indicated the beneficial impact of awareness of the damages of CTS and how to effectively use their hands and wrists (cf 4.2.32). Not only do people learn in different ways, but how to effectively use the hands, is important in eliminating the cause for concern in developing CTS (Luchau, 2018). Similarly, the work done after hours should also be considered as a contributing element in the management of CTS. As Pillay (2012:63) indicated in her findings that participants spending additional hours on tasks outside of working hours may serve as a contributing factor in the development of CTS (cf 5.3). Somatologists already spend a lot of their time completing treatments as their

job requires (cf 1.3) it is therefore also important that somatologists consider reducing the additional hours ensuring the management of CTS.

6.3 Recommendations

The following recommendations reflect the interpretations and inferences drawn from the research data and findings of the study. Recommendations with respect to the employers, institutions and training facilities and implications for future studies are also included. Where relevant, the limitations of the current study are alluded to.

6.3.1 Recommendations for the employers or business owners

In considering all the information presented in the study, and particularly the responses of participants, it may be concluded that employers or business owners play a pivotal role in determining the longevity of a therapist's career. The following serves as specific recommendations.

Employers should ensure that health and safety measures are readily available in the working environment. This will ensure that somatologists familiarise themselves with operational protocols and health and safety standards and feel free to approach employers with health-related concerns. This allows for awareness in CTS and an open dialogue between employer and employee relations. Furthermore, these health and safety protocols should be used in health and safety induction training and a competency test to be written to ascertain if the somatologist is fully competent in the subject matter.

Employers should have procedures in place to monitor whether somatologists are utilising the health and safety strategies set out and adhering to the health and safety policies. The South African Occupational Health and Safety Act of South Africa ensures the protection of persons and those other than persons at work against hazards arising out or in connection with activities of persons at work. It is therefore aimed and an attempt by government to prevent and avoid work related injuries and illnesses (South African Labour Department, 1993). The Act may be a tool helping the beauty industry to make tailored

changes to their policies and procedures in an attempt to prevent and manage the development of CTS. It is evident that employers are not always aware of their somatologist's health-related concerns. Employers must regularly monitor and assess the health and safety of somatologists within the work environment. This could be done by regularly completing short questionnaires, complete the diagnostic tests that does not require medical apparatus that have been discussed in the literature (cf 2.3.4) or have a certified medical practitioner assess employees at an interval that bests suit the business during their financial year.

Employers should maintain a flexible working environment to enable those suffering from CTS to recover. This may include ergonomical physical adjustments to the workspace, changes in treatments offered, more flexible work hours with longer rest breaks, employing more somatologists in shorter shifts and implementing remedial exercise in the normal work day. Spa Staff.com (2018) has highlighted the need for spa and beauty employers to consider the welfare of their staff beyond the general health and safety aspects.

Employers should consider meaningful contributions towards a medical aid or subsidising medical expenses incurred by those diagnosed with CTS, especially as the contributing factor has been identified in this and other studies to almost certainly be work related (cf 2.5). Ruttenberg (2019:1) concluded that a worker who has CTS is often faced with the financial burden CTS has on an individual. Foley, Silverstein and Polissar (2007) conducted the research on the long term earnings of CTS claimants in Washington State and the findings indicated that CTS claimants recover to about half of their pre-injury earnings. They have also had more time-loss than the comparison group that was used.

6.3.2 Recommendations to institutions or training facilities

Based on the results of the study, therapists' training could well be implicated as a contributing factor in the development of CTS. The following are therefore recommended for institutions:

- Implement thorough hand exercise programmes to serve as a preventative measure before and after completing treatments.
- Revise training manuals, especially those techniques that place additional strain on the wrist/ hands.
- Ensure that students currently enrolled in somatology courses are competent to use the correct techniques before allowing them to work in student salons during their training period.
- Assessment criteria should be uncompromising to allow less room for error.
- Alumni may be asked to complete a survey by the educational facilities to enable qualified employed somatologists to rate the training received in relation to their working environments and any health-related conditions that may have developed in the workplace. If collated and analysed, such information would be of immense value to all industry stakeholders and inform future legislation, regulations and policies for the industry.

6.3.3 Recommendations for future studies

The research followed a quantitative approach by design. While the results were valuable, a qualitative approach in future research will allow somatologists to express emotionally how the condition of CTS affects their careers. Furthermore, future studies may require further evaluation, incorporating the employers' views on CTS and the role it plays in their employees' careers. With both the employer and employee input, statistical data can provide valuable research to further studies.

Prospective therapists/ students may also be evaluated to determine the prevalence rate of CTS during training, as well as individuals who have not yet

been medically diagnosed with CTS or other MSDs. This is particularly important given that the findings indicated that CTS-afflicted somatologists were still relatively young and in the early stages of their careers.

Future studies may benefit from a multi-disciplinary approach such as the inclusion of a medical practitioner and/ or physiotherapists to determine the severity of CTS. CTS is also not confined to the Western Cape and therefore research could be extended to a national study. This will facilitate between-country comparisons and the global accumulation of usable statistical data.

Lastly, since medical (pharmacological and surgical) treatments are progressively expensive, future studies could focus more on preventative and remedial treatment strategies and ensure that such information is available to business owners and somatologists alike.

This study has therefore not indicated the prevalence of CTS amongst somatologists within the Western Cape. However, with the data presented and conclusions drawn, future studies may benefit from this study by altering the study design or the use of the collected data to explore the relevance and prevalence of CTS within the beauty industry. This study may pose as a guideline to researches and prospective researches within the beauty industry and beyond to explore the effects CTS has on the sustainability of the industry.

REFERENCES

Aboong, M.S. 2015. Pathophysiology of carpal tunnel syndrome. *NeuroSciences,* 20(1): 4-9.

Adetiba, A. J. 2017. The prevalence and risk of musculoskeletal disorders among dental technicians in South Africa. M.Ed., Durban University of Technology. Available at: https://openscholar.dut.ac.za/bitstream/10321/2537/1/ADETIBA_JN_2017.pdf (Accessed 17 June 2019).

Adkins, J. 2018. *Here's what will happen at your first manicure appointment*. Available at: https://www.liveabout.com/what-should-i-expect-at-my-first-manicure-appointment-3013304 (Accessed 12 February 2019).

Akaranga, S.I. and Makau, B.K. 2016. Ethical considerations and their application to research: a case of the University of Nairobi. *Journal of Educational Policy and Entrepreneurial Research,* 3(12): 1-9.

Alali, H., Braeckman, L., Van Hecke, T., De Clercq, B., Janssens, H. and Wahab, M. A. 2017. Relationship between non-standard work arrangements and work-related accident absence in Belgium. *Journal of Occupational Health,* 59(2): 177–186.

Albalawi, S. S. A., Alrahman, R. W. A., Althagafi, A. M., Alrahili, A. S., Alqahtani, S. S., Almutairi, S. M., Alajmi, D. M., Aljohani, Z. S., Abualnassr, A. and Sabah, A. M. 2018. Evaluation of carpal tunnel diagnosis, management, and outcome in primary health care center. *Egyptian Journal of Hospital Medicine,* 73(3): 6230–6237.

Almeida, V. C., Pinheiro, L. R., Salineiro, F. C. S., Mendes, F. M., Neto, J. B. C., Cavalcanti, M. G. P. and Pannuti, C. M. 2017. Performance of cone beam computed tomography and conventional intraoral radiographs in detecting interproximal alveolar bone lesions: a study in pig mandibles. *BCM Oral Health,* 17: 100.

Ambrosio, D.V. 2018. Incidence and need of advanced aesthetic somatology in South Africa. M.Ed., Central University of Technology. Available at: http://ir.cut.ac.za/bitstream/handle/11462/1887/Ambrosio%2C%20Diana%20Ventura.pdf?sequence=1&isAllowed=y (Accessed 03 March 2020).

Anderssen, J. 2016. What is a health worker? How spa therapists in a Norwegian health hotel understand their work. *Anthropology and Medicine,* 23(1): 30–41.

Arankalle, D. V. 2013. Integrating naturopathy and yoga in management of musculoskeletal disorders. *International Journal of Medicine*, 4(1): 120–121.

Atroshi, I., Flondell, M., Hofer, M. and Ranstam, J. R. 2013. Methylprednisolone injections for the carpal tunnel syndrome. *American College of Physicians*, 159(5): 309–318.

Atroshi, I., Lyrén, P. and Gummesson, C. 2009. The 6-item CTS symptoms scale: a brief outcomes measure for carpal tunnel syndrome. *Quality of Life Research*, 18(3): 347–358.

Avashti, A., Ghosh, A., Sarkar, S. and Grover, S. 2013. Ethics in medical research: general principles with special reference to psychiatry research. *Indian Journal of Psychiatry,* 55(1): 86–91.

Bakhtiary, A. H. and Rashidy-Pour, A. 2004. Ultrasound and laser therapy in the treatment of carpal tunnel syndrome. *Australian Journal of Physiotherapy*, 50(3): 147–151.

Barnham, C. 2015. Quantitative and qualitative research: perceptual foundations. *International Journal of Market Research*, 57(6): 837–854.

Bena, A., Giraudo, M., Leombruni, R. and Costa, G. 2013. Job tenure and work injuries: a multivariate analysis of the relation with previous experience and differences by age. *BCM Public Health,* 13: 869.

Bennett, K. J. 2016. A quick history of make-up. Available at: https://kjbennett.com/makeup-history/ (Accessed 17 September 2019).

Blumenthal, S., Herskovitz, S. and Verghese, J. 2006. Carpal tunnel syndrome in older adults. *Muscle Nerve,* 34(1): 78–83.

Braun, M. B. and Simonson, S. J. 2014. *Introduction to massage therapy*. 3rd ed. Philadelphia: Wolters Kluwer.

Brown, A. 2018. *What is a facial?* Available at: https://www.tripsavvy.com/what-is-a-facial-3090025 (Accessed 12 February 2019).

Brown, A. 2019. *The Swedish massage: full body therapy.* Available at: https://www.tripsavvy.com/what-is-a-swedish-massage-3090297 (Accessed 9 September 2019).

Bryman, A., Bell, E., Hirschsohn, P., Dos Santos, A., Du Toit, J., Masenge, A., Van Aardt, I. and Wagner, C. 2016. *Research methodology: business and management contexts*. Cape Town: Oxford University Press Southern Africa.

BusinessTech. 2018a. *Companies are adopting a 4-day work week – but do they work?* Available at: https://businesstech.co.za/news/business/274891/companies-are-adopting-a-4-day-work-week-but-do-they-work/ (Accessed 25 August 2019).

BusinessTech. 2018b. *These are the cheapest and most expensive medical aids in South Africa*. Available at: https://businesstech.co.za/news/lifestyle/259219/these-are-the-cheapest-and-most-expensive-medical-aids-in-south-africa/ (Accessed 24 August 2019).

Cambridge English Dictionary. n.d. Anonymity [definition]. Available at: https://dictionary.cambridge.org/dictionary/english/anonymity (Accessed 10 March 2020).

Cambridge English Dictionary. n.d. Cosmetology [definition]. Available at: https://dictionary.cambridge.org/dictionary/english/cosmetology (Accessed 23 January 2019).

Canova, S., Cortinovis, D.L. and Ambrogi, F. 2017. How to describe univariate data. *Journal of Thoracic Disease,* 9(6): 1741-1743.

Cape Peninsula University of Technology. n.d. *Wellness Sciences.* Available at: https://www.cput.ac.za/academic/faculties/healthwellness/departments/somatology (Accessed 09 March 2020).

Carlson, H., Colbert, A., FrydI, J., Arnell, E., Elliot, M. and Carlson, N. 2010. Current options for nonsurgical management of carpal tunnel syndrome. *International Journal of Clinical Rheumatology,* 5(1): 129–142.

Chammas, M., Boretto, J., Burmann, L. M., Ramos, R. M., Dos Santos Neto, F. C. and Silva, J. B. 2014. Carpal tunnel syndrome – part 1 (anatomy, physiology, etiology and diagnosis). *Sociedade Brasileira de Orthopedia e Traumatologia*, 49(5) Part 1: 429–436.

Chen, Y., Scholz, J. and Thomas, D. 2015. *Ultrasound evaluation for carpal tunnel syndrome*. Available at: http://marylanddo.org/wp-content/uploads/2015/12/Ultrasound-Evaluation-for-Carpal-Tunnel-Syndrome.pdf (Accessed 17 June 2019).

Chung, V. C. H., Ho, R. S. T., Liu, S., Chong, M. K. C., Leung, A. W. N., Yip, B. H. K., Griffiths, S. M., Zee, B. C. Y., Wu, J. C. Y., Sit, R. W. S., Lau, A. Y. L. and Wong, S. Y. S. 2016. Electroacupuncture and splinting versus splinting alone to treat carpal tunnel syndrome: a randomised controlled trial. *Canadian Medical Association Journal*, 188(12): 867–875.

Chutel, L. and Kopf, D. 2018. *South Africans are among the hardest workers in the world.* Available at: https://qz.com/africa/1282780/south-africans-are-among-the-hardest-workers-in-the-world/ (Accessed 12 March 2020).

Conolly, W. B. and McKessar, J. H. 2009. Carpal tunnel syndrome. Can it be a work related condition? *Australian Family Physician*, 39(9): 694–686.

Cook, A. 2015. Infant massage: the practice and evidence-base to support it. *British Journal of Midwifery,* 23(3): 166–170.

Cook, B. G. and Cook, L. 2008. Non-experimental quantitative research and its role in guiding instruction. *Intervention in School and Clinic,* 44(2): 98–104.

Covelli, G. 2019. *What happens during a facial treatment?* Available at: https://www.livestrong.com/article/199317-what-happens-during-a-facial-treatment/ (Accessed 12 February 2019).

Crnković, T., Bilić, R., Trkulja, V., Cesarik, M., Gotovac, N. and Kolundžić, R. 2012. The effect of epineurotomy on the median nerve volume after the carpal tunnel release: a prospective randomised double-blind controlled trial. *International Orthopaedics,* 36(9): 1885–1892.

Cutler, N. 2019. *Nudity and Esalen massage*. Available at: https://www.integrativehealthcare.org/mt/esalen-massage-and-nudity/ (Accessed 17 June 2019).

Dahlin, L. B., Salö, M., Thomsen, N. and Stütz, N. 2010. Carpal tunnel syndrome and treatment of recurrent symptoms. *Journal of Plastic Surgery and Hand Surgery*, 44(1): 4–11.

Darnell, B. D., Sturgeon, J. A., Cook, K. F., Taub, C. J., Roy, A., Burns, J. W. Sullivan, M. and Mackey, S. C. 2017. Development and validation of a daily pain catastrophising scale. *The Journal of Pain,* 18(9): 1139–1149.

Davis, G. 2006. Occupation and carpal tunnel syndrome. *Royal Australian College of Surgeons,* 1130-1131.

De Pinho Teixeira Alves, M. and De Araújo, G. C. S. 2011. Low-level laser therapy after carpal tunnel release. *Revista Brasileira de Ortopedia*, 46(6): 697–701.

Dictionary.com. n.d. Somatology [definition]. Available at: http://www.dictionary.com/browse/somatology?s=t (Accessed 20 May 2017).

Duman, S., Sahin, V., Sofu, H., Camurcu, Y. and Ucpunar, H. 2017. Can flexor tenosynovectomy and microsurgical epineurectomy improve clinical outcomes following open carpal tunnel release? *SICOT-J,* 3(28): 1–5.

Echchaoui, A., Mourafiq, O., Ahmed, A. A., Hafidi, J., Mazouz, S. E., Gharib, N. and Abbassi, A. 2016. Carpal tunnel syndrome: therapeutic management and outcome for 20 cases. *Medica Innovatica*, 5(2):39–42.

El Kosery, S. M., Elshamy, F. F. and Atta Allah, H. A. 2012. Effect of kinesio tape in the treatment of antenatal carpal tunnel syndrome. *Indian Journal of Physiotherapy and Occupational Therapy*, 6(3): 122–126.

Embong, N. H., Soh, Y. C., Ming, L. C. and Wong, T. W. 2017. Perspectives on reflexology: a qualitative approach. *Journal of Traditional and Complementary Medicine*, 5(4): 197–206.

Faour-Martín, O., Martín-Ferrero, M. Á., Castrillo, A. V., Almaraz-Gómez, A., Valverde-García, H. A., Liñares, L. A. and De la Red-Gallego, M. A. 2013. Long-term effects of preserving or splitting the carpal ligament in carpal tunnel operation. *Journal of Hand and Plastic Surgery*, 47(4): 263–267.

Farrell, S. 2016. *Open-ended vs closed-ended questions in user research.* Available at: https://www.nngroup.com/articles/open-ended-questions/ (Accessed 17 September 2019).

Fernandez, E. 2001. *Review of the McGill Pain Questionnaire*. Available at: https://www.researchgate.net/publication/263655526_Review_of_the_McGill_Pain_Questionnaire (Accessed 23 August 2019).

Foley, B. 2018. *What is SPSS and how does it benefit survey data analysis?* Available at: https://www.surveygizmo.com/resources/blog/what-is-spss/ (Accessed 17 September 2019).

Foley, M., Silverstein, B. and Polissar, N. 2007. The economic burden of carpal tunnel syndrome: long-term earnings of CTS claimants in Washington State. *American Journal of Industrial Medicine,* 50(3): 155-72.

Gcelu, A. and Kalla, A. A. 2015. Musculoskeletal disorders: disease and challenges in the developing world. *South African Medical Journal*, 105(12): 1070–1071.

Gehret, K. 2010. *Body work: careers in massage therapy*. Sausalito, California: Soulstice Media.

Georgia, Research LifeLine. 2012. *White Paper Series for Survey Methods*. Atlanta, Georgia: Research LifeLine. Available at: http://cdn2.hubspot.net/hub/58820/file-17649547-pdf/docs/rl_wp_six_advantages_online_surveys.pdf (Accessed 10 March 2020).

Ghasemi-Esfe, A. R., Khalilzadeh, O., Mazloumi, M., Vaziri-Bozorg, S. M., Niri, S. G., Kahnouji, H. and Rahmani, M. 2011. Combination of high-resolution and color Doppler ultrasound in diagnosis of carpal tunnel syndrome. *Acta Radiologica,* 52(2): 191–197.

Ghasemi-Rad, M., Nosair, E., Vegh, A., Mohammadi, A., Akkad, A., Lesha, E., Mohammadi, M. H., Sayed, D., Davarian, A., Maleki-Miyandoab, T. and Hasan, A. 2014. A handy review of carpal tunnel syndrome: from anatomy to diagnosis and treatment. *World Journal of Radiology,* 6(6): 284–300.

Glen, S. 2017. *Non-probability sampling: definition, types*. Available at: http://www.statisticshowto.com/non-probability-sampling/ (Accessed 17 October 2017).

Goertzen, M. J. 2017. Applying quantitative methods. *Library Technology Reports*, 53(4): 3–31.

Grecu, G. and Ciobanica, M-L. 2014. Study on determination of the quality of higher education in Romania using Statistical Package for the Social Sciences Software. *Economics, Management and Financial Markets*. 9(4): 368–375.

Guan, W., Lao, J., Gu, Y., Zhao, X., Rui, J. and Gao, K. 2018. Case-control study on individual risk factors of carpal tunnel syndrome. *Experimental and Therapeutic Medicine,* 15(3): 2761-2766.

Hains, G., Descarreaux, M., Lamy, A. and Hains, F. 2010. A randomised controlled (intervention) trial of ischemic compression therapy for chronic carpal tunnel syndrome. *Journal of the Canadian Chiropractic Association*, 54(3): 155–163.

Halac, G., Demir, S., Yucel, H., Niftaliyev, E., Kocaman, G., Duruyen., H., Kendirli, T. and Asil, T. 2015. Splinting is effective for night-only symptomatic carpal tunnel syndrome patients. *Journal of Physical Therapy Science*, 27(4): 993–996.

Hanaysha, J. 2016. Improving employee productivity through work engagement: evidence from higher education sector. *International Journal of Industrial Engineering Computations*, 6(10): 61–70.

Hankins, C. L. 2012. Carpal tunnel syndrome caused by a fibrolipomatous hamartoma of the median nerve treated by endoscopic release of the carpal tunnel. *Journal of Plastic Surgery and Hand Surgery*, 46(2): 124–127.

Hargreaves-Norris, C. 2014. *Faradic body treatment*. Available at: https://www.slideshare.net/hpinn/faradic-body-treatment (Accessed 17 February 2019).

Heale, R. and Twycross, A. 2015. Validity and reliability in quantitative studies. *Evidence-Based Nursing,* 18(3): 66–67.

Healthline. 2017. *Carpal tunnel syndrome*. Available at: https://www.healthline.com/health/carpal-tunnel-syndrome (Accessed 13 February 2019).

Henrico, K., Maritz, J.E. and Bezuidenhout, J. 2019. Self-managing individual wellness for the health professional: A somatology perspective. *Health SA Gesondheid,* 24(0): 1-8.

Hersh, E. 2019. *About wrist flexion and exercise to help improve it*. Available at: https://www.healthline.com/health/wrist-flexion (Accessed 23 August 2019).

Hinsliff, G. 2019. *The rise of the 4-day week*. Available at: https://www.huffpost.com/entry/four-day-working-week-overwork-life-balance_n_5c360351e4b0f5aba7da3d5a?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAMaiHknxuTBNKHIyDeFRFaAWgJYvbGk-oegUoBkYhGUjF4sbWxnIl00DoSpl_bcIkhFB6OB9Wwp_slxjdg_tsV1hwrbvBKI0h365eToVsGLXMfcbBUKW9Al86o09lecXrCO1f09mmYoNrhnsFIT0mf-stt9lAYF62EfJvJSAvGow (Accessed 25 August 2019).

Huff, J. S. 2019. *Electromyography (EMG).* Available at: https://www.emedicinehealth.com/electromyography_emg/article_em.htm#what_facts_should_i_know_about_electromyography_emg (Accessed 23 August 2019).

Huizen, J. 2019. *Is it possible to reverse diabetic neuropathy?* Available at: https://www.medicalnewstoday.com/articles/317923 (Accessed 09 March 2020).

Human, N. 2016. Carpal tunnel syndrome in physiotherapists in Bloemfontein. M.Sc., University of the Free State. Available at: http://scholar.ufs.ac.za:8080/xmlui/bitstream/handle/11660/4794/HumanN.pdf?sequence=1&isAllowed=y (Accessed 17 June 2019).

Hunt, K. J., Hung, S. K., Boddy, K. and Ernst, E. 2009. Chiropractic manipulation for carpal tunnel syndrome: a systematic review. *Hand Therapy*, 14(4): 89–95.

Indeed. 2019. *Beautician salaries in South Africa.* Available at: https://www.indeed.co.za/salaries/Beautician-Salaries (Accessed 24 August 2019).

Isa Carstens Academy. 2019. *What is the study of somatology?* Available at: http://www.isacarstens.co.za/articles/what-is-the-study-of-somatology/ (Accessed 23 January 2019).

Isa Carstens Academy. 2020. *What is the study of somatology?* Available at: https://www.isacarstens.co.za/articles/what-is-the-study-of-somatology/ (Accessed 09 March 2020).

Jack, L., Hayes, S. C., Scharalda, J. G., Stetson, B., Jones-Jack, N. H., Vallerie, M., Kirchain, W. R. and LeBlanc, C. 2010. Appraising quantitative research in health education: guidelines for public health educators. *Health Promotion Practice,* 11(2): 161–165.

Jacobs, J. 2018. *Your guide to medical aid insurance and costs.* Available at: https://www.fin24.com/Finweek/Personal-finance/your-guide-to-medical-aid-and-insurance-costs-20181107 (Accessed 24 August 2019).

Jacquire, J. 2017. The epidemiology of work-related musculoskeletal disorders in beauty therapists working within the hotel spa industry in the eThekwini municipality. M.Ed., Durban University of Technology. Available at: https://ir.dut.ac.za/bitstream/10321/2565/1/JACQUIRE_J_2017.pdf (Accessed 13 February 2019).

Jagga, V., Lehri, A. and Verma, S.K. 2011. Occupation and its association with carpal tunnel syndrome - A review. *Journal of Exercise Science & Physiotherapy*, 7(2): 68-78.

Janse van Rensburg, M. 2018. *Medical aid in the workplace*. Available at: https://talentmagnet.co.za/2017/05/04/medical-aid-workplace-101/ (Accessed 24 August 2019).

Jiang, J., Chang, W., Wu, J., Lai, P. T. and Lin, H. 2011. Low-level laser treatment relieves pain and neurological symptoms in patients with carpal tunnel syndrome. *Journal of Physical Therapy Science*, 23(4): 661–665.

Johnson, C. J. 2016. *Health care spending is projected to grow much faster than the economy*. Available at: https://www.washingtonpost.com/news/wonk/wp/2016/07/13/health-spending-will-surge-to-encompass-a-huge-chunk-of-the-economy-by-2025/?utm_term=.dfa72987c6ca (Accessed 6 October 2017).

Jonker, J. 2016. Employability attributes for the somatology profession. M.Ed., Central University of Technology, Bloemfontein, Free State. Available at: file:///H:/Masters/Masters/Literature%20Review/New/Jonker,%20Juanita.pdf (Accessed 31 January 2019).

Kaddour, N. 2016. *African tribal make-up: What's behind the face paint?* Available at: http://english.alarabiya.net/en/life-style/fashion-and-beauty/2016/11/26/African-tribal-make-up-What-s-behind-the-face-paint-.html (Accessed 09 March 2020).

Kaiser, R. M., Alvi, K. Y., Ali, I., Ibrahim, G. H. and Qadar, M. 2018. Frequency of carpal tunnel syndrome in patients with diabetic polyneuropathy. *Armed Forces Medical Journal*, 68(3): 484–490.

Kapuścińska, K. and Urbanik, A. 2015. High-frequency ultrasound in carpal tunnel syndrome: assessment of patient eligibility for surgical treatment. *Journal of Ultrasonography,* 15(2): 283–291.

Karwowski, W. 2006. The discipline of human factors and ergonomics. In G. Salvendy. Ed. *Handbook of human factors and ergonomics*. New Jersey: John Wiley & Sons.

Kaur, S. and Sachdeva, K. 2018. A study on occupational respiratory, musculoskeletal, reproductive and other diseases among cosmetologists. *International Journal of Advanced Research and Development*, 3(1): 152–157.

Khosrawi, S., Moghtaderi, A. R. and Haghighat, S. 2011. Acupuncture in treatment of carpal tunnel syndrome: a randomised controlled trial study *Journal of Research in Medical Sciences,* 17(1): 1–7.

Kim, S. J., Yang, S. M., Kim, J. H., Lee, J. U., Kim, M. Y., Lee, L. K., Park, B. S., Lee, W. D., Noh, J. W., Shin, Y. S. and Kim, D. H. 2018. Analysis of interferential current therapy-induced skin changes in healthy Korean men. *Natural Science*, 10(11): 436.

Klokkari, D. and Mamais, I. 2018. Effectiveness of surgical versus conservative treatment for carpal tunnel syndrome: a systematic review, meta-analysis and qualitative analysis. *Hong Kong Physiotherapy Journal,* 38(2): 91–114.

Kozak, A., Schedlbauer, G., Wirth, T., Euler, U., Westermann, C. and Nienhaus, A. 2015. Association between work-related biomechanical risk factors and the occurrence of carpal tunnel syndrome: an overview of systemic reviews and a meta-analysis of current research. *BMC Musculoskeletal disorders*, 16, 231.

Kruger, H., Khumalo, V. and Houreld, N.N. 2017. The prevalence of osteoarthritic symptoms of the hands amongst female massage therapists. *Health SA Gesondheid,* 22: 184-193.

Kuo, T., Lee, M., Liao, Y., Chen, J., Hsu, Y. and Yeh, C. 2016. Assessment of median nerve mobility by ultrasound dynamic imaging for diagnosing carpal tunnel syndrome. *Plos One,* 11(1).

La Plante, C. 2013. *How to avoid professional burnout.* Available at: https://www.amtamassage.org/articles/3/MTJ/detail/2852/how-to-avoid-professional-burnout (Accessed 25 August 2019).

Lam, P. 2018. *What to know about MRI scans.* Available at: https://www.medicalnewstoday.com/articles/146309.php (Accessed 25 August 2019).

Landman, S. and Buchanan, H. 2010. Human rights and workman's compensation: the experiences of two injured workers. *South African Journal of Occupational Therapy,* 40(1): 2–7.

LeBlanc, K. E. and Cestia, W. 2011. Carpal tunnel syndrome. *American Family Physician*, 83(8): 952–958.

Li, Z., Wang, Y., Zhang, H., Ma, X., Tian, P. and Huang, Y. 2016. Effectiveness of low-level laser on carpal tunnel syndrome: a meta-analysis of previously reported randomised trials. *Medicine*, 95(31): 1–6.

Lowe, W. 2008. Suggested variations on standard carpal tunnel syndrome assessment tests. *Journal of Bodywork and Movement Therapies,* 12(2): 151–157.

Luchau, T. 2018. *Massage therapists: keep your thumbs pain free.* Available at: https://www.massagemag.com/massage-therapist-thumb-pain-90110/ (Accessed 12 March 2020).

Ma, H. and Kim, I. 2012. The diagnostic assessment of hand elevation test in carpal tunnel syndrome. *Journal of Korean Neurosurgical Society,* 52(5): 472–475.

MacFarlane, G. J. 2001. Identification and prevention of work-related carpal-tunnel syndrome. *The Lancet,* 357: 1446–1447.

Maghsoudipour, M., Moghimi, S., Dehghaan, F. and Rahimpanah, A. 2008. Association of occupational and non-occupational risk factors with the prevalence of work related carpal tunnel syndrome. *Journal of Occupational Rehabilitation*, 18(2): 152–156.

Maines, H. 2019. *The history of the manicure and pedicure*. Available at: https://www.leaf.tv/articles/the-history-of-the-manicure-pedicure/ (Accessed 12 February 2019).

Makhuza, M.K., Henrico K, K. and Nel, E.W. 2018. Job Satisfaction of Women Working in Johannesburg Skincare Clinics. *Canadian Center of Science and Education,* 10(10): 11-19.

Mander, J. 2017. *How to use qualitative and quantitative research to your advantage.* Available at: https://blog.globalwebindex.com/trends/qualitative-vs-quantitative/ (Accessed 10 March 2020).

Mathieson, K. 2014. Making sense of biostatistics: types of nonprobability sampling. *Journal of Clinical Research Best Practice*, 10(8): 1–2.

Merriam-Webster.com. n.d. Confidentiality agreement [definition]. Available at: https://www.merriam-webster.com/dictionary/confidentiality%20agreement (Accessed 09 March 2020).

Merriam-Webster.com. n.d. Therapist [definition]. Available at: https://www.merriam-webster.com/dictionary/therapist (Accessed 09 March 2020).

McCallum, L. M., Damms, N. A., Sarrigiannis, P. G. and Zis, P. 2019. Anxiety and depression in patients with suspected carpal tunnel syndrome – a case controlled study. *Brain and Behaviour,* 9(7).

McIntyre, R. and Goergen, S. 2019. *Magnetic Resonance Imaging (MRI).* Available at: https://www.insideradiology.com.au/mri/ (Accessed 25 August 2019).

McLeod, S. A. 2008. *Likert Scale*. Available at: https://simplypsychology.org/likert-scale.html (Accessed 22 May 2017).

Miller, D. R. 2000. Shedding light on the carpal tunnel problem. *Business Insurance*, 34(42): 37.

Moodley, R. and Naidoo, S. 2015. The prevalence of musculoskeletal disorders among dentists in KwaZulu-Natal. *South African Dental Journal*, 70(3): 98–103.

Morisson, W. 2018. *Electromyography (EMG).* Available at: https://www.healthline.com/health/electromyography (Accessed 23 August 2019).

Musolin, K. M. and Ramsey, J. G. 2017. Carpal tunnel syndrome prevalence: an evaluation of workers at a raw poultry processing plant. *International Journal of Occupational and Environmental Health,* 23(4): 282–290.

Musolin, K. M., Ramsey, J. G., Wassell, J. T. and Hard, D. L. 2014. Prevalence of carpal tunnel syndrome among employees at a poultry processing plant, *Applied Ergonomics,* 45(6): 1377–1383.

Nel, H. 2019. *Research Article: Positivism*. Available at: http://www.intgrty.co.za/2019/08/12/research-article-17-positivism/ (Accessed 10 March 2020).

Newington, L., Harris, E. C. and Walker-Bone, K. 2015. Carpal tunnel syndrome and work. Best practice and research: *Clinical Rheumatology*, 29(3): 440–453.

Niu, S. 2010. Ergonomics and occupational safety and health: an ILO perspective. *Applied Ergonomics*, 41(6): 744–753.

Nordmann, L. 2007. *Beauty therapy: the official guide to level 3*. 3rd ed. London: Thomson.

Nordqvist, C. 2018. *CT scan or CAT scan: how does it work?* Available at: https://www.medicalnewstoday.com/articles/153201.php (Accessed 25 August 2019).

Nqamkham, S., Vincent, C., Finnegan, L., Holden, J. E., Jim-Wang, Z. and Wilkie, D. J. 2012. The McGill Pain Questionnaire as a multidimensional measure in people with cancer: an integrative review. *Pain Managing Nurse,* 13(1): 27–51.

Nuckols, T., Harber, P., Sandin, K., Benner, D., Weng, H., Shaw, R., Griffen, A. and Asch, S. 2011. Quality measures for the diagnosis and non-operative management of carpal tunnel syndrome in occupational settings. *Journal of Occupational Rehabilitation*, 21(1): 100–119.

O'Lenick, A. J. 2009. *Comparatively speaking: epilation vs. depilation.* Available at: https://www.cosmeticsandtoiletries.com/research/methodsprocesses/44454712.html (Accessed 25 August 2019).

Oktayaglu, P., Nas, K., Killinc, F., Tasdemir, N., Bozkurt, M. and Yildiz, I. 2015. Assessment of the presence of carpal tunnel syndrome in patients with diabetes mellitus, hypothyroidism and acromegaly. *Journal of Clinical and Diagnostic Research*, 9(6): 14–18.

Osborne, C. 2018. *Supporting pregnancy with massage therapy*. Available at: https://bodytherapyeducation.com/supporting-pregnancy-with-massage-therapy/ (Accessed 17 June 2019).

Oxford Advanced American Dictionary. n.d. Beauty [definition]. Available at https://www.oxfordlearnersdictionaries.com/definition/american_english/beauty (Accessed 23 January 2019).

Özdemir, G., Demir, R., Özel, L. and Ulvi, H. 2014. The effect of steroid injection by novel method in carpal tunnel syndrome on pain severity and electrophysiological findings. *Dicle Medical Journal*, 41(2): 277–281.

Pace, A. 2019. *Call for fewer working hours in SA.* Available at: https://www.capetownetc.com/news/call-for-fewer-working-hours-in-sa/ (Accessed 12 March 2020).

Palmer, K. T. 2011. Carpal tunnel syndrome: the role of occupational factors. *Best Practice and Research: Clinical Rheumatology*, 25(1): 15–29.

Parot-Monpetit A., Mironnet, S. and Monpetit, E. 2015. Hot stone therapy in palliative care. *Journal of Clinical Oncology*, 33(29): 179–179.

Pawlikowski, P., Rico, N. and Van Shell, S.L. 2018. Positivism. *International Journal of Nursing & Clinical Practices,* 5: 284.

Penkins, B. A., Olaleye, D. and Bril, V. 2002. Carpal tunnel syndrome in patients with diabetic polyneuropathy. *Diabetes Care,* 25(3): 565–569.

Petit, A., Ha, C., Bodin, J., Rigouin, P., Descatha, A., Brunet, R., Goldberg, M. and Roquelaure, Y. 2015. Risk factor for carpal tunnel syndrome related to the work organisation: a prospective surveillance study in a large working population. *Applied Ergonomics*. 47:1–10.

Petrover, D. and Richette, P. 2018. Treatment of carpal tunnel syndrome: from ultrasonography to ultrasound guided carpal tunnel release. *Joint Bone Spine,* 85(5): 545–552.

Pillay, P. 2012. A study to determine the prevalence of signs and symptoms of carpal tunnel syndrome and De Quervain's tenosynovitis in garment workers in the eThekwini district of KwaZulu-Natal. M.Ed., University of KwaZulu-Natal. Available at: http://researchspace.ukzn.ac.za/xmlui/bitstream/handle/10413/5366/Pillay_Prabashni_2012.pdf?sequence=1 (Accessed 28 January 2019).

Pizer, A. 2018. *Yoga for carpal tunnel.* Available at: https://www.verywellhealth.com/yoga-for-carpal-tunnel-syndrome-3567218 (Accessed 13 February 2019).

Ponto, J. 2015. Understanding and evaluating survey research. *Journal of the Advanced Practitioner in Oncology*, 6(2): 168–171.

Potchefstroom Academy. 2015. *Have you got what it takes to be a somatologist?* Available at: http://www.potchacademy.co.za/have-you-got-what-it-takes-to-be-a-somatologist/ (Accessed 12 February 2019).

Pranckevičienė, A., Dimšaitė, J., Budėnas, A. and Radžiunas, A. 2016. Catastrophising of pain as a predictor of pre- and acute post-operative pain in patients with carpal tunnel syndrome. *International Journal of Psychology*, 19: 35–47.

Rahman, S. 2017. The advantages and disadvantages of using qualitative and quantitative approaches and methods in language “testing and assessment” research: A literature review. *Journal of Education and Learning,* 6(1): 102-112.

Rakumakoe, D. 2017. *Dr Dulcy on carpal tunnel syndrome.* Available at: https://www.pressreader.com/ (Accessed 25 August 2019).

Rakumakoe, D. 2019. *About carpal tunnel syndrome*. Available at: https://www.knysnaplettherald.com/News/Article/LifeStyle/everything-you-need-to-know-about-carpal-tunnel-syndrome-201903110100 (Accessed 14 June 2019).

Rammanhor, K. 2014. An analysis of the Somatology programme offered at South African universities of technology to determine whether it meets the needs of the industry. M.Ed., Durban University of Technology, KwaZulu-Natal. Available at: https://openscholar.dut.ac.za/bitstream/10321/1266/1/RAMMANHOR_2014.pdf (Accessed 23 January 2019).

Razik, A., Avisar, E. and Sorene, E. 2012. Bilateral carpal tunnel syndrome with anomalous palmaris profundus tendons. *Journal of Plastic Surgery and Hand Surgery*, 46: 452–453.

Riccò, M. and Signorelli, C. 2017. Personal and occupational risk factors for carpal tunnel syndrome in meat processing industry workers in Northern Italy. *Medycyna Pracy*, 68(2): 199–209.

Riccò, M., Cattani, S. and Signorelli, C. 2016. Personal risk factors for carpal tunnel syndrome in female visual display unit workers. *International Journal of Occupational Medicine and Environmental Health,* 29(6): 927-936.

Richardson, A. 2019. *Carpal tunnel steroid injection*. Available at: https://www.drajrichardson.co.za/carpal-tunnel (Accessed 14 June 2019).

Richter, K. and Jooste, K. 2013. The experiences of private somatology therapist on their self-management in a private practice. *Health SA Gesondheid*, 18(1): 9.

Rostkowski, S. M. and Singh, R. J. 2015. Navigation through carpal tunnel syndrome's physical, social and emotional crucibles in a return to work program. *Insight to a Changing World Journal* (3): 253–265.

Rouq, F. A., Ahmed, T. S., Meo, I. M. U., Al-Drees, A. M. and Meo, S. A. 2014. Distribution of clinical symptoms in carpal tunnel syndrome. *Journal of the College of Physicians and Surgeons Pakistan*, 24(1): 30–33.

Rubert, T. 2014. *A pain in the wrist: Carpal tunnel syndrome.* Available at: https://www.nailsmag.com/383436/a-pain-in-the-wrist-carpal-tunnel-syndrome (Accessed 11 March 2020).

Ruttenberg, R. 2019. The social and economic impact of carpal tunnel syndrome among maintenance-of-way employees. *Journal of Ergonomics,* 9: 246.

Sadeli, H. A., Kurniani, N. and Gunadharma, S. 2009. A randomised study comparing oral versus injection triamcinolone in carpal tunnel syndrome. *Neurology Asia*, 14(2): 121–127.

Salamon, M. 2017. *Self-care: Your massage therapy career is in your hands.* Available at: https://www.amtamassage.org/articles/3/MTJ/detail/3778/self-care-your-massage-therapy-career-is-in-your-hands (Accessed 11 March 2020).

Salamon, M. 2018. *Massage and pregnancy: a powerful combination*. Available at: https://www.amtamassage.org/articles/3/MTJ/detail/3852/massage-and-pregnancy-a-powerful-combination (Accessed 17 June 2019).

Salapatek, L. 2015. *Treating and avoiding stylist carpal tunnel pain.* Available at: https://www.modernsalon.com/369319/treating-and-avoiding-stylist-carpal-tunnel-pain (Accessed 11 March 2020).

Santos-Longhurst, A. 2018. *Is a deep tissue massage what your muscles need?* Available at: https://www.healthline.com/health/deep-tissue-massage (Accessed 17 June 2019).

Santos-Longhurst, A. 2019. *Why are my hands numb when I wake up and how can I treat this?* Available at: https://www.healthline.com/health/waking-up-with-numb-hands (Accessed 09 March 2020).

Sarraf, P., Malek, M., Ghajarzadeh, M., Miri, S., Parhizgar, E. and Razavi, S. Z. E. 2014. The best cutoff point for median nerve cross sectional area at the level of carpal tunnel inlet. *Acta Medica Iranica,* 52(8): 613–618.

Seers, K. and Critelton, N. 2001. Quantitative research: designs relevant to nursing and healthcare. *Journal of Research in Nursing,* 6(1): 487–500.

Senel, S., Ceylaner, G., Yuksel, D., Erkek, N. and Karacan, C. 2010. Familial primary carpal tunnel syndrome with possible skipped generation. *European Journal of Paediatrics*, 169(4): 453–455.

Seomun, G., Sung-Bom, P., Eun-Jung, K and Wonjung, N. 2016. A comparison of carpal tunnel syndrome between digital and paper textbook users in elementary school. *Work,* 53(4): 909–915.

Sevy, J. O. and Varacallo, M. 2019. *Carpal tunnel syndrome*. Available at: https://www.ncbi.nlm.nih.gov/books/NBK448179/ (Accessed 8 June 2019).

Shannon, J. and Rizzolo, D. 2012. Carpal tunnel syndrome: symptoms, diagnosis, and treatment options. *Continuing Medical Education*, 25(9): 22–26.

Shiri, R. 2016. Arthritis as a risk factor for carpal tunnel syndrome: a meta-analysis. *Scandinavian Journal of Rheumatology*, 45(5): 339–346.

Showkat, N. and Parveen, H. 2017. *Quantitative methods: survey.* Available at: https://www.researchgate.net/publication/318959206_Quantitative_Methods_Survey (Accessed 6 February 2019).

Simmons, J. V. 1995. *Science and the beauty business: the beauty salon and its equipment*. 2nd ed. Hong Kong, China: MacMillan Press Ltd.

Slater, R. R. 1999. *Carpal tunnel syndrome: current concepts.* Available at: http://www.eatonhand.com/hw/ctsslater.htm (Accessed 25 August 2019).

South Africa, Department of Labour. 1993. *Occupational Health and Safety Act, as amended by the Occupational Health and Safety Amendment Act 181 of 1993.* Available at: https://www.sun.ac.za/english/policy/Documents/Occupational%20Health%20and%20Safety%20Act.pdf (Accessed 11 February 2019).

South Africa, Department of Labour. 2004. The Compensation Commissioner's Guidelines for Health Practitioners and Employers to manage work-related upper limb disorders in terms of Circular Instruction 180 regarding compensation for work-related upper limb disorders (WRULDs)

(Compensation for Occupational Injuries and Diseases Act 130 of 1993, as amended). Available at: http://www.labour.gov.za/E4F03CA5-5065-407B-B584-C33E69DF261E/FinalDownload/DownloadId-694F21BF19B2090EA517AFDAE40E0FF8/E4F03CA5-5065-407B-B584-C33E69DF261E/DOL/downloads/documents/useful-documents/compensation-for-occupational-injuries-and-diseases/Guidelines%20for%20Health%20Practitioners%20-%20Employers%20to%20manage%20Work%20Related%20Upper%20Limb%20Disorder.pdf (Accessed 6 October 2017).

Spa Staff.com. 2018. *Wellness in the workplace – The importance of staff wellbeing.* Available at: https://www.spastaff.com/blog/wellness-in-workplace (Accessed 12 March 2020).

Sparlin, B. 1996. *Conquering carpal tunnel syndrome.* Available at: https://www.nailsmag.com/392151/conquering-carpal-tunnel-syndrome (Accessed 11 March 2020).

Statistics South Africa (Stats SA). 2018. *General Household Survey*. Pretoria: Government Printer.

Stoewen, D. L. 2015. Health and wellness. *The Canadian Veterinary Journal*, 56(9): 983–984.

Taherdoost, H. 2016. Validity and reliability of the research instrument: how to test the validation of a questionnaire/survey in a research. *International Journal of Academic Research in Management*, 5(3): 28–36.

Tandon, R. 2018. *Employee health benefits: a good way to show concern for the employees.* Available at: http://www.businessworld.in/article/Employee-Health-Benefits-A-Good-Way-To-Show-Concern-For-The-Employees-/06-04-2018-145718/ (Accessed 25 August 2019).

Tiret, H. 2016. *The benefits of infant massage*. Available at: https://www.canr.msu.edu/news/the_benefits_of_infant_massage_1 (Accessed 17 June 2019).

Tony, A. A., Tony, E. A. E., Selim, Y. A. R. M. and Saad, E. 2018. Carpal tunnel syndrome in patients with and without diabetes mellitus in upper Egypt: the impact of electrophysiological and ultrasonographical studies. *Alexandria Journal of Medicine,* 54(4): 437–443.

Tsigonia, A., Tanagra, D., Linos, A., Merekoulias, G. and Alexopulos, C. 2009. Musculoskeletal disorders among cosmetologist. *International Journal of Environmental Research and Public Health*, 6(12): 2967–2979.

Tuller, D. 2017. Massage therapists are at risk for backaches, knotted muscles and carpal tunnel syndrome. The answer is proper technique and maybe a masseuse of one's own. Available at: https://consumer.healthday.com/encyclopedia/work-and-health-41/occupational-health-news-507/massage-therapists-646669.html (Accessed 20 May 2017).

Uzkeser, H., Karatay, S. and Melikoğlu, M. A. 2011. Levels of endocrine hormones and lipids in male patients with carpal tunnel syndrome. *Dicle Medical Journal*, 23(4): 427–431.

Vahi, P., Kals, M., Kõiv, L. and Braschinsky, M. 2014. Preoperative corticosteroid injections are associated with worse long-term outcome of surgical carpal tunnel release: a retrospective study of 174 hands with a mean follow-up of 5.5 years. *Acta Orthopaedia*, 85(1): 102–106.

Vallet, M. 2019. *When it's you who is in chronic pain.* Available at: https://www.amtamassage.org/articles/3/MTJ/detail/3921/when-its-you-who-is-in-chronic-pain (Accessed 11 March 2020).

Venter, G. 2012. Somatology is the science of dealing with the body in all its physical aspects. *Sowetan Live*, 10 January. Available:

http://www.sowetanlive.co.za/goodlife/2012/01/10/career-focus---somatology-is-about-the-body (Accessed 10 October 2017).

Vosloo, M. 2009. A framework to position the somatology profession in South Africa. M.Tech., Central University of Technology. http://ir.cut.ac.za/bitstream/handle/11462/263/Vosloo%2C%20Marl%C3%A9.pdf?sequence=1&isAllowed=y (Accessed 23 January 2019).

Walters, R. 2008. *The value of promoting employee health and wellbeing.* Available at: https://www.robertwalters.com/content/dam/robert-walters/corporate/news-and-pr/files/whitepapers/health-and-wellbeing-whitepaper-aus.pdf (Accessed 25 August 2019).

Wertz, K. R. and Bryant, J. J. 2001. Managing workers' compensation: a guide to injury reduction and effective claim management. Washington DC: Lewis Publishers.

Williams, H. 2013. *Luxury and beauty: the best industry for the 21st century.* Available at: http://www.williamsglobalmarketing.com/uncategorised/luxury-and-beauty-the-best-consumer-industry-for-the-21st-century/ (Accessed 3 June 2019).

Wooten, A. 2019. Work-related musculoskeletal disorders in sonography. *Radiological Technology*, 90(3): 215–224.

Yazdani, A. and Wells, R. 2018. Barriers for implementing of successful change to prevent musculoskeletal disorders and how to systematically address them. *Applied Ergonomics,* 73: 122–140.

Yip, C., Han, N.R. and Sng, B.L. 2016. Legal and ethical issues in research. *Indian Journal of Anaesthesia,* 60(9): 684-688.

Yunoki, M. Kanda, T., Suzuki, K., Uneda, A., Hirashita, K. and Yoshino, K. 2017. Importance of recognising carpal tunnel syndrome for neurosurgeons: a review. *Neurologia Medico-Chirurgica,* 57(4): 172–182.

Zarah, L. 2018. *7 reasons why research is important*. Available at: https://owlcation.com/academia/Why-Research-is-Important-Within-and-Beyond-the-Academe (Accessed 21 February 2019).

Žídková, V., Nakládalová, M. and Štěpánek, L. 2019. Effects of exercise and enzyme therapy in early occupational carpal tunnel syndrome: a preliminary study. Available at: https://www.hindawi.com/journals/bmri/2019/8720493/ (Accessed 14 June 2019).

Zimmerman, M., Dahlin, E., Thomen, N. O. B., Andersson, G. S., Björkman, A and Dahlin, L. B. 2017. Outcome of carpal tunnel release: impact of factors related to metabolic syndrome. *Journal of Plastic Surgery and Hand Surgery,* 51(3): 165–171.

APPENDICES

APPENDIX A: LETTER OF PARTICIPATION

12 October 2017

TO WHOM IT MAY CONCERN

I, Charné Kistoor, am a Master's student at the Durban University of Technology undertaking a research study entitled **Prevalence, risk factors and management of carpal tunnel syndrome (CTS) amidst somatologists in the Western Cape.**

I herewith ask your permission to partake in this study. The aim of this study is to determine the prevalence rate of CTS among qualified somatologists, the risk factors associated with CTS and management thereof. This study will also allow awareness to those on their way to pursue a career as a somatologist.

Participants are asked to complete a questionnaire, which will take up 20 to 30 minutes of your time. Participation is voluntary and anonymous. All information obtained for the study will be dealt with anonymously.

Thank you.

Yours sincerely,

Mrs Charné Kistoor
M.Tech Student
Durban University of Technology

APPENDIX B: LETTER OF INFORMATION

LETTER OF INFORMATION

Dear research participant

Title of the research study: Prevalence, risk factors and management of Carpal Tunnel Syndrome (CTS) amidst qualified somatologists in the Western Cape.

Principal investigator/s/researcher: Charné Kistoor, BTech: Somatology

Co-investigator/s/supervisor/s: Dr Brooks, PhD; K. Rammanhor, MTech: Somatology

Brief introduction and purpose of the study: The study will be conducted in the fulfilment of a dissertation for the Master of Technology: Somatology degree at Durban University of Technology.

Having a successful career path is essential to many individuals. Being brilliant in your field of expertise can be daunting if you are unable to perform to your fullest potential due to carpal tunnel syndrome (CTS). This study aims to create awareness of the long-term consequences or implications of CTS.

The purpose of this study is therefore to determine the prevalence rate of CTS among qualified somatologists or beauty therapists, the risk factors and

management. Further to establish if somatologists are being compensated after they are diagnosed with CTS or are they allowed to continue working within their field of study knowing their limitations due to CTS. This study will also allow awareness to those on their way and wanting to pursue a career as a somatologist.

Inclusion criteria:

- Qualified full-time somatologists employed by the various institutions or the head of the Somatology department.
- Qualified somatologists, male and female, in the Western Cape, with a relevant diploma or higher qualification within the field of the study.

Exclusion criteria:

- Somatologists still in the process of completing their studies.
- Somatologists not medically diagnosed with CTS.
- Individuals who have not completed their studies, whether diagnosed with CTS or not.

Outline of the procedures:

- You that are suffering from CTS will be asked to complete a questionnaire (which will be emailed or accessed online) in order to share their experiences about CTS.
- The research will require 20 to 30 minutes of your time. During the time you will be asked to complete a questionnaire about CTS. All information obtained from the study will be anonymously utilised within the study. All questionnaires and material collected during the study will be kept in a locked filing cabinet by the researcher and will only be accessible by the researcher or supervisors. All information will be kept for a period of five years only.

Risks or discomforts to you: There are no anticipated risks and discomforts related to this research. If at any stage you are feeling uncomfortable

throughout the process or feel that you are being emotionally disturbed, you should feel free to know that you may withdraw from the study.

Benefits: This research will be valuable to somatologists suffering from CTS, for employers who employ staff suffering from CTS as well as for education and training providers of Somatology or related qualifications. The aim is to equip you and the society about the prevalence, risk factors and most importantly the management for CTS.

Reason/s why you may be withdrawn from the study: There will be no adverse consequences should you choose to withdraw from the study.

Remuneration: You will not receive any form of remuneration.

Costs of the study: All costs related to the study will be covered by the researcher only.

Confidentiality: No individually identifiable information about you, or provided by you during the study, will be shared with others without written permission. All the information gathered will be used in a secure manner and you will remain anonymous. All electronic information will be kept password-protected and hard copies will be kept locked for a minimum of five years.

Research-related injury: No injuries should emerge from the study as you complete the questionnaire in your own environment.

Persons to contact in the event of any problems or queries:
Please contact the researcher (Charné Kistoor on 0715046897), my supervisor (Dr Brooks on 021 460 3436) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support, Prof S Moyo on 031 373 2577 or moyos@dut.ac.za

APPENDIX C: CONSENT FORM

CONSENT

Statement of Agreement of your participation in the research study:

- I hereby confirm that I have been informed by the researcher, Charné Kistoor, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: 94/11,
- 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**

Thumb print

I, Charné Kistoor, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Charné Kistoor	07 June 2017	
Full Name of Researcher	**Date**	**Signature**

Full Name of Witness (If applicable)	**Date**	**Signature**

Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

APPENDIX D: GATEKEEPER PERMISSION LETTER

53 Brookford Road
Lotus River
7941

1 June 2018

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

Dear []

My name is **Charné Kistoor**, a Master's student at the Durban University of Technology. The research I wish to conduct for my Master's in Somatology involves **Prevalence, risk factors and management of Carpal Tunnel Syndrome (CTS) amidst qualified somatologists in the Western Cape.**

I herewith ask your permission to partake in this study. The aim of this study is to determine the prevalence rate of CTS among qualified somatologists, the risk factors and management. This study will also allow awareness to those on their way and wanting to pursue a career as a somatologist. Participants are asked to complete a questionnaire, which will take up 20 to 30 minutes of your time. Participation is voluntary and anonymous. All information obtained for the study will be dealt with anonymously.

I _____ hereby give Charné Kistoor permission to conduct her study using participants from my company.

Signature _____ Date _____ Stamp _____

If you require any further information, please do not hesitate to contact me on 0715046897 or alternatively at charne.terry@gmail.com. Thank you for your time and consideration in this matter.

Yours sincerely,

Charné Kistoor
Durban University of Technology

APPENDIX E: QUESTIONNAIRE

PARTICIPANT QUESTIONNAIRE FOR THE RESEARCH STUDY ENTITLED "PREVALENCE, RISK FACTORS AND MANAGEMENT OF CARPAL TUNNEL SYNDROME (CTS) AMIDST QUALIFIED SOMATOLOGISTS IN THE WESTERN CAPE"

BY CHARNÉ KISTOOR

Please tick (✓) the appropriate box for each question below.

Please ignore the codes (numbers in grey) next to the options.

1. Gender:

	Male	0
	Female	1

2. Age:

	18–25	0
	26–35	1
	36–45	2
	45 and older	3

3. Ethnicity

	White	0
	Coloured	1
	Black	2
	Asian	3
	Indian	4
	Other (Specify)……	5

4. Do you suffer from diabetes mellitus?

	No	0
	Yes, Type 1	1
	Yes, Type 2	2

5. Have you ever had any injuries to your hand/wrists?

	Yes	0
	No	1

6. Indicate below the field that is most applicable to you as a therapist.

	Somatologist	0
	Cosmetologist	1
	Masseuse	2
	Other (Specify)……	3

7. How many years had you worked in the industry before you were diagnosed?

	0–5 years	0
	6–11 years	1
	12–17 years	2
	18–24 years	3
	25 years or longer	4

8. How would you rate your first thoughts when you were diagnosed with carpal tunnel syndrome? *(Tick all that apply)*

	Happy	**0**		**Irritated**	**6**		**Disbelief**	**12**
	Sad	1		Disappointed	7		Blame	13
	Confused	2		Frustrated	8		Fear	14
	Tearful	3		Relief	9		Withdrawal	15
	Angry	4		Denial	10		Shameful	16
	Anxious	5		Guilt	11		Not sure	17

9. Based on the above question. Briefly state why you felt this type of emotion.

_____

_____

10. **What was your employer's reaction *(omit if you have not worked for someone at this stage)* when you informed him/her about your condition?**

_____

_____

Omit question 11 if you have not worked for someone at this stage.

11. **Were they accommodative with the number of treatments you performed on a daily basis?**

	Yes	**0**
	No	1

12. **When performing treatments which hand do you predominantly exert pressure on?**

	Left-handed	0
	Right-handed	1

13. **When performing your treatments as a therapist, in which hand/s have you experienced the most symptoms of carpal tunnel syndrome?**

	Left predominantly	0
	Right predominantly	1
	Both hands	2

14. **When you were diagnosed with carpal tunnel syndrome, what was the severity of your condition?**

	Mild	0
	Moderate	1
	Severe	2

15. **Due to the severity of your symptoms experienced, has this resulted in you needing time off from work or inability to perform certain tasks?**

	Yes	0
	No	1

Please explain_____

16. Indicate whether you have experienced any or none of the neuropathy symptoms connected to carpal tunnel syndrome in the past 12 months. ***(Tick all that apply)***

	None	0		Loss of movement	6
	Tingling	1		Swelling	7
	Numbness	2		Prickling	8
	Mild to severe pain	3		Tendency to drop things	9
	Decreased sensation	4		Difficulty manipulating small objects	10
	Decreased strength	5		Other (Specify)…… …..	11

17. Do you wake up during the night due to symptoms (mentioned in question 16) from carpal tunnel syndrome?

	Yes	0
	No	1

18. Overall, how would you rate the level of discomfort experienced during the night?

Highest level of discomfort 5 4 3 2 1 → Lowest level of discomfort

19. With reference to the image below. Circle what areas were more applicable to you in experiencing symptoms (the dark areas signify symptoms of carpal tunnel syndrome). ***Circle all that apply.***

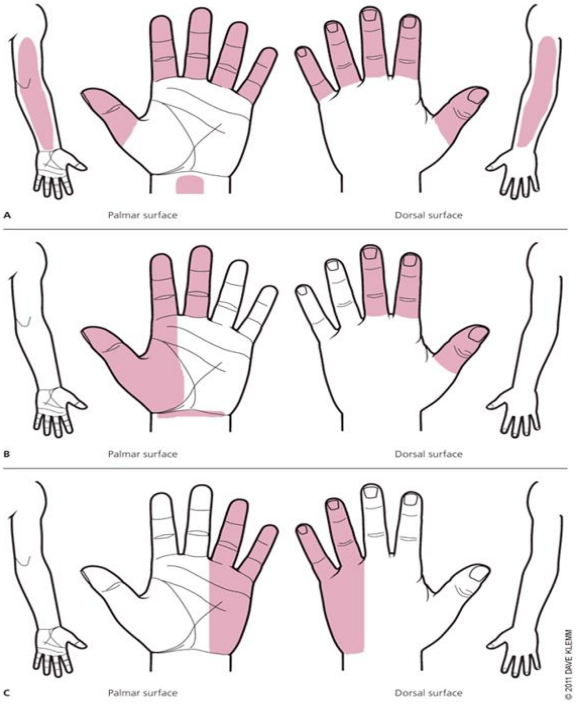


Figure 1: A hand system diagram to guide proper diagnosis.
LeBlanc, K. E. and Cestia, W. 2011. Carpal Tunnel Syndrome. *American Family Physician,* 83(8): 954.

20. Have you undergone treatment to alleviate the symptoms of carpal tunnel syndrome?

	Yes	0
	No	1

21. If "No" to question 20, state what the reason was for not having treatment.

Omit this if question 20 was "No".

22. Indicate the therapy you received to alleviate your symptoms *(Tick all that apply)*

	None	0		Wrists splinting	7
	Corticosteroids	1		Manual therapies (mobilisations)	8
	Physical therapy	2		Retraining (new ways of working)	9

	Hand/ Occupational therapy	3		Acupuncture	10
	Non-steroidal anti-inflammatory drugs	4		Yoga	11
	Open surgery	5		Ultrasound therapy	11
	Endoscopic surgery	6		Other (Specify)……	12

Omit this if question 20 was "No".

23. How long did the alleviation of symptoms last after the therapy?

	1–2 days	0		4–7 years	7
	3–5 days	1		8–12 years	8
	1–3 weeks	2		13–17 years	9
	1–3 months	3		18–23 years	10
	4–7 months	4		More than 24 years	11
	8–11 months	5		No symptoms experienced after therapy	11
	1–3 years	6		Other (Specify)……	12

24. How long have you continued working in the industry after diagnosis?

	Less than 1 year	0
	1–2 years	1
	3–5 years	2
	More than 5 years	3

25. Do you still work in the industry since you have been diagnosed with carpal tunnel syndrome?

	Yes	0
	No	1

If question 25 was "No" please omit question 26.

26. How many hours of manual work (hand intensive tasks) does your day consist of?

	0–5 hours	0
	6–10 hours	1
	11 hours or more	2

27. If YES to question 25. How many hours of overtime do you work?

	0–5 hours	0
	6–10 hours	1
	11 hours or more	2

28. If NO to question 25. How many hours' overtime did you work while in the industry?

	0–5 hours	0
	6–10 hours	1
	11 hours or more	2

29. Out of the treatments listed below, which do you perform most on a weekly basis?

	None	**0**		**Spa treatments**	**4**
	Facials	1		Pedicures	5
	Waxing	2		Manicures	6
	Massage	3		Other (Specify)_____	7

30. Do you perform any other hand-intensive tasks outside of working hours? Please specify the type and duration of the activity.

_____

_____

31. Overall, how would you rate the techniques used during the training phase?

Excellent 5 4 3 2 1 ▶ Poor

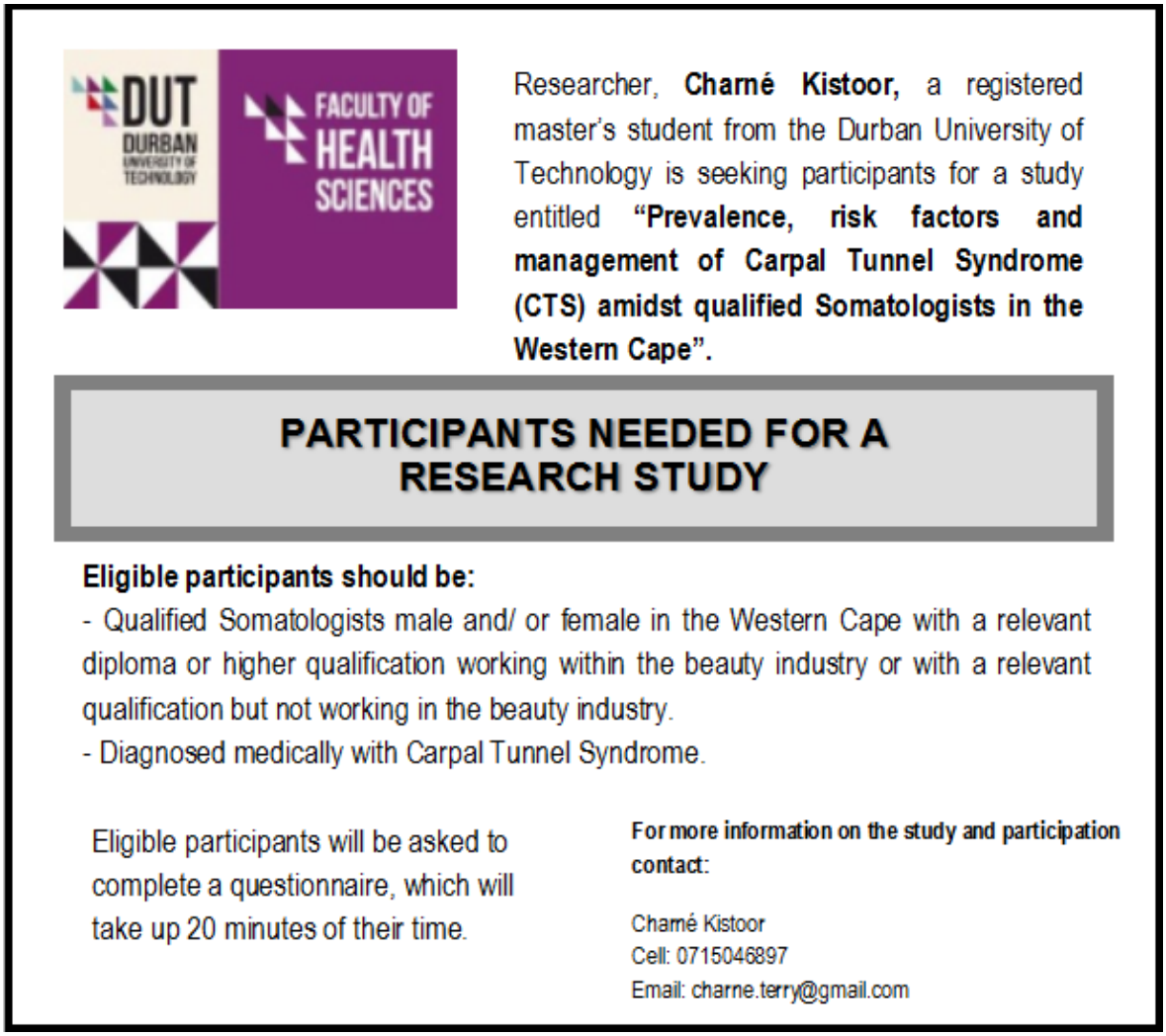
32. Do you feel that the type of training had an influence with the development of carpal tunnel syndrome?

	Yes	**0**
	No	1

If yes, please elaborate _____

THANK YOU FOR YOUR PARTICIPATION

APPENDIX F: ADVERT



APPENDIX G: ETHICAL APPROVAL

DUT
DURBAN UNIVERSITY OF TECHNOLOGY

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, 4000

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

27 July 2018

IREC Reference Number: **REC 94/17**

Mrs C Kistoor
53 Brookford Road
Lotus River
7954

Dear Mrs Kistoor

Prevalence, risk factors and management of Carpal Tunnel Syndrome (CTS) amidst qualified Somatologists in the Western Cape

The Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of the data collection tool.

In addition, the IREC acknowledges receipt of your gatekeeper permission letters.

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,

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY
2013 -07- 27
INSTITUTIONAL RESEARCH ETHICS COMMITTEE
P O BOX 1334 DURBAN 4000 SOUTH AFRICA

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www.dut.ac.za

11 April 2019

Mrs C Kistoor
53 Brookford Road
Lotus River
7954

Dear Mrs Kistoor

Application for Amendment of Approved Research Proposal

Prevalence, risk factors and management of Carpal Tunnel Syndrome (CTS) amidst qualified Somatologists in the Western Cape

I am pleased to inform you that your application to change your number of participants to 12 has been approved.

Yours Sincerely

Professor J K Adam
Chairperson: IREC