

Chiropractic students' perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic

By

Hardus Nieuwenhuis

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I, Hardus Nieuwenhuis, do declare that this dissertation is representative of my own work in both conception and execution

Hardus Nieuwenhuis

M.Tech: Chiropractic

29/11/2022

Date

Approved for Examination

Dr P. Maharaj

M.Tech: Chiropractic

29/11/2022

Date

29/11/2022

Date

Dr C. M. Korporaal

M.Tech: Chiropractic, CCFC, CCSP,
ICSSD

DEDICATION

I dedicate this dissertation to my late grandfather, Gert. Thank you for all the love, support and kindness you have shown me over the years. The work ethic you helped to instill in me has contributed greatly to my success today. You were an incredible role model to me; I am truly grateful to have called you my grandfather.

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ABSTRACT

Background

Modern healthcare is characterised by patient-centred care, which requires that healthcare professionals have equal proficiency in communication and practical skills. As part of their duty as healthcare professionals, chiropractors must show patients how to help themselves through patient education, which requires communication skills. Patient education no longer solely involves or refers to knowledge transfer alone, but rather working with patients in their specific context to build knowledge together from a partnership perspective and to share power in this dynamic. From this perspective, patient education becomes a tool to empower patients and improve their self-efficacy and coping habits, without constantly relying on passive care. This study presents a detailed evaluation of patient education within a South African chiropractic student context at the Durban University of Technology.

Aims and Objectives

This study aimed to describe chiropractic students' perceptions and practice of patient education of musculoskeletal conditions at a teaching clinic. The objectives were to evaluate the students' perception of patient education and the strategies they use; their self-reported practice of patient education; barriers that students face when educating patients; factors that contribute to their patient education skills development, and to determine whether there is an association between demographics, their perception and practice.

Methods

The study was an anonymous web-based questionnaire with a cross-sectional design within a quantitative paradigm. The survey used in this study stems from a physiotherapist study. Permission was obtained from the author to replicate the study in a South African context at the Durban University of Technology Chiropractic Day Clinic (DUT CDC). The original survey was then put through a focus group and pilot study and subsequently adapted to include questions related explicitly to chiropractic and the student population at the Durban University of Technology. Weekly reminders were sent via email to class representatives to distribute among their respective classes. A total of 42 completed questionnaires were used for analysis in this study.

Cronbach's alpha was used to assess internal consistency of scales. The scale scores were computed by averaging the 18 items for Question 6 and Question 5 respectively where T-tests were used to compare these scores between the demographic variables for binary data, ANOVA for ordinal data and Pearson's correlation analysis, where the demographic

variable was quantitative and normally distributed. A Wilcoxon signed ranks test was used for the comparison of time spent on patient education at initial consults and time spent on patient education at follow-up consults

Results

Overall, the students viewed most of the patient education items to be important and should be discussed with patients. In practice, however, the frequency of their practice did not correspond to the perceived importance. Only a few items were practised to the same extent as the perceived importance thereof. The chiropractic students' discussions with their patients tend to focus on the main complaint of patients. In most cases, students educate their patients through one-on-one discussions, physical demonstration and anatomy models. During initial visits, students usually spend between 6–15 minutes educating their patients; in follow-up visits, the time is reduced to 6–10 minutes. In most cases, students cited patient characteristics as a barrier to effective patient education. For the chiropractic students, developing their patient education skills was largely dependent on their interactions with supervising clinicians. There was no association between demographics, perceived importance, and practice behaviour in this study.

Conclusion

Although the patient education topics were generally deemed important by chiropractic students, the topics considered most important are directly related to the main complaints of their patients, with more complex topics not being perceived as necessary as those directly related to the complaint, such as diagnosis. Like their perceptions, the students most frequently addressed the topics they deemed important; thus, their perceptions and practice were congruent (for issues related to the main complaint of the patients). An important finding of this study was that, although DUT follows an evidence-based paradigm, many students perceived pathoanatomical explanations to be important and, thus, provided their patients with such explanations, even though the literature does not support it. In addition, the students reported several methods through which they educate their patients. However, the assessment of whether it was successful was mainly centred around physical activity rather than the patients' understanding of the information discussed. The results indicate an opportunity to improve the patient education skills of students, as they appear to have difficulty adjusting to difficult situations, and thereby perceive factors to be barriers that are not actual barriers but rather challenges.

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Musculoskeletal conditions are prevalent across all age ranges and affect all sociodemographic levels (Woolf, Erwin and March 2012). These conditions affect all aspects of life as they frequently manifest as pain (Walsh *et al.* 2008), and a decreased ability to perform daily functions (Woolf, Erwin and March 2012). All of these musculoskeletal conditions are characterised by pain and the consequences of pain (Blyth *et al.* 2019). The loss of function of these patients are attributed to decreased mobility and altered dexterity, which eventually develops into disability (Woolf, Erwin and March 2012).

While the factors associated with the development of musculoskeletal conditions are the same in all populations, individual exposure to risk factors does not occur to the same extent (Woolf *et al.* 2008). Although the same conditions occur across countries, the severity of these conditions are more pronounced in developing countries (Woolf *et al.* 2008). As South Africa is still considered a developing country (Bakari 2017), consideration should be given to the prevalence of musculoskeletal disorders in developing countries as they experience a higher rate of aging compared to developed countries. Thus, chronic conditions are more likely to occur as people now live longer (increased risk with increased age), and musculoskeletal types are among the most common of these chronic conditions (Blyth *et al.* 2019).

When comparing musculoskeletal conditions between developing and developed countries, the literature indicates that musculoskeletal conditions that occur in developing countries are synonymous with those in developed countries (Woolf *et al.* 2008). In contrast, recent literature suggests that some may be more prevalent in underdeveloped countries, such as South Africa (Brennan-Olsen *et al.* 2017; Morris *et al.* 2018). In support of this statement, (Blyth *et al.* 2019) report that current prevalence and burden estimates are most likely underestimated. This underestimation, in part, is due to a lack of universal standardisation and inconsistent application of case definitions for most of these conditions in population-based studies (Blyth *et al.* 2019). Similarly, since publication costs are high, it may prevent poorer African countries to publish their prevalence studies. Additionally, many other studies are mainly published as a postgraduate thesis and, therefore, only available through local university libraries (Morris *et al.* 2018).

The prevention and management of musculoskeletal conditions have not been a priority in research since these conditions have a low mortality rate (Woolf, Erwin and March 2012;

Briggs *et al.* 2021). In a South African context, earlier research indicates that musculoskeletal health has not been a priority, as the country is plagued with epidemics such as HIV and TB (Adebajo and Gabriel 2010; Major-Helsloot *et al.* 2014), which removes musculoskeletal conditions from the research agenda. Instead, resources have mainly been allocated toward the prevention and management of these epidemics (Louw, Morris and Grimmer-Somers 2007; Adebajo and Gabriel 2010; Major-Helsloot *et al.* 2014).

Although musculoskeletal health is currently a major contributor to the disease burden in South Africa, HIV, TB and other non-communicable diseases are still given priority (Carpenter, Nyirenda and Hanass-Hancock 2021). One such example is that international funds are readily available for HIV/AIDS and TB research in Africa, while a similar funding arrangement does not exist for research on low back pain (Morris *et al.* 2018). Given the large economic inequality between African countries, the poorer countries on the continent cannot contribute to back pain research as they do not have the capacity for musculoskeletal pain research, nor is such research endorsed, as funds are directed towards more severe health concerns (Morris *et al.* 2018).

These conditions being prioritised over musculoskeletal types are evidenced by recent evidence confirming the high burden placed on South Africa by HIV, TB and more recently, COVID-19. In 2017, South Africa was ranked among the countries with the highest TB and co-infection of TB with HIV burdens in the world, with an incidence rate of 322 cases per 100 000 people (WHO 2018; Moyo *et al.* 2022), while, in 2019, the incidence rate of TB increased to 360 cases per 100 000 people (WHO 2020).

From a global perspective, South Africa is one of eight countries that contributes to two-thirds of cases globally (WHO 2020, 2021). While for HIV, the most recent HIV prevalence study in South Africa was conducted in 2017 (Simbayi *et al.* 2019), which reports that globally, the prevalence of HIV is the highest in South Africa, with the country's overall prevalence indicating a sharp increase since the last prevalence study conducted in 2012 (Shisana *et al.* 2014).

Regarding COVID-19, the pandemic in South Africa was characterised by four waves by the end of January 2022 (Jassat *et al.* 2022). Moonasar *et al.* (2021) outlines the strain that the South African economy and healthcare sector faced during the first surge of the pandemic. Among the numerous resources devoted to those that fell ill and contact tracing (Moonasar *et al.* 2021), HIV viral load testing platforms and TB diagnostic platforms were reassigned to COVID-19 (Abdool Karim and Baxter 2022). South Africa was among the top 10 most acutely affected countries in the world during this time in terms of total cases (South African National Department of Health 2020; Moonasar *et al.* 2021), but also the most

affected country on the African continent (Africa CDC 2020; Moonasar *et al.* 2021). Following the declaration of a state of disaster in the country, several HIV and TB clinical trials led by South African researchers were suspended (Abdool Karim and Baxter 2022).

It can therefore be seen that the priority of healthcare in South Africa does not have a musculoskeletal focus, but rather one of communicable and infective disease which seemingly has a higher impact. In this context musculoskeletal conditions are not absent and still require attention, therefore, the presentation of patients to chiropractors/chiropractic students still occurs, but these practitioners have greater need to address both musculoskeletal and non-musculoskeletal concerns for patients. This requires that the chiropractors and students have good communication skills to address both aspects of care.

In this context, patient education is recognised as an important strategy to allow for patients to take control of their condition through patient empowerment (Aujoulat, d'Hoore and Deccache 2007; Woolf *et al.* 2008; Jotterand, Amodio and Elger 2016; Yeh, Wu and Tung 2018; Caneiro *et al.* 2020), which enables patients to effectively self-manage their condition as a result of education (Woolf *et al.* 2008; Ndosi *et al.* 2015; Thompson 2017) and to support patients and inspire permanent change such as healthy behaviour and lifestyle modifications (Jotterand, Amodio and Elger 2016). This concurs with (Lewis *et al.* 2019), who outlines that patient participation and healthy behaviour are vital in order to optimise musculoskeletal health in the 21st century, especially in the face of increasing aging populations, but also healthy aging for the younger population, such as minimising childhood obesity or increasing physical activity.

Adebajo and Gabriel (2010) argue that patient education may address musculoskeletal health in sub-Saharan countries as it has the potential to improve the self-efficacy of patients. Ndosi *et al.* (2015) outline that self-efficacy is a determinant of self-management in patients; thus patient education should be geared towards improving patients' self-efficacy. Furthermore, as patients' self-efficacy improves, other health outcomes, such as pain, will also improve (Field, Newell and McCarthy 2010; Ndosi *et al.* 2015; Ruben, Meterko and Bokhour 2018).

This agrees with Edwards *et al.* (2016), who find in their review that addressing patients' self-efficacy has shown to improve the functional outcomes of patients. Functional outcomes improve due to self-efficacy having the ability to mediate the association between the intensity of pain that an individual experiences, and the level of disability that an individual develops (Costa *et al.* 2011; Hermann 2011; Miró *et al.* 2011; Kalapurakkal *et al.* 2015; Edwards *et al.* 2016). In this respect, self-efficacy is a protective psychological

resource for those with persistent pain, and a resilience factor for those with chronic pain (Stewart and Yuen 2011; Edwards *et al.* 2016).

In terms of functional outcomes, compared to disease severity, resilience predicted pain and physical function more effectively in osteoarthritic patients (Wright, Zautra and Going 2008; Stewart and Yuen 2011). In this context, the effect that resilience has on pain intensity and a patient's functional ability was mediated through self-efficacy (Wright, Zautra and Going 2008). Simply put, patients with high self-efficacy are more likely to have decreased pain and better physical function (i.e., less likelihood of developing disability) (Wright, Zautra and Going 2008).

The prevalence of musculoskeletal conditions are expected to increase due to an increase in global life expectancy and the associated increased risk of developing these conditions with increases in age, as well as increased exposure to factors that negatively affect musculoskeletal health, such as physical activity levels of populations that are declining and the increased levels of obesity (Woolf *et al.* 2008; Woolf, Erwin and March 2012; Clark and Ellis 2014). Given the expected increased prevalence, effective patient education may play a significant role in decreasing disability, suffering, and missed work when applied in conjunction with other treatment interventions (Foster, Hartvigsen and Croft 2012).

Bartlett (1985: 323) proposes an operational definition of patient education as “a planned learning experience using a combination of methods such as teaching, counselling and behaviour modification techniques which influence patients' knowledge and health behaviour”. Patient education provides an avenue for healthcare professionals to relay important information to their patients (Hoving *et al.* 2010; Jotterand, Amodio and Elger 2016; Forbes *et al.* 2017a), including clearing up misconceptions and addressing any concerns that the patient may have (Jotterand, Amodio and Elger 2016; Wittink and Oosterhaven 2018). It also allows for the improvement of self-efficacy (Ndotsi *et al.* 2015; Forbes *et al.* 2017a) and self-management of patients (Núñez *et al.* 2006; Ndotsi *et al.* 2015; Forbes *et al.* 2017a; Eilayyan *et al.* 2019). If applied in addition to therapeutic interventions, it may be possible to decrease disability, suffering and missed work days through patient education, such as encouragement to remain active and to stay at work, as well as assisting patients in modifying their beliefs and expectations (Foster, Hartvigsen and Croft 2012).

Patient education is consistently being highlighted as an essential clinical practice guideline as part of first-line treatment in primary care for patients with musculoskeletal pain (Babatunde *et al.* 2017; Lin *et al.* 2020b). These clinical practice guidelines also apply to chiropractors as they form part of the first contact line in primary care for musculoskeletal pain (Babatunde *et al.* 2017).

Within a South African context, chiropractors function at a primary contact level (Myburgh and Mouton 2007). Therefore, they are ideally placed (Jamison 2002) to deliver patients with information on available treatment options, self-management strategies and advice on preventing future episodes of musculoskeletal conditions (Foster, Hartvigsen and Croft 2012). Furthermore, an increase in musculoskeletal conditions in South Africa and the fact that they affect all aspects of an individual's life requires practitioners to optimise their ability to improve clinical outcomes.

Given that the prevalence of musculoskeletal conditions are expected to increase, and that chiropractors specialise in this domain, it is the profession's responsibility to devote chiropractic resources to the prevention and management of such conditions. Therefore, this study focused on assessing the patient education skills of chiropractic students at DUT, as they will form a part of the future of chiropractic in South Africa.

In addition, this study provided insight regarding the perceptions and practices of chiropractic students. Thus, this study identified possible areas of improvement for chiropractic education and inform professional development programmes of possible educational needs of students that need to be targeted. Consequently, the study provided a base from which to improve patient education, practice education and training for future professionals.

1.2 RESEARCH PROBLEM

The modern healthcare provider's role has evolved from simply being competent in clinical skills to effective communication skills, especially regarding patient education. Regarding musculoskeletal conditions, patient education is valuable in terms of healthy lifestyle modifications, making informed choices, and improving the self-management and uptake of recommended health services which helps patients deal with their condition on a day-to-day basis. Several research papers (Gliedt *et al.* 2017; Muddle, O'Malley and Stupans 2019; Stomski *et al.* 2019) argue that chiropractic students should be efficient in these areas of communication, and whilst the health promotion topic has been researched at DUT (Ford 2013), patient education specifically has not been studied at DUT. This study will provide knowledge, perceptions and practices of chiropractic students in order to provide a base from which to improve patient education practice, education and training for these future professionals.

1.3 AIM AND OBJECTIVES OF THE STUDY

The aim of this study was to describe chiropractic students' perceptions and practice of patient education of musculoskeletal conditions and to identify the strategies used to educate patients and possible barriers that students experience when educating their patients.

The first objective of this study was to evaluate the perception of chiropractic students' regarding the strategies that they use to educate their patients.

The second objective of this study was to evaluate chiropractic students' self-reported practice behaviour regarding patient education strategies.

The third objective of this study was to investigate chiropractic students' perceived barriers that they experience regarding the provision of patient education to patients at the DUT CDC (such as language or the attitude of the patient).

The fourth objective of this study was to investigate chiropractic students' perceived factors that enables them to develop their patient education skills.

The fifth objective of this study was to determine the association between demographics and the perception and practice of patient education.

1.4 RATIONALE FOR THE STUDY

It is the responsibility of healthcare providers to teach patients how to manage their pain effectively and how to apply the strategies taught to them in their lives (Caneiro *et al.* 2020). Patient education is an influential factor in addressing and improving patients' self-efficacy, allowing for empowerment, improved clinical outcomes and decreased healthcare costs (Adebajo and Gabriel 2010). In addition, the empowerment of patients allows them to manage their condition appropriately at home in a sustainable way (Caneiro *et al.* 2020).

A recent review of musculoskeletal care finds that patient education also aids patients in maintaining their independence by not solely relying on a healthcare professional to manage their symptoms (Engers *et al.* 2008; Babatunde *et al.* 2017). Additional benefits of patient education are reflected in reduced direct and indirect healthcare costs (Ullrich and Vaccaro 2002; Pellisé and Sell 2009; Stenberg *et al.* 2018) and decreased loss of productivity at home and within the workplace (Stenberg *et al.* 2018), through positive clinical outcomes overall.

Thus, the physician's role in educating patients regarding their healthcare and appropriate intervention options is significant. This requires that part of the consultation be utilised to

teach patients about self-care strategies, monitoring clinical progression and how to evaluate information within their specific contexts (Hoving *et al.* 2010). Gliedt *et al.* (2017) emphasised the need for educational efforts to equip chiropractic students with a wide variety of methods to empower patients by working towards self-efficacy. This concurs with Hecimovich and Volet (2009) and Muddle, O'Malley and Stupans (2019), who state that majority of literature regarding communication skills exists within the medical field and that this area is deficient in the chiropractic domain. Moreover, the authors suggest that the development of confidence in communication skills of chiropractic students should not be undervalued as it should be attained before entering professional practice (Hecimovich and Volet 2009).

Chiropractic institutions should strive to produce graduates with a core skill set and adequate knowledge that allows the chiropractor to fulfil their professional duty at the primary health contact level (Puhl *et al.* 2017). Clinical training assists in bridging the gap between theory and practice by providing students with a setting in which they can develop their clinical skills in real-life situations (Rapport *et al.* 2014).

The Durban University of Technology Chiropractic Day Clinic (DUT CDC) is a teaching clinic for Master's degree chiropractic students where they treat patients with legitimate health conditions, under the supervision of qualified and experienced clinicians, as part of their clinical training. Such a clinical environment allows students to develop the required knowledge, skills, attitudes and behaviours, but it also allows them to develop their own professional identity (Rapport *et al.* 2014).

As chiropractic students are the future of the profession, studying their perceptions and practice behaviour in such an environment may provide insight into the future principles and practices of the profession (de Luca *et al.* 2018). This study provides a basis for developing strategies to enable patient education skills development for future students to impact musculoskeletal health and patient-centred care at the DUT CDC.

1.5 LIMITATIONS OF THE STUDY

This research study assessed the self-reported practice and perceptions of chiropractic students, thereby relying on the honesty of the participants, as a result, there is a possibility that the findings of this study may not accurately reflect reality. Other research methods may be used to report the actual clinical behaviours of chiropractic students. Since a total sample size method was used which allowed for reporting of student perceptions and practice at the Durban University of Technology (DUT), therefore the findings of this study

may have relevance for DUT; however, this study did not include chiropractic students at other institutions in South Africa, thereby limiting the generalisation of this study.

Lastly, those students who do not have a particular interest in patient education may lead to social desirability bias and possibly overreporting of their actual patient education practices (Forbes *et al.* 2017a).

1.6 OUTLINE OF THE CHAPTERS

Chapter One summarises the literature and highlights the need for this study as well as the aims and objectives, and limitations of the study. Chapter Two discusses the literature related to the research topic in detail, including the history and development of patient education, how it relates to patient-centred care and chiropractic, and the content that needs to be covered with patients during consultations. Chapter Three discusses the research methodology. Chapter Four presents the results of the study and the discussion of the results. Finally, Chapter Five presents the conclusion and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter discusses the history and development of patient education, mainly focusing on its importance in musculoskeletal health in the 21st century. This is addressed through a discussion of the constituent parts of patient education that relate to musculoskeletal health, methods used to deliver patient education, barriers to effective patient education, the perception of patient education and the development of patient education as a clinical skill in healthcare professionals.

2.2 HISTORY AND THE DEVELOPMENT OF PATIENT EDUCATION

Due to differences in and between various countries, advancements in patient education practices have developed variably. However, they have collectively contributed to the modern concept of patient education that we use today (Hoving *et al.* 2010). Given this, the development of patient education can be traced back to specific advancements over time (Hoving *et al.* 2010).

For example, in the Middle Ages, the domain of medical knowledge lay with the clergy and the educated nobility, with little or no training for anyone outside of that realm (Mory, Mindell and Bloom 2000). This often led to the development of untrained medical professionals, with whom patients were more likely to interact (those professions' education was passed from father to son, or mother to daughter, such as bonesetters of old, and midwives) (Basmajian and Nyberg 1993). Within this context, the patient relied heavily on the medical professional to make decisions or aid in making decisions, principally due to a lack of knowledge of their conditions.

This led to many unsound medical practices such as trephining, leeching, bloodletting and other medical practices that were routinely applied to patients (Reiser 1985; Mory, Mindell and Bloom 2000; Bartlett *et al.* 2021), to which they neither could object nor had the knowledge to object. The gravity of this situation became so dire that the Flexner report in the 1910s was brought about to task medical professionals with codes of ethics and professional practices to protect the rights and dues of the patient (Nachman and Marzuk 2011). This led to the development of the biomedical model of healthcare.

Thus, for the most part, between the 1910 Flexner report and the 1960s, healthcare professionals practised in what is termed a "paternalistic paradigm" (Jotterand, Amodio and Elger 2016), where patients were seen as the passive recipients of care. The physicians

dominated the doctor-patient relationship and viewed the decision-making process as their sole responsibility (Pellisé and Sell 2009; Hoving *et al.* 2010). This was reinforced by the fact that they were considered “experts” who could decide what was best for the patient without necessarily discussing patients’ preferences (Hoving *et al.* 2010). Thus, physicians developed an approach that rarely provided patients with information in an attempt to educate them. When they did, the information provided was not part of a comprehensive plan aimed at health promotion and disease prevention (Hoving *et al.* 2010).

Several positive changes were brought about since the 1910 Flexner report, which transformed medical education (Ludmerer 2010; Duffy 2011), and the development of the Nuremberg Code in 1947 resulted in human-rights law and medical ethics undergoing immense changes (Shuster 1997). However, despite the positive impact of the Nuremberg Code, there were still shortcomings which led to the development of the Declaration of Helsinki, which the World Medical Association accepted in 1964. Under this act, informed consent practices became even more strict (Miracle 2016). The Declaration of Helsinki set the scene for the development of the Belmont Report in 1979, which included principles of respect for persons, justice and beneficence (Miracle 2016). The Belmont Report and the 1981 Protection of Human Subjects Law set the current ethical standards and principles for protecting patients in research and therapeutic practice (Miracle 2016). A paradigm shift started in healthcare around the 1960s and 1970s, leading to the paternalistic model being replaced by a patient-centred approach (Jotterand, Amodio and Elger 2016). The patient-centred approach placed practitioners and patients on equal moral, ethical, information and rights grounds and allowed for patients to actively participate in their management and treatment through shared decision-making (Jotterand, Amodio and Elger 2016). This shift in power during clinical encounters led to the need for patients to be appropriately informed about their problems, the consequences, the available interventions and the possible outcomes or prognoses (Lenz *et al.* 2012; Jotterand, Amodio and Elger 2016).

As a result, the perceived authority that healthcare professionals had over patients decreased as time went by, and patients progressively took on their new role as decision-makers during their clinical encounters (Jotterand, Amodio and Elger 2016). For this to be successful, however, the patient education provided was required to facilitate the redistribution of power. The redistribution of power resulted from providing patients with the necessary information to understand their condition, obtain the necessary skills to cope or empower patients to act according to long-term, rather than short-term, goals (Jotterand, Amodio and Elger 2016).

In this context, the Lalonde Report (Lalonde 1974) was the first time that behavioural factors of an individual’s lifestyle, such as physical exercise and diet, were recognised as

constituents of health (Hoving *et al.* 2010). Furthermore, the first scientific journal dedicated to patient education, known today as *Patient Education and Counselling*, was established in 1976 at the First International Conference on Patient Counselling (Hoving *et al.* 2010).

During the 1980s, patient education continued to develop alongside social matters such as patient rights and patient advocacy organisations (Hoving *et al.* 2010; Jotterand, Amodio and Elger 2016). These developments led to the establishment of legislation regarding patient rights and the provision of information relating to a patient's condition and treatment options (Deccache and Aujoulat 2001; Hoving *et al.* 2010). This allowed patients to participate actively in their healthcare by improving their health through lifestyle modifications (Hoving *et al.* 2010).

By the 1990s, it was accepted that patients were part of the decision-making process and engaging in health promotion and disease prevention (Hoving *et al.* 2010). In addition, the day-to-day management of conditions through alterations in patient behaviours were being recognised as important considerations as patients spend most of their time outside of the clinical encounter (Hoving *et al.* 2010). As a result, patients received education regarding skills on managing themselves at home in lay terms that the patient could understand (Hoving *et al.* 2010). This changing process was further facilitated by the advent of the internet from the mid to late 1990s, due to health information that became more readily available to the general public (Hoving *et al.* 2010).

Thus, in modern healthcare, patient education does not merely serve to relay important information to patients but also to address their quality of life (Hoving *et al.* 2010). In contrast to the previous paternalistic model, patient education aims to empower and support the patient by influencing their choices to inspire permanent change, as opposed to practitioners persuading patients to help themselves (Jotterand, Amodio and Elger 2016; Yeh, Wu and Tung 2018). The published benefits of patient education are reflected in

- A positive influence on disability, anxiety, active movements, improvement of negative perceptions of pain, and a reduction in fear or catastrophisation associated with pain (Louw *et al.* 2011; Nijs *et al.* 2013).
- Improved health behaviour (Taal, Rasker and Wiegman 1996; Oosterhof *et al.* 2014; Jotterand, Amodio and Elger 2016; Thompson 2017).
- Patient empowerment (Aujoulat, d'Hoore and Deccache 2007; Woolf *et al.* 2008; Jotterand, Amodio and Elger 2016; Yeh, Wu and Tung 2018; Caneiro *et al.* 2020).
- Improved self-efficacy (Taal, Rasker and Wiegman 1996; Field, Newell and McCarthy 2010; Knittle, De Gucht and Maes 2012; Ndosi *et al.* 2015).

- Improved self-management (Taal, Rasker and Wiegman 1996; Lorig and Holman 2003; Peek *et al.* 2016; Stenberg *et al.* 2018).
- Decreased direct and indirect healthcare costs (Ullrich and Vaccaro 2002; Pellisé and Sell 2009; Stenberg *et al.* 2018).
- Decreased productivity loss at home and within the workplace (less absenteeism and presenteeism) (Stenberg *et al.* 2018).

Ultimately, patient education enabled a patient-centred medical practice whereby healthcare professionals can mitigate the burden placed upon their patients by their conditions.

As healthcare develops further and with a view to increasing advances in technology, restricted time with patients and increased financial constraints, there is an increased likelihood that healthcare can become dehumanised in its evolution (Finset 2007). This would suggest that patients are likely to again become puppets within the healthcare system (Finset 2007).

Fortunately, to combat the realisation of dehumanisation of patients, movements such as the biopsychosocial model (Borrell-Carrió, Suchman and Epstein 2004; Finset 2007; Gliedt *et al.* 2017; Wade and Halligan 2017) and patient-centred care (Mead and Bower 2000; de Haes 2006; Finset 2007) have surfaced in order to preserve and promote the humanistic aspect of patient care (Pellisé and Sell 2009; Miles, Asbridge and Caballero 2015). These movements were established in response to the biomedical approach, which has become too restrictive in modern healthcare (Finset 2007), especially in musculoskeletal care, such as chronic pain (Nijs *et al.* 2013).

According to a systematic review of patient-centred care, it is against the background of healthcare providers focusing on diseases and its treatment instead of the patient, their lives and the health issues they face that challenges in communication may occur (Dwamena *et al.* 2012). Their review states that patient-centred care, in essence, is characterised by an approach where the providers place themselves in the patient's shoes to understand the illness from the patient's perspective, as described by McWhinney (1989). Dwamena *et al.* (2012) explain that, within this context, it is the patient's knowledge, experience (Byrne and Long 1976), preferences and needs (Laine and Davidoff 1996) that guide the healthcare provider, and they begin to see the patient as a unique human being (Balint, Ball and Hare 1969).

More recently, the Institute of Medicine (Institute of Medicine 2001) defined patient-centred care as "care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions". Dwamena *et al.*

(2012) interpret the IOM definition as a partnership between healthcare practitioners and, when needed, their families, and that such care ensures the patient's needs, values and preferences are addressed. Therefore, according to the perspective of the Institute of Medicine, patient-centred care involves collaborative relationships where power is shared and the "whole person" is considered (Dwamena *et al.* 2012). Similarly, Epstein *et al.* (2005) suggest an operational definition of patient-centred care that includes "shared power and responsibility". In addition, the authors describe patient-centeredness as that of a moral philosophy of healthcare providers to ensure high quality care for their patients (Epstein *et al.* 2005).

There has been a discernible shift in healthcare towards supporting active engagement, involvement, and autonomy of patients, as outlined in a recent narrative review (Snyder and Engström 2016). The authors state that patient education is an important enabler for patient involvement in their treatment, thus leading to increased adherence to treatment. In addition, involvement objectives such as shared decision-making, successful collaboration and self-management can also be achieved through patient education (Anderson *et al.* 1995; Grantham *et al.* 2006; Timmermans *et al.* 2006; Williams *et al.* 2012; Snyder and Engström 2016).

Therefore, patient education is regarded as an active component in the patient-centred approach to and treatment of musculoskeletal pain and disability. As such, clinicians should be trained in patient education as a core component of patient care (Caneiro *et al.* 2020).

2.3 THE BURDEN OF IMPAIRED MUSCULOSKELETAL HEALTH IN THE 21ST CENTURY

Musculoskeletal health is vital to an individual's ability to participate in life fully, which requires normal human function, mobility, dexterity, and the ability to perform all activities of daily living (ADL) and to maintain independence (Briggs *et al.* 2016; Briggs *et al.* 2018; Woolf and Akesson 2020). According to Briggs *et al.* (2016), the effects of impaired musculoskeletal health are reflected in decreased quality of life, decreased capacity to perform physical activity and decreased physical and mental health.

A study by Palazzo *et al.* (2014) illustrates that musculoskeletal conditions affect an individual's ability to change their basic body position, lifting or carrying objects, walking and moving around, washing themselves, shopping, doing housework and increased assistance from others (i.e., family members and healthcare professionals). In addition to these disabilities, the study also illustrates that conditions such as neck and low back pain are associated with changing jobs (Palazzo *et al.* 2014). Furthermore, a strong association

exists between painful musculoskeletal conditions and a decreased capability to perform physical activity, with resultant functional decline, frailty, loss of well-being, loss of independence and depressive symptoms (Briggs *et al.* 2016; Woolf and Akesson 2020).

During the late 20th century and 21st century, an epidemiological transition from communicable diseases to non-communicable diseases has been observed (Gouda *et al.* 2019). This has been documented at 20–33% of the global population living with a painful musculoskeletal condition (James *et al.* 2018; Crawford *et al.* 2020). Currently, the majority of the total burden of disease (Kyu *et al.* 2018; Briggs *et al.* 2020) and total disability burden (James *et al.* 2018; Briggs *et al.* 2020) is now attributable to non-communicable diseases. For example, since 2007, the total burden of disease increased by 16%, reaching a total of 62% in 2017, while the total disability burden increased by 61% since 1990, reaching a total of 80% in 2017 (James *et al.* 2018; Kyu *et al.* 2018; Briggs *et al.* 2020). Among non-communicable diseases, musculoskeletal conditions are considered to be the main driver of disability in most parts of the world (Bryans *et al.* 2014), and in developing countries contributed 19.2% to all disability in 2010 (Hoy *et al.* 2014).

Musculoskeletal disorders are one of the most common reasons for an individual to consult with a healthcare professional (Jordan *et al.* 2010; Mody and Brooks 2012). Not only are the direct costs of musculoskeletal healthcare extremely high, but the indirect costs attributed to the loss of productivity that are associated with these conditions are considerably greater than the direct healthcare costs (Briggs *et al.* 2016; Bornhöft *et al.* 2019). The indirect healthcare costs outweigh the direct costs by a factor of five to one (Arthritis and Osteoporosis Victoria 2013; Briggs *et al.* 2016).

According to Crawford *et al.* (2020), in Canada and the United States, these musculoskeletal conditions are responsible for the greatest financial burden on an organisation's overall healthcare costs (Crawford *et al.* 2020). Musculoskeletal conditions account for 53% of overall healthcare costs and eclipse those of cancer (47%), diabetes (44%) and cardiovascular disease (32%) (Crawford *et al.* 2020). To further illustrate the burden of impaired musculoskeletal health on the workplace, these conditions account for an annual economic burden of \$25.6 billion in Canada, of which \$13.9 billion is attributable to productivity loss (Crawford *et al.* 2020). While direct costs of musculoskeletal care in the United States in 2016 amounted to \$380.9 billion (Briggs *et al.* 2020; Dieleman *et al.* 2020). The loss of the workforce due to absenteeism and presenteeism reflects the high indirect costs associated with musculoskeletal disorders (Briggs *et al.* 2020). Among non-communicable diseases, the greatest loss of productive life years is attributable to impaired musculoskeletal health. This often results in early retirement and or medical boarding and

decreased financial security (Crawford *et al.* 2020; Woolf and Akesson 2020). As an example, low back pain is highly prevalent during adolescence and decreases between the ages of 20–29 but gradually increases thereafter until reaching a peak between the ages of 40–69, which means middle age is characterised by the highest prevalence of low back pain (Hoy *et al.* 2012). At the same time, work productivity is highest during middle age for many people (Hoy *et al.* 2012). In other words, people are most affected during their most productive years, which becomes increasingly important to remain at work when other family members may be dependent on them (Hoy *et al.* 2014).

Considering the above, musculoskeletal conditions pose a great problem for healthcare systems globally, especially in developing countries. As a result, several papers have raised concern regarding the effect of musculoskeletal conditions, with developing countries being affected more acutely (Hoy *et al.* 2014; Briggs *et al.* 2016; Blyth *et al.* 2019).

To paint a clearer picture of the burden of musculoskeletal conditions in the African setting, an argument can be made that the prevalence of musculoskeletal conditions is lower than in developed countries. To illustrate this, Woolf and Pfleger (2003) find that, in comparison with other countries, Europe and the USA had the highest prevalence of osteoarthritis. Rheumatoid arthritis was similarly described, particularly as most of the prevalence they found emanated from Europe and the USA (Woolf and Pfleger 2003). Despite few or no cases of rheumatoid arthritis reported in surveys from Africa at the time (Silman and Hochberg 1993; Woolf and Pfleger 2003). One study in Soweto, however, indicated a correlation between rheumatoid arthritis and urban living, where the prevalence among a black population living in urban areas was comparable to the prevalence of white Europeans (Solomon *et al.* 1975; Woolf and Pfleger 2003).

There was no distinction between developed and developing countries in terms of back pain, although an increase was noted in the United Kingdom (UK), which the authors attributed to cultural changes of increased awareness and willingness to report minor back symptoms (Woolf and Pfleger 2003). Additionally, Hoy *et al.* (2012) reviewed 165 studies across 54 countries from 1980 to 2009, and estimated the global point prevalence of low back pain to be 18.3%. In terms of rural and urban areas, they found no significant difference, but they also found that developed countries had a higher mean prevalence of low back pain compared to developing countries (Hoy *et al.* 2012).

While the information related to Africa was very limited in the abovementioned studies, a growing body of research, however, suggests quite the opposite for the African setting specifically. In contrast to the argument mentioned above, it may not be true that musculoskeletal pain is less prevalent in developing countries. Illustrating this, the first

systematic review of low back pain prevalence and risk factors in Africa was only published in 2007 (Louw, Morris and Grimmer-Somers 2007). Although the authors also found no difference between developed and developing countries, they mention that very first study on low back pain in Africa was in 1990, and that only one study from Africa was included in a 2000 global review. Thus, they contend that African countries have only recently begun to face the problem of low back pain prevalence, and that it has been only since the early 1990s that resources have been allocated for such research which may have previously been only available to HIV/AIDS research (Louw, Morris and Grimmer-Somers 2007). This concurs with the earlier discussion of HIV/AIDS as explained by Morris *et al.* (2018) who emphasised that many African countries still do not facilitate or allocate funds to research on low back pain.

More recent evidence from an updated systematic review (which included 16 studies from South Africa), demonstrated that low back pain is much more common among Africans (Morris *et al.* 2018) than what was suggested by (Hoy *et al.* 2012). Their review shows that the point prevalence of low back pain for Africans were 39% compared to the previous estimation of 18.3% by Hoy *et al.* (2012). Furthermore, they found the annual prevalence of low back pain for the African population to be 57%, compared to 38.5%, and that the lifetime was also higher than what was previously reported (47% compared to 38.9%) (Hoy *et al.* 2012; Morris *et al.* 2018). In short, the point prevalence estimates of low back pain concerning Africa, was significantly higher compared to Canada, Denmark and Sweden, and were equal to Germany and Belgium (Hoy *et al.* 2010; Morris *et al.* 2018).

Furthermore, Morris *et al.* (2018) find that low back pain was more common among African males, which is contradictory to global trends where prevalence is usually higher in females (Wáng, Wáng and Káplár 2016), which may have been because most of study participants may have included men mostly. Nonetheless, this is significant as they also indicate that health-related problems are perceived as diminishing African male masculinity, many African cultures discourage African males from reporting these problems (Thorpe *et al.* 2013; Morris *et al.* 2018). Thus, there is a possibility that the actual prevalence in African countries may be even higher still than what the authors found. Against this background, the cultural changes that occurred in the UK, as previously explained according Woolf and Pflieger (2003), become even more compelling that should cultural changes similar to that which occurred in the UK also occur around the world, the burden of back pain could rise dramatically, especially where back pain is not considered to be associated with disability.

In terms of osteoarthritis prevalence in developing countries, osteoarthritis is also increasing as people age, and the pattern is comparable to that in developed countries (Brennan-Olsen *et al.* 2017). When the researchers applied age-standardisation, they found in South Africa

and other developing countries that men, in particular, had a much higher prevalence of osteoarthritis than developed countries. One proposed reason is that in developing countries, in part, this is because lower levels of education often correlate with lower-skilled jobs, which typically involves heavy manual labour, thereby increasing their risk factor exposure (Brennan-Olsen *et al.* 2017).

Furthermore, a South African study found musculoskeletal conditions unrelated to injury to be prevalent in 36% of patients visiting a community clinic in Cape Town, South Africa (Parker and Jelsma 2010). The study reported mild to moderate disability as the most commonly reported problem, and the worst difficulty was performing whole body function such as “running errands”. The study also reported a correlation between multiple joint involvement and increased disability (Parker and Jelsma 2010). The impact of these conditions on patients’ lives concurs with current literature (Briggs *et al.* 2016; Briggs *et al.* 2018; Woolf and Akesson 2020), which emphasises the effect on activities of daily living and loss of independence.

2.4 FACTORS THAT INFLUENCE MUSCULOSKELETAL HEALTH

The World Health Organization defines risk factors as “social, economic or biological status, behaviours or environments which are associated with or cause increased susceptibility to a specific disease, ill health, or injury” (World Health Organization Health Promotion Glossary 1998). The aetiology of musculoskeletal disorders is multifactorial, of which the collective of risk factors include those of individual, biomechanical and psychosocial origin (Hernandez and Peterson 2012; Hutting *et al.* 2019).

Woolf, Erwin and March (2012) state that people of all ages should be motivated to follow a healthy lifestyle (with a specific focus on bone and joint health), which requires individuals to reduce their exposure to specific risks for musculoskeletal disorders. These include, but are not limited to, inappropriate physical activity, unhealthy weight, insufficient daily allowance intake of calcium and vitamin D, smoking, alcohol abuse, musculoskeletal injuries, overuse due to work or sport and inadequate awareness of issues relating to musculoskeletal health.

Additional factors implicated in the development of musculoskeletal disorders include urbanisation, industrialisation and motorisation in low- and middle-income countries (Woolf and Pflieger 2003; Lewis *et al.* 2019; Crawford *et al.* 2020) and environmental factors (Mody and Brooks 2012). At the person level, the factors that may influence an individual’s musculoskeletal health include genetic, psychosocial, lifestyle, workplace, and individual

factors (da Costa and Vieira 2010; Mody and Brooks 2012; Coggon *et al.* 2013; Crawford *et al.* 2020).

Workplace factors include (da Costa and Vieira 2010; Coggon *et al.* 2013; Crawford *et al.* 2020):

- Heavy physical labour.
- Sedentarism.
- Repetitive work.
- Poor and awkward postures.
- Exposure to psychosocial risks.

Lifestyle factors include (Crawford *et al.* 2020; Woolf and Akesson 2020):

- Overweight/obesity.
- Smoking.
- Physical activity and sport during leisure time.

Individual factors include (da Costa and Vieira 2010; Coggon *et al.* 2013; Crawford *et al.* 2020):

- Gender (female).
- Age.
- Musculoskeletal conditions that occur unrelated to work (such as rheumatoid arthritis).
- General health and comorbidity.

These collective risk factors can further be divided into modifiable and non-modifiable risk factors. Non-modifiable risk factors include genetics, gender and age (Mody and Brooks 2012). Modifiable risk factors include physical inactivity, obesity, nutrition, smoking and excessive alcohol, musculoskeletal injury (Mody and Brooks 2012; Clark and Ellis 2014), medications (Mody and Brooks 2012), as well as posture, the nature and duration of tasks, job demands and the physical features of work (van Niekerk, Louw and Hillier 2012). Modifiable risks are important as they could be a target for lifestyle interventions that may prevent or improve a wide range of musculoskeletal conditions (Walsh *et al.* 2008; Mody and Brooks 2012).

In developing countries, rapid ageing and increased prevalence of obesity are significant contributors to the burden associated with musculoskeletal disorders (Hoy *et al.* 2014). However, these conditions affect a wide range of people, and the burden will only increase in those who do not take their health and lifestyle seriously, including those who disregard for the importance of diet and physical activity (Lewis *et al.* 2019).

Patient education is an empowering process (Jotterand, Amodio and Elger 2016; Yeh, Wu and Tung 2018), through which patients can gain more control over their lives (Aujoulat, d'Hoore and Deccache 2007) and their health and management of their condition (Jotterand, Amodio and Elger 2016).

Within South Africa, chiropractors' patient education is among the activities that they report spending most of their time on (Johl, Yelverton and Peterson 2017). In this context, their practice is in line with recent guidelines that stipulate that care provided by chiropractors should be multimodal and, therefore, should include patient education (Chou *et al.* 2007; Bryans *et al.* 2014; Bussières *et al.* 2016; Beliveau *et al.* 2017; Brockhusen *et al.* 2017; Wong *et al.* 2017; Hawk *et al.* 2020).

Chiropractors find themselves in an ideal position to educate their patients (Jamison 2002; Foster, Hartvigsen and Croft 2012). This may be even more applicable to chiropractic students at the DUT CDC as they have a broad and diverse patient base due to satellite clinics and informal events that supplement the clinical training (European Council on Chiropractic Education 2017). Additionally, the DUT CDC has a fee-reduction policy in place in order to provide services, even to those who may not be able to afford standard rates (DUT Chiropractic clinic manual 2020). Due to the fee-reduction policy, the reach of students may extend even more, including those who may be underserved.

Patient education, while not a cure-all, may play an essential role in alleviating the burden of musculoskeletal problems at the level of the individual, as will be explained later in this chapter. As chiropractors function at the primary contact level in South Africa (Myburgh and Mouton 2007), they can effectively educate patients on self-management strategies, and along with the necessary skills, disease management may improve. Therefore, it becomes a cost-effective approach, whereby patients are in less need of service (Traeger *et al.* 2015; Yeh, Wu and Tung 2018).

2.5 THE DOCTOR-PATIENT RELATIONSHIP IN PATIENT-CENTRED CARE

As previously stated, communication challenges may occur when the focus during consultations is on the disease and its treatment instead of the patient as a person, the individual health issues they experience and their context (Dwamena *et al.* 2012). To contextualise this, Scholl *et al.* (2014) proposed an integrative model of patient-centred care which illustrates the inter-relatedness of all aspects of patient-centred care, where no aspect is independent of one another. By way of example, the doctor-patient relationship is influenced by individual clinician and patient attributes or characteristics; information that is

patient specific and responsive to patient enquiry which allows shared-decision making and accommodates patient preferences; good interpersonal communication provides emotional support (such as patients experiencing anxiety about the impact of their problem on their lives, treatment and prognosis thereof); and communication is essential to building a supportive relationship between clinicians and patients (Frank 2013; Scholl *et al.* 2014).

A recent systematic review summarises the themes that are related to patient-centred care, which illustrates the integrative nature of patient-centred care as discussed above. The themes of patient-centred care include the following (Wijma *et al.* 2017):

- Individuality.
- Communication.
- Education.
- Goal setting.
- Support.
- The personal skills of the therapist (that is, their social characteristics, confidence, skills, and knowledge).

Within the framework of patient-centred care, individuality refers to tailoring education, communication and treatment to individual patients (Wijma *et al.* 2017). Not only are all of the themes mentioned above closely related (Wijma *et al.* 2017), but the research also indicates that communication adds to all other themes to varying degrees (Cooper, Smith and Hancock 2008). Education mainly concerns information regarding the patient's problem, their diagnosis, treatment and the course of treatment (Wijma *et al.* 2017). Goal setting relates to patient activation and motivation (Wijma *et al.* 2017). Support is considered a combination of individuality, equality, responsibility, understanding, reassurance and empowerment (Wijma *et al.* 2017). Finally, the personal skills of the therapist should comprise of updated current knowledge and their teaching skills (Wijma *et al.* 2017).

Regarding the adoption of patient-centred care in chiropractic practice, Stomski *et al.* (2019) state that only one article previously looked at patient-centred care in chiropractic practice (Stuber *et al.* 2018). The article points out that the degree to which chiropractic care is patient-centred is largely unexplored in the literature (Stuber *et al.* 2018). Moreover, the literature is entirely deficient in terms of the acquisition of patient-centred care skills among chiropractic students. Therefore, the study by Stomski *et al.* (2019) aimed to assess the patient-centred care skills of chiropractic students. Their study reveals that the patients were generally satisfied with the person-centred skills of the students who treated them at a teaching clinic. However, the authors stipulated there are areas that can be improved, such as the advice provided to patients regarding alternative treatment options and how to adjust

their living and workplace situations to manage their pain, and that educators should emphasise these attributes that require improvement (Stomski *et al.* 2019).

In light of education being closely related to the other themes of patient-centred care, and the general lack of knowledge related to patient-centred care delivered by chiropractors and chiropractic students, the current study at DUT contributes to the literature regarding the understanding of patient education of chiropractic students.

2.5.1 Patient Treatment

Patient preferences and shared decision-making are integral to patient-centred care but, more importantly, individualised. In this context, techniques should not be the primary concern during treatment but rather emphasise the patient (Wijma *et al.* 2017). In essence, the treatment is constructed around the patient, including how their needs change during the course of treatment, instead of trying to fit techniques to the patient's presentation (Wijma *et al.* 2017). Chiropractic management includes a wide variety of treatment options available to patients, which include joint manipulative therapy, joint mobilisations, soft tissue techniques, exercise therapy, therapeutic modalities, orthopaedic supports/taping/strapping and patient education (Beliveau *et al.* 2017; Brockhusen *et al.* 2017; Johl, Yelverton and Peterson 2017). Thus, it not only allows them to provide multimodal care as practice guidelines suggest they should (Beliveau *et al.* 2017), but it also allows the patient to choose the treatment that aligns with patient preferences.

2.5.2 Patient Communication

Communication refers to the need to provide individualised, straightforward discussions that are in layman's terms and should be provided continuously throughout care (Wijma *et al.* 2017). Communication is consistently highlighted as a key component of patient-centred care (Epstein *et al.* 2005; Cooper, Smith and Hancock 2008; Kidd, Bond and Bell 2011; Dwamena *et al.* 2012; Wijma *et al.* 2017; Lin *et al.* 2020a; Lin *et al.* 2020b).

The primary healthcare provider's role has changed due to healthcare reform, which now requires effective communication with patients in addition to the competence of clinical skills (Muddle, O'Malley and Stupans 2019). The relevance of communication is reflected when it is done effectively; it narrows the gap between the specialised knowledge of healthcare professionals, and patients' personal understanding and unique knowledge and experience of what it is like to live with a chronic pain condition (Fu *et al.* 2016). Against this background, effective communication is integral to reaching a mutual understanding of the patient's problem between the provider and the patient (Fu *et al.* 2016).

This concurs with Svavarsdóttir, Sigurðardóttir and Steinsbekk (2015), who outline the necessity of proficient communication skills, mainly due to the transition from a biomedical model to a patient-centred (Robinson *et al.* 2008). Thus patient education becomes critical in modern healthcare due to patients' desire to be more informed and to participate in decision-making (Deccache and Aujoulat 2001).

Good communication skills enhance the doctor-patient relationship as it helps to build a therapeutic alliance between the patient and the provider, and improves satisfaction and the probability of improved outcomes (van Dalen 2013; Muddle, O'Malley and Stupans 2019). It is essential to reach a shared understanding during this interaction; for the clinician, this relates to understanding the patient's perspective (Dwamena *et al.* 2012; van Dalen 2013; Muddle, O'Malley and Stupans 2019; Caneiro, Bunzli and O'Sullivan 2021), that is the patient's particular context, beliefs and concerns (van Dalen 2013).

According to van Dalen (2013), three phases are outlined in the doctor-patient communication process. The patient is considered the expert in the first phase, as they know the reason why they have presented to the doctor and what concerns them, and they have to explain it to the doctor. In this context, the doctor's role is to listen to what the patient has to say and be receptive to the patient's concerns. As the expert in the second phase, the doctor interprets the patient's complaint in a medical context through directed questioning. However, lifestyle and past medical history, systems review, cursory and physical examination are also part of this phase after the patient's concerns have been clearly understood. Finally, both are considered experts in the last phase, where it is the doctor's responsibility to impart their knowledge about what can be done for the patient, what the patient can do for themselves and any alternative options to the patient. The patient considers these in relation to their own context, what is possible for them and what they prefer (van Dalen 2013).

As indicated in the second phase, as discussed, an exploration of patient concerns is integral to the communication process. However, it is not always the case that healthcare providers fully explore patients' concerns. For example, Lin *et al.* (2020a) point out that the content that clinicians need to discuss with patients is typically better known to them (such as explaining to them what may be the cause of their problem), but patients are less familiar with the process that is involved, which includes active listening and exploring the patient's concerns and beliefs, which has been well described in the previous paragraph by van Dalen (2013).

According to Stenner, Palmer and Hammond (2018), clinicians are not as aware of their patients' agendas and what is most important to them as they should be. As a result, they

are less responsive to these needs. This might be because clinicians tend to underestimate patients' concerns regarding their symptoms and their desire for an explanation and information while overestimating their expectations regarding treatment (Stenner, Palmer and Hammond 2018).

Essentially, the communication process ensures that complex and large volumes of information are broken down and explained to the patient in a reliable, accurate and appropriate manner so that patients can use the information provided to them.

2.5.2.1 Patient Education

Patient education is a process that empowers patients and allows them to be responsible for their health (Falvo 2004; Malterud 2010; Piper 2010; Yeh, Wu and Tung 2018). This occurs because of two separate but interrelated processes. The first is one of personal transformation within the patient, and the second occurs from the practitioner-patient interaction (Aujoulat, d'Hoore and Deccache 2007). There is an argument that the former process cannot exist without the latter supporting process. Therefore, in this context, patient education proves to be a fundamental tool on which healthcare practitioners can depend, which allows patients to become more autonomous in terms of their health management, provided that they utilise the tools that the practitioner provides (Yeh, Wu and Tung 2018).

According to Aujoulat, d'Hoore and Deccache (2007), when it is considered from the patient's vantage point, empowerment is a process of personal transformation to gain more power over their lives, which emanates from a caring relationship that provides the skills to do this (McWilliam *et al.* 1997). Outcomes associated with this transformation include improved disease and treatment knowledge (Golant, Altman and Martin 2003; van Dam *et al.* 2003) and improved pain management (Wong *et al.* 2000; Maliski, Clerkin and Litwin 2004). These are facilitated by improved patients' self-efficacy (in terms of their behaviour relating to disease and treatment) (Aujoulat, d'Hoore and Deccache 2007; Koehn and Esdaile 2008), as well as through changes in patient values and priorities resulting in improved patient self-management, condition management and control of their lives (Aujoulat, d'Hoore and Deccache 2007).

According to a recent study by Bastemeijer *et al.* (2021), patients' needs and circumstances need to be taken into account during management; in essence, providing patients with information is a key component, yet, one should take care not to overwhelm the patient with complex information. Similar to the phases of doctor-patient communication outlined previously, according to van Dalen (2013), Macdermid *et al.* (2013) illustrate that when clinicians are responsive to what a patient has to say, including their concerns, patients feel

that they are being understood and that their condition is being recognised as a real entity. This is especially true when diagnostic tests are inconclusive.

The goal of patient education extends beyond helping patients to make informed and intelligent healthcare decisions because it offers patients a framework to understand their treatment options and management of their condition, as well as the behavioural implications and how these relate to a successful outcome (Jotterand, Amodio and Elger 2016).

To this end, the goals of patient education can be summarised as establishing precise therapeutic goals to improve the management of a condition; improving treatment adherence; encouraging healthy behaviour and limit cost; empowering patients and improving their involvement healthcare decisions (Deccache and van Ballekom 2010; Jotterand, Amodio and Elger 2016).

2.5.2.2 Informational Needs of Patients

Patients are positioned on the receiving end of healthcare services and, therefore, it is relevant to ascertain what patients want from their interactions with healthcare providers (King and Hoppe 2013). A meaningful characteristic of primary care is its capacity to respond to patients' needs with musculoskeletal conditions, such as anticipatory and preventative care throughout a person's life, and to assist patients in self-management strategies (Helliwell *et al.* 2014). Alternatively, if healthcare is a partnership, as described in terms of patient-centred care (Dwamena *et al.* 2012), then mutual responsibility is required (Paterick *et al.* 2017). Within this frame of reference, it is the healthcare provider's responsibility to educate patients on how to improve health and wellness. In contrast, it is the responsibility of patients to act on such information (Paterick *et al.* 2017).

Thus, the factors essential to the successful management of musculoskeletal conditions include behaviour change, patient participation (Lewis *et al.* (2019); active patient engagement; and patient uptake of recommended health services and self-management strategies (O'Leary *et al.* 2020). In addition, it is suggested that clinicians should use education to promote active management strategies (such as healthy lifestyle and coping behaviours) and decrease patients' dependence on passive interventions (Gliedt *et al.* 2017; Caneiro *et al.* 2020).

To complicate this, Jotterand, Amodio and Elger (2016) raise the moral dilemma that exists between a clinician's duty to promote the well-being of patients and the conflicting ability to allow the patient autonomy, especially when patients choose to ignore health advice that may be detrimental to their health. In such instances, patient education should be ethically applied and principled by education serving as a tool to empower patients by providing them

with control of their health and management of their condition (Jotterand, Amodio and Elger 2016). This dialogue should be couched in the patient's values and thus not be utilised as "beneficent manipulative strategies" to ensure that the patient achieves what the practitioner feels would be the best clinical outcome (Jotterand, Amodio and Elger 2016).

Within the framework of patient-centred care, the study by Erwin *et al.* (2020) outlines a patient-centred approach to musculoskeletal care. In particular, the patient-centred practices that patients value include the desire to be supported by the healthcare provider to build their knowledge, and skills and to improve their confidence that is needed to manage their conditions appropriately, and to be able to make informed decisions regarding their health (Erwin *et al.* 2020).

If information is to be tailored to the individual, one cannot overlook the kind of information that patients seek. Research that concerns patients' informational needs provides insight into the specific topics that healthcare providers should address during consultations. Thus, the findings of Erwin *et al.* (2020) prove to be valuable in terms of patient priorities as they relate to patient education. The study identified the following concerns that patients have and need to be addressed (Erwin *et al.* 2020):

- The nature and the cause of their condition.
- The most suitable treatment options available to them.
- What they can do for themselves to manage the pain.
- What their prognosis is (and what to expect in the future).
- Appropriate activities (including work, and those they want to do such as sport).
- Feedback regarding their individual progress (i.e., are they improving).
- Reinforcement of self-efficacy.
- Patients also want to know what information is accessible to them, such as websites.

Several systematic reviews regarding musculoskeletal conditions have found similar informational needs of patients (Hush, Cameron and Mackey 2011; Fu *et al.* 2016; Chou *et al.* 2017; Chou *et al.* 2018a; Chou *et al.* 2018b; Segan *et al.* 2018; Connelly *et al.* 2019; Lim *et al.* 2019).

2.5.3 Content of Patient Education to be Discussed with Patients During Consultations

2.5.3.1 Providing Information Regarding the Patient's Condition or Diagnosis

Patients want (Cooper, Smith and Hancock 2008; Segan *et al.* 2018; Erwin *et al.* 2020) and expect (Oosterhof *et al.* 2014) a clear-cut explanation of their condition (or the cause of their pain) in simple, understandable terms without jargon (Cooper, Smith and Hancock 2008;

Rowell and Polipnick 2008; Slade, Molloy and Keating 2009; Chou *et al.* 2018a). Clinicians can improve the health literacy of their patients, which in turn would allow patients to make better sense of their condition, the experience of pain, and the management options available to them, once it has been clarified (O'Leary *et al.* 2020).

Musculoskeletal specialists have a well-rounded understanding of musculoskeletal conditions, and the high level of practical and technical skills required to treat them (O'Leary *et al.* 2020). As stated previously, healthcare now demands equal proficiency in communication and practical skills (Muddle, O'Malley and Stupans 2019). Hence, these healthcare providers are better able to interpret and communicate with patients about their musculoskeletal conditions when they combine their knowledge and practical/technical skills with effective patient-centred communication skills (O'Leary *et al.* 2020). This means they can communicate on a personal level with patients, explaining and connecting the relevance of findings clinical findings, reassuring the patient, acknowledging their concerns around the condition and explaining possible intervention outcomes (O'Leary *et al.* 2020). This interaction sets the basis for a collaborative approach to healthcare, which supports improved uptake of recommended management strategies due to increased patient motivation (O'Leary *et al.* 2020).

From a chiropractic perspective, the topic of diagnosis requires some dissection as there is some internal controversy regarding this aspect. According to Gliedt *et al.* (2017), an equally significant aspect of communication with patients during the clinical encounter is the words that healthcare professionals use and how they are delivered. The authors contend that despite a chiropractor being motivated by good intentions, using a dialogue that emphasises pathoanatomical diagnoses or using language associated with disability and pain may negatively impact empowerment, beliefs and behaviour, as indicated by the literature (Gliedt *et al.* 2017). Hinman *et al.* (2020) refer to such terms as “threatening” language, and include descriptions of “bone on bone”, “wear and tear”, and “grinding”. Certain practices may have a detrimental effect on the self-efficacy of patients and encourage increased fear. With reference to chiropractic, such practices include providing patients with diagnostic information such as the “bone out of place” / “pinched nerve” theory that necessitates routine correction and recommending indefinite maintenance care and long-term treatment plans that revolve around passive care (Louw *et al.* 2011; Gliedt *et al.* 2017).

For example, chiropractic patients often state that their spine is out of alignment when they present with benign non-specific complaints; providing patients with such information may be interpreted by patients as not having any control over their condition, thus creating the sense of dependence on the healthcare practitioner (Gliedt *et al.* 2017). Alternatively, these patients should be informed about non-specific back pain's benign nature and directed to

self-management strategies instead (Gliedt *et al.* 2017). The example provided agrees with Linton and Shaw (2011), who draw from the misdirected problem-solving model, and explain that overemphasis on biomedical explanations or diagnostic details can add to futile searches for a cure to their pain, thereby deferring self-management.

Chiropractic students' education includes that of diagnosis, including differential diagnosis (Gíslason *et al.* 2019), and in chiropractic student clinics musculoskeletal conditions are usually diagnosed and managed based on evidence-based clinical guidelines (Stomski *et al.* 2019). Differential diagnoses are an integral part of the clinical decision-making process where the clinical impression of a patient or reaching a diagnosis is one of its characteristics, where the clinical examination informs the diagnosis, and the diagnosis informs the rationale for care (Amorin-Woods and Parkin-Smith 2012). Nonetheless, in its early stages, the formative ideas of chiropractic were shaped by the idea of subluxations, which refers to misalignments or lesions in the spine that obstruct the flow of forces through the spinal nerves, which ultimately causes almost all disease (Innes, Leboeuf-Yde and Walker 2020). Thus, there are still clinicians who do not believe that they are diagnosing or treating anything other than subluxations (Gíslason *et al.* 2019). This may be because these chiropractic clinicians may see this as the 'medicalisation' of chiropractic (Amorin-Woods and Parkin-Smith 2012).

In this frame of reference, Innes, Leboeuf-Yde and Walker (2016a) consider the term subluxation as a warning sign that evidence-based practice has been inconsistently or incompletely implemented. In their closing statement, they question why the United States Councils on Chiropractic Education maintain that their chiropractic graduates should be able to detect subluxations, as it is unsupported by evidence. In a different paper, they recommend that accrediting agencies should use unambiguous descriptive terminology and prescribe the specific competencies required upon graduation, relating to physical examination, since inadequate physical examination skills can result in delayed or missed diagnoses (Innes, Leboeuf-Yde and Walker 2016b).

In light of the design of a new curriculum recently, Wiles (2020) reflects on the evidence-based practice and calls for the cessation of outdated and conflicting terminology in a modern chiropractic curriculum. According to the author, it is imperative to use evidence-based terminology and to emphasise the outdated and historical nature of such language (Wiles 2020). In his paper, Wiles (2020) makes reference to Carraccio and Englander (2013), who reflect on the future of medicine as it relates to the Flexner centennial. Not only do they emphasise the importance of standardising language for achieving a shared vision, but also the need for such effort.

In keeping with the words of Carraccio and Englander (2013), Wiles (2020) claims that due to internal conflict regarding the profession's lexicon, the need for a standardisation of language is substantially more important for chiropractic especially. To support his argument, he explains that the chiropractic profession has been criticised recently for its continued use of outdated and anatomically incorrect terminology (i.e., the manipulable lesion, namely subluxation) and related treatment (referred to as adjustments), which denote imaginary adjustment of bone positions. The author maintains that such conflicting terminology promotes the persistence of the outdated and unscientific bone-out-of-place model while simultaneously leading to scepticism among other healthcare professionals.

A recent paper by Leboeuf-Yde *et al.* 2019 compares the chiropractic profession to an unhappy marriage due to an ideological division that continues to widen that is observed within the profession. Although the history of the profession is beset by long-standing internal conflict, it is becoming more apparent, and currently centres around two different chiropractic factions. The division is between chiropractors who subscribe to an evidence-based paradigm, namely the 'evidence friendly' faction with a modern approach to musculoskeletal conditions grounded in contemporary evidence, and those who subscribe to historic notions such as 'subluxation', known as the 'traditional' faction, who views the spine as the source of health (Leboeuf-Yde *et al.* 2019).

In recent years, organisations that previously strived for unity between the different chiropractic subgroups are increasingly distancing themselves from such views in favour of the intent to promote evidence-based practice for chiropractic (Leboeuf-Yde *et al.* 2019). Accordingly, the authors argue that if the interests of patients are actually the priority, the argument for 'professional divorce' is more compelling than the argument for unity between these two groups (Leboeuf-Yde *et al.* 2019).

For example, one such argument is that with regards to the future of chiropractic, those subscribing to an evidenced-based paradigm are likely to be integrated into healthcare systems. At the same time, 'traditional' chiropractors are unlikely to be integrated due to a lack of evidence supporting that the spine is the cause of disease (Leboeuf-Yde *et al.* 2019). Concerning the issue of integration, several authors have discussed how subluxation is damaging to the profession. Disapproval of subluxation has been attributed to the term marginalising the chiropractic profession as there is no interdisciplinary function for it (Funk *et al.* 2018), which has prevented the profession from gaining cultural authority (Murphy *et al.* 2008).

Essentially when it comes to evidence-based practice and patient-centred care of chiropractic, diagnosis includes conducting a thorough physical examination to come up

with differential diagnoses and ultimately to reach a diagnosis. The diagnosis would then inform the treatment plan and possible treatment options available to the patient, and it also informs the diagnosis, and patient education. Since the profession has moved past these theories, in addition to no evidence in support of subluxation spinal misalignment or bone-out-of-place being considered a viable diagnosis in modern chiropractic, chiropractors should refrain from providing patients with an explanation as to the cause of their problem. In terms of providing patients with an explanation of their pain or diagnosis, the clinical reasoning process outlined above should also inform the advice provided to the patient.

If patient education is to be individualised, explaining to a patient that their spine is being realigned or that a bone is put back into its original place, ultimately translates into an inappropriate explanation for why they have pain and why specific treatment was provided. For instance, if patients are diagnosed as having subluxations, the chiropractor might explain the patient's pain to them in terms of subluxation; thus, their practice of patient education is not individualised as, historically, such a practice style relates to providing all patients with the same care (namely, practitioner-centred care).

2.5.3.2 Pain Neuroscience Education

Moseley (2007) argues that pain biology is complex, even though it may seem uncomplicated in some cases. The author explains that pain does not indicate the state of bodily tissues but rather that pain is a conscious driver of behaviour intended to protect these tissues. Moreover, Moseley (2007) illustrates that pain is modulated by various factors, including psychological, social, and somatic aspects. In this context, a biomedical approach to explaining pain to patients is insufficient as it fails to address intricate matters, such as neuroplasticity, inhibition, facilitation, and peripheral and central sensitisation (Louw *et al.* 2016).

In fact, a biomedical approach, such as anatomy, biomechanics and pathoanatomic models, may encourage fear and anxiety, which in turn feeds into the fear avoidance and pain catastrophisation of patients (Louw *et al.* 2011; Louw *et al.* 2016). When patients are offered a tissue damage perspective of their pain, they may, in turn, form iatrogenic maladaptive beliefs (Louw *et al.* 2011). Consequently, explanations such as “your nerve is being pinched” can support a patient's fear of movement and maintain their belief that their pain is due to tissue damage (Louw *et al.* 2011). Thus, pain neuroscience education is a better alternative to pathoanatomical explanations.

Oosterhof *et al.* (2014) illustrate that patients who come to a shared understanding of their pain with their healthcare provider realise that they have an active role in their management and subsequently display new acquired behaviour and positive outcomes. This description

concur with Moseley (2019), who illustrates that when patients understand their pain, they take responsibility and adopt a more active role in their management, affecting the short-term and long-term effects of pain and disability.

In contrast, those who do not reach a shared understanding of their pain do not show any behaviour change and, subsequently, poor outcomes (Oosterhof *et al.* 2014). The authors explain that this is possibly due to clinicians' insistence that psychosocial variables are to blame for pain persistence, leaving patients with the impression that their physical pain experience is being neglected and that clinicians believe they imagine the pain. However, pain neuroscience is an intricate concept (Butler and Moseley 2013), easily misinterpreted by patients, which may leave them feeling that clinicians do not perceive their pain experience as real but rather made up (Oosterhof *et al.* 2014).

Educating patients on self-management is a core intervention for patients with musculoskeletal disorders; hence, it is included in several practice guidelines (Fernandes *et al.* 2013; McAlindon *et al.* 2014; Bussi eres *et al.* 2016; C ot e *et al.* 2016; NICE 2016; van Wambeke *et al.* 2017; Stochkendahl *et al.* 2018; Lin *et al.* 2020b). Similarly, Ndosi *et al.* (2015) state that patient education is essential to rheumatoid arthritis care since it prepares patients to engage in self-management strategies and adhere to their treatments. This is evident in the fact that patient education can improve self-efficacy (Field, Newell and McCarthy 2010; Knittle, De Gucht and Maes 2012; Gliedt *et al.* 2017), which in turn is associated with improvement of other health outcomes, such as pain (Field, Newell and McCarthy 2010; Ndosi *et al.* 2015; Ruben, Meterko and Bokhour 2018).

The effect of patient education affecting self-efficacy and subsequently mediating the effect on pain has been illustrated in a chiropractic patient population by Field, Newell and McCarthy (2010). Among the factors that they identified as possible barriers to early improvement in patients during chiropractic care were catastrophisation, fear-avoidance behaviour and low self-efficacy (Field, Newell and McCarthy 2010). The authors cited the definition of self-efficacy by Bandura (1986), which centres on the patient's self belief in their ability to plan and execute the actions required to reach set goals or expected outcomes. In this context, Field, Newell and McCarthy (2010) explain that patients who are better able to face their pain, by overcoming their fear of it are also better able to deal with the pain, and therefore remain proactive, active and involved in managing their pain. This is then demonstrated in their study that when patients' belief in their ability to carry out an activity successfully without pain or minimal pain is sufficient, it can outweigh their fear of completing the activity (i.e., negating fear-avoidance behaviour) and it can break the negative cycle of fear, avoidance, disuse and pain followed again by fear (Field, Newell and McCarthy 2010). A change in physical findings and a concomitant change in pain are not

always seen. This suggests that physical treatment does not correlate directly with observed clinical improvements. Thus, Field, Newell and McCarthy (2010) attribute the clinical improvements to, amongst others, allowing patients to express their concerns, ensuring that the patient received a clear, unambiguous and understandable explanation for their concern along with patient reassurance (Field, Newell and McCarthy 2010).

2.5.3.3 Prognosis

Discussions involving informing the patient about their diagnosis create a context in which the provider can inform the patient about the most appropriate treatment options and self-management strategies, and how these relate to their prognosis. In terms of prognosis, patients struggle to see a path of recovery when they believe the pain to be due to factors that cannot be improved (Darlow *et al.* 2015), such as degeneration, misuse, injuries, or individual predisposition (Borkan *et al.* 1995). This statement is well illustrated by Setchell *et al.* (2017), who showed that patients had a shared perception that once damage (e.g., injury) or disease occurred, even when it was early on in their lives, it cannot be fixed and it is likely to remain so for the rest of their lives, which is especially important since those who expect their low-back pain to last for a long time showed poor clinical outcomes.

In this context, the argument by Croft *et al.* (2015) is evident that sometimes, for patients, it is better to discuss with them what it is that they can do to help themselves or what treatment could help them rather than telling them what is wrong with them. Similarly, Bannuru *et al.* (2019) recommend that healthcare providers must inform patients adequately regarding disease progression and self-management, provide hope, optimism, and a positive expectation regarding treatment, and should do so continuously.

2.5.3.4 Health Promotion

It is well established that chiropractic acknowledges the importance of health promotion (Hawk *et al.* 2005; Evans, Ndetan and Williams 2009; Ndetan *et al.* 2010; Evans *et al.* 2011; Grand, Morehouse-Grand and Carter 2016) and recommends that it should be part of treatment at teaching clinics (Hawk *et al.* 2005; Ndetan *et al.* 2010; Evans *et al.* 2011). From a chiropractic perspective, it is essential to note that certain lifestyle factors may negatively impact musculoskeletal health. Among these are a sedentary lifestyle, unhealthy weight, unhealthy diet, smoking and excessive alcohol consumption (Mody and Brooks 2012; Dean and Söderlund 2015). Notwithstanding the musculoskeletal impact, from a healthcare provider perspective, it is important to note that these risk factors also extend to other non-communicable diseases, such as cardiovascular disease (Mody and Brooks 2012) and may contribute to multimorbidity (Duffield *et al.* 2017). Therefore, it is required that chiropractic students provide the appropriate advice (such as an active lifestyle, healthy diet, and weight counselling) to those at risk.

2.5.3.5 Activities of Daily Living

Since musculoskeletal conditions often affect a patient's activities of daily living (ADL) (Woolf, Erwin and March 2012; Duffield *et al.* 2017), it is, therefore, the responsibility of chiropractors to assist patients in maintaining or optimising their current function and ADL (Hawk *et al.* 2020). In consequence, patient education should include motivating patients to implement the functional strategies they have learned into their daily activities to improve self-efficacy and strengthen the new representation (Caneiro, Bunzli and O'Sullivan 2021). Furthermore, patients should be motivated to follow through with a positive response when experiencing pain and to engage confidently in meaningful activities, unaccompanied by hypervigilance of pain (Caneiro, Bunzli and O'Sullivan 2021). Similarly, Linton and Shaw (2011) state that patients who do not have fear-avoidance beliefs, according to the fear-avoidance model, are better equipped to confront their problems directly. Subsequently, it facilitates the uptake of active coping strategies to increase daily function.

Dunlop *et al.* (2011), who compared activity levels (physically active versus less activity) in osteoarthritis patients, show that physical activity allows patients to preserve their functional ability. Similarly, Knittle, De Gucht and Maes (2012) state that physical activity may be recommended in rheumatoid arthritis patients as it allows them to retain independence and decreases the deterioration of functional capacity. However, while physical activity may benefit some (Dunlop *et al.* 2011; Knittle, De Gucht and Maes 2012), others may require modification of their environment or the use of assistive devices to carry out ADL (Palazzo *et al.* 2014).

In this sense, it may be beneficial to the patient to relate the effects of physical activity to their functional capacity, subsequently, the positive impact on independence (such as remaining able to work) and quality of life. Although the content of advice regarding ADL may be different for different conditions and different ages, it remains evident that ADL should be discussed during consultations, followed by patient education.

2.5.3.6 Assistive Devices

Related to activities of daily living is the use of assistive devices, aids, or equipment. The rationale for using assistive devices or equipment is not the same for all patients and varies depending on the condition or cause of the pain. For chronic musculoskeletal pain, such as rheumatoid arthritis, the inclusion of such devices or equipment is primarily for improving or maintaining function and remaining independent (Rogers and Holm 1992; Mann, Hurren and Tomita 1995; de Boer *et al.* 2009). While for some acute injuries, it can be used for joint protection and immobilisation, pain reduction, decreased swelling, and to promote healing (Sprouse, McLaughlin and Harris 2018). In the elderly, assistive devices may be useful from a fall and fracture perspective (McGuigan, Bartosch and Åkesson 2017) or to maintain or

improve mobility and reduce disability (Bateni and Maki 2005; Faruqui and Jaeblo 2010; Bradley and Hernandez 2011). In developing countries, many people are affected by the burden of musculoskeletal impairment throughout their most productive years of life, during which function is often required to care for both older and younger family members (Hoy *et al.* 2014). Assistive devices may aid these individuals in an early return to work (Hoy *et al.* 2014), which may be an important consideration from a South African perspective.

A recent systematic review found a thin evidence base supportive of the inclusion of assistive devices, especially for the neck, back, shoulder and knee regions (Babatunde *et al.* 2017). Similarly, the use of assistive devices as part of the treatment for knee osteoarthritis has recently been removed from treatment guidelines (Bannuru *et al.* 2019) and is also not included in chiropractic guidelines for knee osteoarthritis (Hawk *et al.* 2020).

In essence, the use of assistive devices is not indicated for most patients but also depends on the extent to which important activities are affected, and those for whom it is indicated require appropriate advice. Depending on the patient, advice may include, but is not limited to why the device is recommended; expected benefit from using a device; the most appropriate device (e.g., cane versus crutches); how to use the device correctly; and for those presenting with a device to maintain the device (e.g., loose rubber caps on walking aids).

2.5.3.7 Self-Management

Guiding patients on how to self-manage their condition is essential. It involves empowering them to undertake exercise, lead a healthy lifestyle and participate in activities that are meaningful to them (Caneiro *et al.* 2020) and work towards a goal of self-efficacy (Gliedt *et al.* 2017). Such an active approach may result in improved function and a reduction in pain, across conditions, including comorbidities (Pedersen and Saltin 2015; Skou *et al.* 2018; Caneiro *et al.* 2020).

Concerning patients' self-efficacy, self-management is directly associated with an individual's belief that they have the capability to cope with pain. In this context, low pain efficacy is defined by the perception that pain is unmanageable, especially in view of the physical demands of daily life (Linton and Shaw 2011). As such, the self-efficacy model demands the promotion of self-management strategies and minimising dependence; thus, patient care that includes patient education should be individualised so that self-management strategies are useful to the patient enabling them to deal with flare-ups and functional difficulties effectively (Linton and Shaw 2011).

Therefore, it is a critical component of self-management, as it influences the amount of effort an individual will invest and how long they will continue to do so when they encounter

difficulties and negative experiences (Bandura 1997; Knittle, De Gucht and Maes 2012). Moreover, an individual's self-efficacy can be improved by successfully performing a behaviour, seeing how others perform the behaviour successfully, effectively overcoming stressful or taxing circumstances and by verbal persuasion (Bandura 1997; Knittle, De Gucht and Maes 2012). Considering this, the doctor-patient interaction may have a significant positive or negative impact on a patient's sense of efficacy (Knittle, De Gucht and Maes 2012). For instance, Gliedt *et al.* (2017) explain that chiropractors' communication style is crucial for how well they interact with patients because the messages they pass on, whether direct or indirect, can influence patients, either positively or negatively. A positive influence will empower a patient and encourage personal growth, and improve their self-efficacy, while a negative influence will cause or reinforce self-limiting behaviour and passivity (Hayden *et al.* 2010; de Rooij *et al.* 2014; Edwards *et al.* 2016; Rundell *et al.* 2016; Gliedt *et al.* 2017).

Self-efficacy is a critical component for those with chronic conditions, such as arthritis, who, in addition to family and work responsibilities, are required to engage in self-management activities and adhere to various therapeutic approaches (Ndosi *et al.* 2015). Changes in self-efficacy, particularly in the early phase of disease, are thought to play a role in long-term health outcomes (Ndosi *et al.* 2015). Self-efficacy also plays a part in the relationship between pain and disability (Costa *et al.* 2011; Edwards *et al.* 2016). Similarly, studies regarding other musculoskeletal disorders illustrate similar findings where improvement in self-efficacy associated with improved functional outcomes demonstrate that the relationship between pain intensity and disability is mediated by self-efficacy (Hermann 2011; Miró *et al.* 2011; Kalapurakkal *et al.* 2015; Edwards *et al.* 2016). These findings indicate that overall, higher levels of self-efficacy are linked to lower pain intensity and discomfort and reduced disability (Edwards *et al.* 2016), which is important for musculoskeletal conditions, as discussed in the section regarding the burden of musculoskeletal conditions.

It is evident that day-to-day management for a chronic condition is assigned to the patient (Baker *et al.* 2011) and, as such, a large portion of the management occurs outside of the consultation and lies with the patient. This is significant as patients need to make decisions continuously during the self-management process (Bodenheimer *et al.* 2002; Lorig and Holman 2003; Koehn and Esdaile 2008) and, therefore, the role of self-efficacy expectation becomes important in how much effort patients will invest in changing their behaviour and how long they will continue to do so (Taal, Rasker and Wiegman 1996; Koehn and Esdaile 2008).

2.5.3.8 Problem-Solving Skills

In the self-management process, patients require specific skills to effectively manage their pain or condition themselves. Problem-solving is regarded as one of the necessary skills that facilitate self-management (Lorig and Holman 2003; Hutting *et al.* 2019); it is also a behaviour change technique (Eisele *et al.* 2019). In this context, problem-solving becomes a necessary skill, which should be used to determine the appropriate strategies the patient can use to minimise or prevent aggravation of their symptoms (Hutting *et al.* 2019). In addition, the problem-solving skills that patients acquire during the patient education process promote the development of confidence and resilience, which aids in the persistence with behaviour change (Thompson 2017). Because of this, patients become proactive and begin to anticipate which actions they need to take and when they should take them instead of being reactive (Thompson 2017).

2.5.3.9 Social Support

Informational needs of patients also include social support (Zuidema *et al.* 2015), which should be provided regularly, rather than just during flare-ups or recurrences (Ryan *et al.* 2003; Zuidema *et al.* 2015). Thus, self-management interventions may also include counselling on social support (Koehn and Esdaile 2008). Irrespective of the chosen intervention, the goal remains to change a patient's attitude and behaviour. Subsequently, physical and mental health status improvements may accompany these changes (Koehn and Esdaile 2008).

Social support may facilitate the self-management of pain but a lack of social support may be a barrier to self-management (Bair *et al.* 2009). It contributes to the effectiveness of self-management and may contribute through means of improved self-efficacy, motivation, coping strategies and psychological well-being in general (Gallant 2003; Ali *et al.* 2018). In this context, in addition to providing information, counselling patients on social support may be an area to address during care (Koehn and Esdaile 2008).

2.5.3.10 Posture and Movement

It is common practice for chiropractors to educate their patients on posture and movement (Goncalves, Le Scanff and Leboeuf-Yde 2017). A growing body of recent research points to an implicit bias toward how certain postures and movements may harm the body, such as bending down or picking up objects with a rounded back (Caneiro *et al.* 2020). As a result, patients with back pain receiving such advice may develop a fear of these postures or movements and, thus, when they bend down to pick up an object, they protect their spine more, and their bodies stiffen when performing these movements (Caneiro *et al.* 2020).

A case in point is the study by Darlow *et al.* (2013) that illustrates that when patients were advised to take up specific postures and specific strengthening exercises, it reinforced the belief of patients that the spine is a vulnerable structure. Advising patients on what they should not do, as opposed to what they should do, gave them the idea that their recovery was reliant on avoiding activities, instead of their performance, movement and activity (Darlow *et al.* 2013). The advice provided by clinicians in this study appears to be rooted in the acute model of care. Their advice to patients often persisted to influence their attitudes for an extended period beyond that of the acute phase. This study demonstrates that biomedical advice has a negative consequence as it inspired hypervigilance and fear of movement. Such advice may reinforce avoidance and protective behaviours, which is concerning as it leaves patients with limited active coping strategies to deal with their pain and preserve their quality of life (O'Sullivan *et al.* 2016).

The paper by Lehman (2018) offers a practical approach to advice on posture and movement, where it should be used as a symptom modification. Within the framework of symptom modification, correcting posture becomes relevant when the goal is a short-term improvement in symptoms (such as pain) and not a long-term solution that, in turn, may cause fear in the patient (Lehman 2018). Therefore, if the patient is educated on posture and movement, following the advice of (Lehman 2018), the patient should understand that it is mainly to improve their symptoms in the short term and that they should not be fearful of such postures or movements in the future.

2.5.3.11 Activity Pacing

Activity pacing is an active approach to rehabilitation and is understood as a multifaceted coping strategy for patients (Antcliff *et al.* 2018). The purpose of activity pacing is to decrease overactivity-underactivity cycling to improve an individual's function and decrease flare-ups (Birkholtz, Aylwin and Harman 2004a; NICE 2007; Jamieson-Lega, Berry and Brown 2013; Antcliff *et al.* 2018). Antcliff *et al.* (2018) suggest that the definition by Jeong and Cho (2017) is too restricted as it is not merely a modification of activities, such as rest breaks or reducing the pace of activities (Birkholtz, Aylwin and Harman 2004b; Antcliff *et al.* 2013; Jamieson-Lega, Berry and Brown 2013). The literature review of Antcliff *et al.* (2018) allows for an expansion of an operative definition to include activity planning, prioritising activities, alternating activities, gradually increasing activities, maintaining consistent activity levels, goal setting and acceptance of current abilities (Birkholtz, Aylwin and Harman 2004b; Antcliff *et al.* 2013; Nielson *et al.* 2013; Antcliff *et al.* 2015; Antcliff *et al.* 2018).

Although exercise is beneficial for musculoskeletal health, a short-term exacerbation of joint pain may occur (Millar *et al.* 2020). Thus, from a rehabilitation exercise perspective, the healthcare provider should first determine a patient's appropriate baseline activity levels

that do not excessively add to the patient's symptoms (Booth *et al.* 2017). Accordingly, exercise should be balanced against the patient's daily activities to a capacity that is manageable by the patient (Andrews, Strong and Meredith 2012). In this sense, the patient should be reassured that the activity is safe to perform and relate to the patient how progressive overload (pacing up) adds to the treatment (Booth *et al.* 2017).

Considering daily activities, chiropractic students may advise patients that they may need to divide large tasks into smaller tasks that are more easily managed, while also planning rest periods (Knittle, De Gucht and Maes 2012). For exercise, they may inform patients about the possible short-term exacerbation of pain (Millar *et al.* 2020), explain how pacing up of activities or exercise may modulate pain and advise patients not to pace up too quickly (Booth *et al.* 2017). With regards to flare-ups, patients may be advised that a flare-up is not necessarily a sign of damage but rather a protective strategy. Therefore, they may continue with an earlier activity schedule that did not exacerbate symptoms significantly, such as dialling down the impact, intensity and duration during flare-ups and gradually building it up again (Booth *et al.* 2017).

2.5.3.12 Exercise

With regard to the topic of exercise, a recent systematic review presents strong evidence for the effectiveness of exercise in musculoskeletal pain patients, with benefits to not only pain but also function and quality of life (Babatunde *et al.* 2017). Furthermore, active strategies positively impact the level of disability and allow for reduced dependence on formal healthcare (Buchbinder *et al.* 2018). Therefore, it is recommended that chiropractors include active management strategies, such as exercise, in addition to passive strategies (e.g., manipulation) (Hawk *et al.* 2020).

Several different methods of patient education can be employed in this regard, including verbal information and instruction, written material and physical demonstration of exercise. Verbal information may be necessary as an initial step to clear up misconceptions or to relate the importance of exercise to the patient. In this sense, an important talking point would be that patients need to understand that it will take time for exercise to have an effect, as it is challenging to correct the biological adaptations that occur with chronic pain. Moreover, patients need to understand that exercising is not the ultimate goal, but that consistent exercise positively impacts their functional ability and daily living activities, thereby improving their quality of life (Booth *et al.* 2017).

Prior to starting exercise, patients should have the confidence that exercise holds meaning for them and that it is safe to perform exercise or movements, thus facilitating their active involvement in their own care (Lotze and Moseley 2015; Booth *et al.* 2017). From this

perspective, the significance of exercise may be communicated to the patient by relating the effect of exercise to the modulation of their pain and other symptoms (Fu *et al.* 2016; Booth *et al.* 2017), thereby making it meaningful to them.

As advice and exercise instruction is superior to the advice of staying active alone (Liddle, Baxter and Gracey 2007; Stenberg, Fjellman-Wiklund and Ahlgren 2014), it is important to satisfy patient needs for verbal instruction. However, verbal instruction may be the least effective educational strategy, and it is advised that it should be supplemented with additional methods (Friedman *et al.* 2009; D'Gasper *et al.* 2018).

Schneiders, Zusman and Singer (1998) demonstrate the effectiveness of an educational strategy consisting of providing clear verbal instructions, then supplementing this with written information, as opposed to providing verbal instruction alone. This is based on the reasoning that integrating written instruction with verbal instruction will improve the patient's understanding, stimulate their memory, and reinforce their recall of what they learned, thereby promoting their adherence to exercise (Schneiders, Zusman and Singer 1998). Chiropractic research found that patients identified demonstration of exercises as a facilitator to exercise adherence (Stilwell and Harman 2017). Compared to other educational strategies, demonstration has the biggest effect size on patients (Friedman *et al.* 2009). This is corroborated by D'Gasper *et al.* (2018), who showed that a combination of verbal instruction, demonstration and handouts was most effective, as it further adds to patients' understanding and information retention and, as a consequence, they continued to perform the exercises at home (D'Gasper *et al.* 2018).

A previous study found that 99% of chiropractic students believe exercise counselling to be moderately or very important to their future scope of practice and that 90% of them reported an intention to engage in such counselling with patients (Howitt *et al.* 2016). Similarly, but focusing on current practices and frequency, exercise counselling and methods of delivery are included in this study. South African chiropractors often include exercise as part of their management strategy for their patients (Johl, Yelverton and Peterson 2017). However, it is not known how DUT students view the importance of exercise and whether they include it in their management plans or how they deliver exercise related information to patients.

2.5.3.13 Exploring Patient Perceptions

Apart from improving disease knowledge, facilitating shared decision-making and reaching a shared understanding of a condition, patient education may also clear up misconceptions that a patient may have. How a patient perceives their condition is shaped by previous experiences and information they received (Nijs *et al.* 2013). Similarly, patients' negative perceptions of their condition stem from a lack of clear understanding of what caused it, the

course it is likely to take, and the consequences thereof (Nijs *et al.* 2013). This is important to note as those who think about their condition negatively may have maladaptive behaviours, impaired function, poor adherence to treatment and treatment outcomes (Nijs *et al.* 2013).

Furthermore, Clark and Ellis (2014) state that erroneous health beliefs, such as chronically painful joints require rest (Gross *et al.* 2006) or that nothing can be done to improve their health (Jinks, Ong and O'Neill 2010), are common and may limit patients with musculoskeletal conditions from taking active steps towards health improvement.

If tailored to the individual, patient education may alter negative perceptions, such as fear avoidance or a poor understanding of the treatment that may help them (Nijs *et al.* 2013). The authors describe such beliefs by using the example of a patient with moderate hip osteoarthritis who believes that their “cartilage is melting away due to erosion”. As a result, the patient does not want to participate in therapeutic exercise owing to the fear of increased pain and adding to the erosion (Nijs *et al.* 2013). In such instances, the practitioner should aim to address the patient’s lack of understanding in terms of pain and its treatment before the treatment starts (Nijs *et al.* 2013). This means that once a patient understands their condition or the cause of their pain, it is easier to explain the treatment strategies to them and to relate the importance of treatment to them, such as exercise.

Demoulin *et al.* (2018) report that patients receiving spinal manipulation therapy had misconceptions regarding the origin of the cracking sound produced during treatment. The authors suggest that the misconception that an anatomical structure is not in its original alignment, and therefore has to be put back into place, can be seen as an approach that is harmful, as it implies that the spine is vulnerable and only a professional can realign the spine (Demoulin *et al.* 2018). These beliefs regarding spinal manipulation indicate clinicians’ inadequate provision of appropriate information (Demoulin *et al.* 2018). Patients should be informed about the physical cavitation process appropriately, instead of explaining it as the relocation of anatomical structures (Demoulin *et al.* 2018).

2.5.3.14 Asking the Patient About Their Concerns

Strictly speaking, asking the patient their concerns is not part of patient education content specifically, yet it is an essential step in the education process. Effective communication is necessary during such a discussion to gain a sense of understanding from the patient’s perspective, in terms of what that specific patient experiences and, therefore, what concerns them (Dwamena *et al.* 2012; van Dalen 2013; Muddle, O'Malley and Stupans 2019; Lin *et al.* 2020a). Subsequently, once the clinician is aware of the patient’s concerns, the clinician may be able to identify issues that need to be addressed during the education stage. For

example, a typical emotional response to pain is for patients to feel as though their pain is a sign of something serious (Linton and Shaw 2011; Lim *et al.* 2019; Caneiro, Bunzli and O'Sullivan 2021).

People's behaviour is strongly influenced by their emotions (i.e., fear-avoidance behaviour), and these emotions also influence their coping strategies (Linton and Shaw 2011). These emotions and subsequent behaviour and coping strategies may lead to the development of persistent problems, such as minimising activity or taking pain medication that only relieves pain relief temporarily. Consequently, the relief of pain may reinforce the behaviour in the future (Linton and Shaw 2011). The significance of reassurance and patient education (regarding the cause and nature of pain) in such instances cannot be overstated (Traeger *et al.* 2015; Gliedt *et al.* 2017; Lin *et al.* 2020b), which should include advice to remain active (Walsh *et al.* 2008; Lim *et al.* 2019). Another example is that of patients' concern that prescribed exercises may be harmful instead of helping them (Nijs *et al.* 2013; Booth *et al.* 2017; Davenport, Dickinson and Minns Lowe 2019), in which case it needs to be explained to them that exercise is safe and how exactly it will help them (Nijs *et al.* 2013; Booth *et al.* 2017).

2.5.3.15 Psychosocial Factors

It is now well understood that psychosocial factors may influence musculoskeletal pain due to a reciprocal relationship that exists between pain and these factors (Edwards *et al.* 2016). Edwards *et al.* (2016) explain that psychosocial factors are not only recognised as powerful drivers of pain transition from acute to chronic (Bair *et al.* 2003; Edwards *et al.* 2011; Linton *et al.* 2011; Nicholas *et al.* 2011; Asmundson *et al.* 2012; Williams 2013), but they are also implicated in having a major negative impact on long-term outcomes, such as disability (Hall *et al.* 2011; Hung, Liu and Fu 2015; Ross *et al.* 2015), work disability (Kenardy *et al.* 2015), and healthcare expenses (Baumeister, Knecht and Hutter 2012). Contextually, for chiropractors, and therefore the students as well, it is an important aspect of care, as it may affect treatment outcomes.

Ample time is allocated to consultations at chiropractic teaching clinics, which allows for an in-depth clinical assessment, which should include an assessment of psychosocial factors (Stomski *et al.* 2019). Given that chiropractic is aligned with a biopsychosocial approach to healthcare (Gliedt *et al.* 2017), and recently published chiropractic guidelines stipulating that multimodal treatment is advised, which includes a mind-body approach in addition to active and passive treatments (Hawk *et al.* 2020), it seems reasonable to assume that students also address these issues during consultations.

Cognitive behavioural therapy (CBT) is included in the chiropractic guidelines (Hawk *et al.* 2020) but Main *et al.* (2012) state that the literature in favour of the superiority of CBT over alternative techniques is disputable. According to the authors, what is referred to as “psychologically informed practice” (Main and George 2011) is a middle ground between biomechanical therapy and complete CBT. Psychologically informed practice could be achieved by students in the clinical setting on campus, as one does not need to be a psychological expert with advanced knowledge (Main *et al.* 2012). Examples include modifying expectations; graded activity or pacing of activities and goal setting (Main *et al.* 2012); stress management; and relaxation techniques, such as mindfulness-based meditation and yoga (Hawk *et al.* 2020). As expectations regarding recovery and benefits of treatment are prognostic, these need to be aligned with what can be achieved realistically. In the context of this study, it means that students may offer a positive outlook, but they must be honest and reassure patients, but not unduly so (Linton and Shaw 2011).

2.6 BENEFITS OF PATIENT-CENTRED CARE

Empowering patients by teaching them how to better manage their conditions themselves, and providing knowledge to make informed decisions, allows for cost-effective treatment and improved disease management, as patients would be less reliant on healthcare services (Yeh, Wu and Tung 2018). Active management strategies, such as exercise, positively impact disability and dependence on healthcare are one illustration of cost-effectiveness (Buchbinder *et al.* 2018). Likewise, during a single consultation, patient education in the form of effective reassurance may have a long-lasting effect, as it can lead to decreased expenses through fewer primary care visits (Traeger *et al.* 2015). As a result, the direct costs associated with musculoskeletal disorders may be affected directly.

Similarly, if healthcare providers can change the negative attitudes of patients and teach them to adopt healthy behaviours, the physical and psychological health status of patients may improve (Koehn and Esdaile 2008). As a result, decreased healthcare costs may accompany improvements in health status (Koehn and Esdaile 2008). Furthermore, since healthcare providers also possess the skill to influence patients’ uptake of services, they will be able to better navigate all the services available to them and when to seek out a specific service (O’Leary *et al.* 2020). For example, they will know when it is within their capabilities to manage their pain themselves versus when to consult a pharmacist for over-the-counter pain medication, or when to consult a general practitioner or manual therapist. Moreover, it is known that what patients do and believe regarding their musculoskeletal pain is predictive of the duration of pain and the degree to which they will be disabled (Picavet,

Vlaeyen and Schouten 2002; Campbell *et al.* 2013; Hill *et al.* 2016; Quicke *et al.* 2017; Caneiro, Bunzli and O'Sullivan 2021). Given that beliefs are modifiable, it should be a goal of musculoskeletal pain management (Caneiro, Bunzli and O'Sullivan 2021). Thus, with regards to what patients do, self-management becomes important. Ergo, patient education encompasses more than merely providing patients with information, but it also aids in the development of the necessary skills to manage the condition, as through self-management (Lorig and Holman 2003), which is a core intervention for musculoskeletal conditions (Lin *et al.* 2020b).

Lorig and Holman (2003) explain that within the framework of self-management, which is problem-based, patients are not necessarily given solutions to their problems; instead, they are taught self-management skills. These skills include (Lorig and Holman 2003):

- Problem-solving.
- Decision-making skills (necessary for the day-to-day management which are in line with how the condition changes, e.g., flare-ups).
- Utilisation of resources (where to find resources as well as how to them, e.g., the internet).
- Forming a relationship with providers (where the provider has the role of teacher, professional supervisor and a partner).
- Taking action (deciding on an action plan for 1–2 weeks for instance, and then to act upon it).

These reasons epitomise why healthcare providers must teach patients the necessary strategies to manage pain and promote the uptake of daily activities and how to continue to do so in the face of flare-ups and distress (Caneiro *et al.* 2020). These strategies aid in improving self-efficacy and self-management (Caneiro *et al.* 2020), while the likelihood of sustainability of the strategies increases when they are aligned with patients' goals, preferences, and circumstances (Caneiro *et al.* 2020; Caneiro, Bunzli and O'Sullivan 2021).

2.7 BARRIERS TO EFFECTIVELY DELIVERING PATIENT EDUCATION

If the delivery of health information, including patient education, is to be effective, one needs to be aware of the potential barriers to making the necessary changes and use the appropriate methods to assist in the delivery of information (Beagley 2011). Therefore, the healthcare provider's role as a competent communicator necessitates effective

communication irrespective of the complexity of a consultation so that challenges in patient education can be managed successfully (Wouda and van de Wiel 2015).

It is against this background that patient-centred care in musculoskeletal practice requires effective communication, shared decision-making and individualised patient education that is centred around the patient's context and needs (Lin *et al.* 2020a; Lin *et al.* 2020b).

Insight into the factors that present a barrier to effective patient education is paramount to understanding the motivations and behaviours of therapists (Wilesmith, Lao and Forbes 2020). The authors explain that the importance is due to previous literature that demonstrated the perception of how barriers can detrimentally affect a healthcare provider's engagement in patient education (Sluijs, van der Zee and Kok 1993), which has the potential to affect the motivations and behaviours of therapists (Glanz, Rimer and Viswanath 2008).

This is further reinforced by Adams *et al.* (2018), who found that there is many aspects for improvement regarding health information delivery to patients, particularly the skills required to relay complex information to patients. The authors conclude that continuous efforts are needed regarding the preparation and continued education of healthcare providers' skills to deliver complex health information to patients (Adams *et al.* 2018).

Forbes *et al.* (2017b) outline that practising physiotherapists (Chase *et al.* 1993) and students (Holmes 1999) identified barriers to patient education, which still remain in modern physiotherapy (Forbes *et al.* 2017a) where novice physiotherapists (Forbes *et al.* 2017b) and newly graduates (Wilesmith, Lao and Forbes 2020) appear to face more challenges regarding barriers to patient education. Identifying barriers to the practice of patient education may be of significance and inform the educational needs of healthcare professionals in this regard (Forbes *et al.* 2017a).

These barriers may either be related to the patient, healthcare professional or the environment. Known barriers to patient education include (Forbes *et al.* 2017a):

- The patient's cognitive status.
- Lack of trust or rapport between the patient and practitioner.
- Emotional status of the patient.
- The attitude of the patient.
- Language barrier.
- Patient assuming a passive role.
- The practitioner's lack of knowledge on the topic.
- Lack of time allocated to treatment session.

- Knowledge or literacy of the patient.
- Lack of participation by or support from family members.
- Lack of privacy in the clinic environment.

Significant value is placed on the doctor-patient relationship by patients, which in turn may have a direct impact on satisfaction, compliance, and quality of life (Bogart *et al.* 2004; Baker *et al.* 2011). In addition, patients with chronic musculoskeletal conditions may have recurring interactions with healthcare providers over a prolonged period, thereby making the interaction (and the health of the interaction) even more critical (Baker *et al.* 2011). In terms of successful management, healthcare providers need to build patients' knowledge to facilitate the daily management of their condition or pain, which is a major component of their healthcare (Baker *et al.* 2011). This is in concordance with Davenport, Dickinson and Minns Lowe (2019), who outline that although patients value input from peers or family members, the greatest value was placed on their healthcare providers' role as an educator. Within the interaction, this was specific to their provider's communication skills and the guidance they receive in terms of explaining to patients what to do, showing them what to do, and building their confidence (Davenport, Dickinson and Minns Lowe 2019).

In that respect, the study by Holmes (1999) is significant in the domain of perceived barriers. In this study, the students regarded patient characteristics as a barrier to patient education and, therefore, the author concluded that patient characteristics might be a barrier in and of itself (Holmes 1999). Thus, the education of students should focus on changing the perception of students such that patient characteristics are no longer regarded as a barrier to patient education, which would improve their capability to do so.

The aforementioned may be influenced by the fact that practitioners may present patients with a carefully explained treatment rationale, which patients better understand, as opposed to students who do not (or may do so to a lesser extent). Likewise, with regards to explaining the aetiology of the diagnosis to patients nearly always or most of the time, there was a 10-point decrease between the 1st year (41.9%) and 2nd year students (31.5%) compared to 55% of practitioners. However, considering all variables, the overall gap appears to close between 1st and 2nd year students and from 2nd year towards that of practitioners (Holmes 1999).

The examples provided demonstrate that the students appear to be less likely to inform patients. If this is to be the case, it could easily be misinterpreted as patients not being receptive to the educational efforts of students. For instance, patients may seem intentionally non-adherent when the students are, in reality, less inclined to provide patients with information in the first place (unintentionally non-adherent). This interpretation could

explain the outcome of the study related to patients' attitudes towards their condition as perceived to be a barrier for students (Holmes 1999). In this context, providing patients with knowledge allows them to form perceptions followed by an attitude towards it. In other words, patients cannot act on that which they do not know (they are unintentionally non-adherent). This is important as it is known that patients require an understanding of their pain for them to accept responsibility and take up active approaches in their management (Moseley 2019). The literature supports this fact, in that respect, that patients who are more satisfied with their provider's communication demonstrate adherence to a greater extent when compared with those who are unsatisfied (van Dalen 2013). Alternatively, if patients receive information but do not understand what has been relayed to them, it is unlikely that they will follow the advice (Institute of Medicine 2004; Coulter and Ellins 2007; Davenport, Dickinson and Minns Lowe 2019).

This correlates with the examples provided in the previous sections, which explained that patients need to understand that pain is not necessarily indicative of tissue damage and that it is safe to exercise. A case in point is the study by Robertson, Hurley and Jones (2017) regarding crepitus in patients with patellofemoral pain and its effect on their behaviour. Patients believed that wear and tear or degeneration caused the sound; therefore, they interpreted the sound as having a pathology and premature aging, and anxiety associated with the sound was the basis for these beliefs (Robertson, Hurley and Jones 2017). A negative cycle appeared that included fear with a resultant decrease in physical activity. Essentially fear-avoidance ensued due to the erroneous belief that crepitus is indicative of joint degeneration (Robertson, Hurley and Jones 2017).

Along with fear-avoidance several patients also presented with catastrophisation. Consequently, they attempted to prevent the noise from occurring by avoiding activity (Robertson, Hurley and Jones 2017). In terms of pain literature, attempts to avoid the occurrence of pain are described as a behavioural response to pain (Turner and Aaron 2001; Robertson, Hurley and Jones 2017). In line with literature on pain, the findings can therefore be interpreted as a behavioural response to crepitus and eventually lead to change in behaviour, such as alteration of movements or avoidance of ADLs to prevent further damage (Robertson, Hurley and Jones 2017).

If practitioners are to encourage patients to respond more positively to pain (Caneiro, Bunzli and O'Sullivan 2021), then the same could apply to crepitus, which would start by explaining the aetiology (Robertson, Hurley and Jones 2017), thereby clearing up misconceptions, especially because crepitus frequently occurs without the presence of pathology (Robertson 2010). If this is to be interpreted considering the findings by Holmes (1999), where students were less inclined to discuss the aetiology of a diagnosis, it could explain why compliance

of patients decreases, as Robertson, Hurley and Jones (2017) found that when the exercises caused the noise, they stopped performing prescribed exercises. This explains that patient education is not only necessary to initiate a physical activity or exercise programme, as in the “bone-on-bone” example of Nijs *et al.* (2013) mentioned in the previous section, but effective communication is also necessary for sustained participation and compliance.

A shared understanding becomes questionable if patient education is unsuccessful, either by not providing relevant information or if the patient does not understand the information. If shared understanding is not reached, patients may indeed not realise that they have an active role to play in their own healthcare (Liddle, Baxter and Gracey 2007; Steihaug 2007; Oosterhof *et al.* 2014), which may explain why students found passivity to be a barrier (Holmes 1999) and the students may have unknowingly reinforced such behaviour.

It appears as if the students appreciated the fact that patient education should be individualised, as the attitudes related to flexibility (in terms of recognising that not all patients should be approached in the same manner) and establishing the learning style of patients were both highly rated by both 1st and 2nd year students (Holmes 1999).

When these results are compared to their techniques that are used to assess whether their attempts are effective, it becomes problematic in that not only do they perceive more barriers than practitioners do, but they also do not assess their patients’ understanding. This is evidenced by an assessment of the students’ implementation of the teach-back method. This method involves explaining something to a patient and then asking the patient to repeat what has been discussed in their own words (Brega *et al.* 2015; Flanders 2018). If the patient is unable to provide a clear explanation, it must be explained to the patient again.

While 1st year students reported higher implementation (80.6%) of the teach-back method to elicit the understanding of patients, 2nd year students reported far less use (59.1%) (Holmes 1999). The 2nd year students’ implementation of teach-back is comparable to that of practitioners (59.1% and 59.0%, respectively). However, the problem becomes apparent in consideration of the significant decrease in assessing patient understanding, while the students’ opinions of perceived barriers remain closely related. Although 2nd year students’ practice behaviour progress towards alignment with that of practitioners, the degree to which practitioners perceive barriers is significantly less (Holmes 1999), which may be indicative of 2nd year students’ ability to implement patient-centred care.

This may be because the education skills of practitioners are more developed in terms of their education style being more flexible (not just regarding it as important, but they are actually applying it appropriately). In addition, the information that practitioners provide is

indeed more contextualised to the patient, and experience may have taught them that these perceived barriers are not true barriers. Hence, they realise that their education is effective and only need to elicit patient understanding when they think a factor may impede patient learning and understanding. For 2nd year students, in particular, who were close to graduation, this attitude and practice gap is significant as it may indicate that they fail to recognise that their skills are not as developed as they should be, as opposed to factors that are truly a barrier for them.

This may be why physiotherapy students perceive the cognitive status of patients as a barrier (Holmes 1999), and less representative of the cognitive status being a barrier; instead, it may be representative of students having less reflective capacity of their own practice behaviour. In addition, it may be that students are unaware that their explanations fail to create a shared understanding. Thus, patients cannot find common ground to interact with students.

Karnieli-Miller *et al.* (2021) outline in a recent article, that an individual's capacity to be reflective is essential, as future behaviour is guided by the lessons acquired from experiences. An individual's understanding of a situation is informed by the various perspectives and experiences and awareness of emotions, which ultimately allows for critical analysis of the situation, as well as the possible challenges that may accompany the situation to make sense of it. Therefore, good communication requires that the communicator be aware of the other person's needs and, thus, students' ability to reflect upon their communication behaviour (Karnieli-Miller *et al.* 2021).

Considering this, Karnieli-Miller *et al.* (2021) illustrate that it is necessary to observe and identify not only informational needs but also emotional needs, so that information may be individualised and deal with the emotional influence it may have on the patient effectively (Karnieli-Miller *et al.* 2021). Accordingly, proficiency in this area necessitates that they need to learn sensitivity and be aware of the effect that communication may have on others, which would require them to consciously decide on how a given situation should be managed (Karnieli-Miller *et al.* 2021). Furthermore, with regard to their own impressions and attitudes, students are required to develop self-awareness and understanding of how these may influence their communication with patients and, therefore, the relationship as well (Karnieli-Miller *et al.* 2021).

This is supportive of Holmes (1999), who, in his discussion, states that students may not realise how their own behaviour and beliefs may influence patients and, thus, they perceive more barriers. Therefore, the results indicate that the students' attitudes conform to the biomedical model, instead of patient-centred care (Holmes 1999).

A biomedical perspective has detrimental effects on modern healthcare because it degrades the doctor-patient relationship and, consequently, the interaction. This highlights that the positive impact on patients' motivation, information retention, health outcomes and compliance are associated with education that is approached from a patient-centred perspective, where strategies take into consideration the preferences and educational needs of patients (Hyrkas and Wiggins 2014; Forbes *et al.* 2018a).

Conversely, the literature implies that if interactions with patients are deficient in its patient-centred approach, attentiveness to patients' needs suffers, which in turn may lead to the development of barriers, thus compromising outcomes of patient education and care (Saha, Beach and Cooper 2008; Forbes *et al.* 2018a). According to Forbes *et al.* (2018a), the literature indicates that exploration of novice practitioners supports this argument (Jensen, Shepard and Hack 1990; Gyllensten *et al.* 1999; Jensen *et al.* 2000), as patient education is not held in the same regard compared to other skills (Jensen, Shepard and Hack 1990). Additionally, patient-centred educational initiatives that encourage patient responsibility are often lacking in their approach to care (Gyllensten *et al.* 1999; Forbes *et al.* 2018a). The same has been reported in chiropractic students, where more emphasis is placed on clinical skills, namely joint manipulation and adjustments (Hecimovich and Volet 2012).

Although the attitudes of students appear to progress toward those held by practitioners, (Holmes 1999) author suggests that efforts are needed to bridge the gap. The need to bridge this gap becomes apparent when weighed against the fact that healthcare providers' skills are often limited, and they may be left to their own devices to acquire these skills and may be unaware that their skills could be improved upon (Levinson, Lesser and Epstein 2010). This raises concern as they are unlikely to receive feedback in this regard once they are in practice (Levinson, Lesser and Epstein 2010).

The above-mentioned studies appear to follow the same pattern as that of (Holmes 1999), where the students were less inclined to implement educational activities that are in line with a patient-centred approach as well as an inefficiency in modifying their application to patient needs (Forbes *et al.* 2018a). In that context, the literature suggests that students are not comfortable dealing with specific situations. If that is the case, it is not the characteristics of patients which act as a barrier but rather the capacity of students to manage a particular situation. This explains why the literature repeatedly emphasises the importance of addressing these concerns so that students qualify as competent patient-centred practitioners (Levinson, Lesser and Epstein 2010; Sanders *et al.* 2013; Forbes *et al.* 2018a).

In summary, if perceived barriers exist in communicating the relevant health information to patients effectively, the doctor-patient relationship will erode, and adherence and outcomes

may also be affected. Therefore, the objective of investigating students' perceived barriers to educating their patients effectively during their clinical practicum was included in the scope of this study to serve as a basis for future research to determine whether these are true barriers or the students' capability to deal with specific situations.

2.8 THE NEED TO EVALUATE THE EFFECTIVENESS OF PATIENT EDUCATION EFFORTS

If communication in the doctor-patient relationship aims to create the same meaning of what is being communicated between both individuals (van Dalen 2013), evaluating the effectiveness of patient education would benefit the interaction.

An assessment of educational efforts is recommended, as it guarantees whether patients understand what has been discussed and, therefore, can apply that information to their lives (Flanders 2018). In this context, it ensures that education is centred around the patient and their context and, thus, individualised. As outlined previously, patient education should be tailored to the patient, such as by confirming their understanding of what has been discussed. In contrast, if it is not tailored to the patient, it is not that the patient is not receptive to such educational efforts but, rather, it could be challenging for them to apply information they do not fully understand. Hence, patient-centeredness is an invaluable attribute of healthcare providers and is a guiding principle for patient education.

If the patient is placed at the centre of care, the delivery of health information should consider patient understanding. Several different methods of delivery exist (Beagley 2011; Friedman *et al.* 2011), aimed at addressing different learning styles (Beagley 2011). An assessment of patients' understanding could inform the provider whether a different method could facilitate understanding or which key points discussed during the encounter need to be revisited and possibly rephrased (Beagley 2011). This validates the importance of evaluating the understanding of patients and, therefore, the effectiveness of efforts, as the healthcare provider would otherwise be uninformed in this regard.

Close-ended questions, such as "do you understand?", are inappropriate (London 2016; Flanders 2018); rather the teach-back method and return demonstration are preferred to elicit the patient's understanding (Brega *et al.* 2015; London 2016; Flanders 2018). The teach-back approach allows patients to relay their understanding in their own words (Brega *et al.* 2015), which is essential for the provider to assess their understanding accurately, if patients cannot explain it correctly, misunderstandings should be cleared up (Flanders 2018).

The return demonstration is concerned with performing a skill. However, it is a process and does not simply involve showing the patient how to perform the desired skill, who is then required to demonstrate it. Instead, the evaluation process should begin with the provider teaching the skill, followed by the patient practising the skill, and then the patient demonstrating the skill to the provider when they are ready (London 2016; Flanders 2018). Furthermore, it is advocated that the skill be demonstrated at three different times, which aids in long-term recall of what has been taught (London 2016; Flanders 2018).

Recognising verbal and non-verbal cues of patients can also serve as a measure to evaluate comprehension (Beagley 2011). This requires that the provider be aware of such cues, for instance, inattentiveness or apparent confusion, to which they should respond by pausing the education and confirming understanding by asking to relay what they have noted up until that point (Flanders 2018). This method assures that the provider, not the patient, is responsible for the effectiveness of patient education (Flanders 2018).

In terms of objective measures to evaluate effectiveness, the Brief Illness Perception Questionnaire may be used to assess the beliefs that patients hold regarding their condition (Broadbent *et al.* 2015; Leysen *et al.* 2015; Kongsted *et al.* 2019). For instance, the construct of 'expectations', as defined in an article by Kongsted *et al.* (2019), evaluates a patient's belief in terms of recovery. As illustrated earlier in this literature review (sections 2.5.3.13 and 2.5.3.14), patient beliefs is an area that needs to be addressed as it may have an impact on outcomes. In contrast, fear of movement or activity could be assessed by the Fear Avoidance Beliefs Questionnaire (Waddell *et al.* 1993; Woby *et al.* 2004; Grotle, Brox and Vøllestad 2006; Kongsted *et al.* 2019). In terms of self-efficacy, the Arthritis Self-Efficacy Scale may be of use (Lomi and Nordholm 1992; Lomi *et al.* 1995; Primdahl, Wagner and Hørslev-Petersen 2010), which would address fatigue, mood, pain, and sleep and evaluates how certain a particular patient is in managing these aspects (Kongsted *et al.* 2019). At the same time, the Oswestry Disability Index (Lauridsen *et al.* 2006b, 2006a) may be useful to assess functioning and give an impression of how successful self-management is (Kongsted *et al.* 2019).

Different aspects of these questionnaires could be helpful, but all may not apply to all patients and could be assessed before and after patient education or treatment sessions as well as during follow-ups. For example, these assessments may be useful to assess behavioural implications of patient education (for example, graded activity and reassurance were able to address the fear avoidance) or how likely a patient is to take up exercise if misconceptions were cleared up.

2.9 PATIENT EDUCATION SKILLS DEVELOPMENT

In order to educate patients effectively, an individual requires communication skills specifically (Nijs *et al.* 2013). However, the need for chiropractors to gain acceptance by their medical peers resulted in an overemphasis on medical sciences within the chiropractic curriculum with a subsequent lack of education regarding disease prevention and health promotion, such as health education and counselling (Hawk *et al.* 2004). This statement appears to be well-grounded, as the study by Stomski *et al.* (2019) concludes that chiropractic students' attributes of person-centred care, such as advice regarding lifestyle modification and adaptation of the workplace to manage pain and health promotion showed significant room for improvement. Furthermore, Grand, Morehouse-Grand and Carter (2016) find that students feel somewhat unprepared to provide health promotion and preventative care.

In the same manner, there is a paucity in the literature to support the practical implementation of communication skills and how they are taught to chiropractic students (Muddle, O'Malley and Stupans 2019). Moreover, Grand, Morehouse-Grand and Carter (2016) maintain that chiropractic students are likely to graduate without the necessary skills or motivation to provide health promotion (in which patient education is embedded) and preventative care (such as advice) if they believe that these topics to be irrelevant to their scope of practice or if they feel that training in these topics was insufficient.

Although several subjects in the DUT curriculum inherently include concepts of patient education, particularly towards the end of the theoretical component, there is no particular subject allocated towards teaching students how to effectively communicate health information to patients specifically (Durban University of Technology 2020). Newly graduated physiotherapists' perceptions of the clinical value of patient education interventions were influenced significantly by their entry level training, and that the theoretical training prior to their professional transition was crucial to building a foundation for their patient education skills (Wilesmith, Lao and Forbes 2020). Alternatively, those who received training in patient education specifically, showed improved performance during OSCEs and were better able to individualise the content (Forbes *et al.* 2018b). Thus, it raises the question of whether the current chiropractic curriculum is adequate in terms of students preparation to engage in patient education or if there is a need to prepare them for their future role as educators. Exploration of the current factors that contribute to chiropractic students' patient education skills development may inform efforts to optimise the skill development.

Hecimovich and Volet (2009) drew from the self-efficacy framework described by Bandura (1986) to illustrate how chiropractic students develop their skills. Three main sources contribute to the development of self-efficacy: vicarious experience, verbal, or social persuasion and enactive proficiency (Bandura 1986; Hecimovich and Volet 2009).

Direct experience with patients has been identified as the most influential factor in the development of patient education skills (Holmes 1999; Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015; Forbes *et al.* 2017a; Wilesmith, Lao and Forbes 2020). This substantiates that enactive mastery experience is the most powerful contributor to the development of self-efficacy (Hecimovich and Volet 2009) because such encounters are the most reliable indicators of whether one can overcome challenges and master a situation in order to succeed (Hecimovich and Volet 2009). Success, in return, promotes a strong belief in personal efficacy in that particular task (Hecimovich and Volet 2009). However, if efficacy is not yet achieved completely, and the individual exclusively experiences continued easy successes, they may develop a false sense of efficacy (Hecimovich and Volet 2009). Challenges and setbacks may have a constructive role because of the opportunities they present for students to understand how failure can be developed into success by becoming more able to better manage circumstances (Hecimovich and Volet 2009). It thus explains why practitioners may better navigate barriers as outlined previously (in section 2.7).

Interaction with colleagues has been identified as one of the most influential factors in the development of patient education skills (Holmes 1999; Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015; Forbes *et al.* 2017a; Wilesmith, Lao and Forbes 2020). Within a clinical setting, supervising clinicians serve not only as role models for students but also as coaches and assessors. Therefore, the role of supervising clinicians is integral to workplace-based learning. This is corroborated by earlier literature highlighting that a prominent role model in an individual's life can instil self-beliefs, which may affect that individual's life and course thereof, which contributes to the vicarious experience (Schunk 1981; Hecimovich and Volet 2009).

Furthermore, for on-campus clinics, such as the DUT CDC, supervising clinicians become important in that they must promote or enforce the policy set by the clinic director to ensure that students engage adequately with patients so that they receive necessary advice (Evans *et al.* 2011). Additionally, should a student not feel confident in their ability to educate patients, the supervising clinicians play a significant role in that regard through verbal or social persuasion.

Verbal persuasion, such as convincing the student that they do in fact have the ability to master a given task, may influence them by means of being more inclined to commit to and

maintain substantial effort, as opposed to constantly thinking about personal deficits and doubting themselves, thereby contributing to the development of self-efficacy (Hecimovich and Volet 2009). If persuasion is to be effective, automatic praise or inspirational homilies should be avoided (Bandura 1986; Hecimovich and Volet 2009). Furthermore, the authors drew from the work of Erikson (1980), who states that constant flattery will not improve a weak ego. In contrast, artificial inflation is not required by a strong ego that is secured in its identity by a strong society (Erikson 1980; Hecimovich and Volet 2009). This is particularly important for chiropractic education due to a great deal of skills training and verbal feedback that occurs (Hecimovich and Volet 2009). This explains why providers value support and supervision (Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015).

Students' peers may also play a role in another student's patient education skills development through observation. Observation of others and noticing the consequences of their actions or behaviour are known as vicarious experiences. Thus, Hecimovich and Volet (2009) explain that if a student observes an individual comparable to them, and how they prevail through consistent effort, the observing student's confidence also increases by believing that they also have the ability to master similar tasks and to prevail. Thus, peer modelling and social comparison also contribute to the vicarious experience and strongly affect the development of self-perceptions related to competence (Schunk 1981; Hecimovich and Volet 2009).

Chiropractic students are introduced to real patient interaction in a clinical setting under supervision, where they have the opportunity to combine theoretical knowledge with their practical skills, which is the main objective of internships (Hecimovich and Volet 2012). Continuous guidance and feedback are provided to students to promote skills development and to build their confidence (Hecimovich and Volet 2012). With regards to DUT, chiropractic students are exposed to real patients in their 4th year of academic studies as part of Diagnostics IV, where they must take patient histories during weekly hospital visits (Durban University of Technology 2020). Additionally, in their 4th year, the students are part of an observer programme, where they must observe a set number of older students' interactions with patients (Durban University of Technology 2020). It is only during their 5th year of study that the clinical setting is introduced, and they are required to interact with and treat real patients (Durban University of Technology 2020). This illustrates the importance of the vicarious experience via observation in chiropractic education, where a major component of the students' education, such as the internship, relies heavily on such experiences (Hecimovich and Volet 2009).

Forbes *et al.* (2017a) noted that the participants in their study placed more value on professional in-services compared to the study by Chase *et al.* (1993), which according to

the authors, could be indicative of its importance. With regards to DUT, the observer programme at DUT provides initial exposure to the clinical interaction with patients from different peers to increase their exposure to the various styles of older students (Durban University of Technology 2020).

CPD courses were another significant contributor to the development of patient education skills both for practitioners (Forbes *et al.* 2017a) and students (Holmes 1999). In South Africa, chiropractors attend a wide variety of CPD activities, with courses, workshops, conferences, congresses, and seminars being the most popular (Johl, Yelverton and Peterson 2017). In addition, for all chiropractic students, CPD accredited seminars and workshops are made available by the World Congress of Chiropractic Students University of Johannesburg or DUT chapters annually over the course of two to three days, known as the African Regional Event (WCCS 2021).

With regards to experience or training prior to university, this factor was regarded as the least contributing factor (Forbes *et al.* 2017a). As COVID-19 placed strain on patient contact and interactions, chiropractic had to employ different methods to engage with patients (Green *et al.* 2020). Telehealth is defined by the Health Professions Council of South Africa as “the application of electronic telecommunications, information technology or other electronic means to administer healthcare services in two geographically separated locations for the purpose of facilitating, improving, and enhancing clinical, educational and research” (HPCSA 2021). This is particularly valid for underserved areas in South Africa. Telehealth proved to be the answer for chiropractors in response to the pandemic (Green *et al.* 2020).

To the author’s knowledge, chiropractic students at the DUT CDC were not allowed to do video-conference calls with patients, as their interaction could not be supervised as when in the clinic. Although students could not provide self-management advice (Varatharajullu 2022), as the statutory body would require consent for this (AHPCSA 2020), students could at the very least direct patients to websites or refer to chiropractors who were allowed to do so via video-conference calls. As direct patient experience/interaction has been described as having an influence, considering the COVID-19 pandemic, where contact with patients was restricted and students were limited to the type of advice that students could provide their patients, the questionnaire explored whether remote communications with patients played a role in their skills development.

2.10 STRATEGIES TO DELIVER PATIENT EDUCATION

Not all patients have the same learning style and, therefore, if patient education is to be effective, the patient's learning style needs to be taken into account (Beagley 2011). The three known types of learning styles include the visual learner, auditory learner and the kinaesthetic learner (Russell 2006; Beagley 2011). For this reason, different formats should be used for different patients to accommodate for their preferences and context (Beagley 2011; Caneiro *et al.* 2020). This would require chiropractic students to adapt to the learning styles of their patients, meaning they should make use of various strategies of delivery, as opposed to a 'one size fits all' approach.

Education, according to the various styles of learning, could be summarised as follows (Beagley 2011):

The visual learner prefers:

- Visual aids.
- Handouts which are easy to read.
- Technology resources (including online material, computers, television, and videos).

The auditory learner prefers:

- Rephrasing important information.
- Changing communication speed, volume, and pitch.
- Supplementing education by making notes of important information.
- The provider should be positioned in such a way that the patient is able to hear them clearly.
- Multimedia.

The kinaesthetic learner prefers:

- Taking breaks often and moving about for a bit.
- Making their own notes of important points.
- Tactile activities.
- Product samples.

It is preferred that more than one method of delivery is used, as it would further facilitate the uptake of knowledge (Beagley 2011; Friedman *et al.* 2011). Learning aids, written notes of important points and using patient stories or online resources further improve the active process that is patient education (Caneiro *et al.* 2020). The literature supports these statements as not all education strategies are equally effective. A systematic review found that demonstration has the largest effect size, while the least effective strategy is to provide

verbal information alone, and should not be a standalone approach but rather be used in conjunction with other methods, which include videos, audio, written material, visual aids and demonstration (Friedman *et al.* 2011).

For instance, supplementing verbal information with written information augments patients' understanding, as well as their recall and adherence (Gannon and Hildebrandt 2002; Freda 2004; Cutilli 2006; Gold and McClung 2006; Friedman *et al.* 2011; Forbes *et al.* 2018b), while that which one cannot see, on the inside of the body, may be made easier to understand by using visual images (pictures or illustrations) (Thompson 2017). Furthermore, illustrations may be particularly useful for young patients; may facilitate understanding of written information, and become even more necessary for patients with low literacy skills in particular (Houts *et al.* 2006; Friedman *et al.* 2011).

Regarding handouts, the systematic review by Zuidema *et al.* (2015) identified that leaflets were useful to patients and allowed them to refer back to the information at a later time (Barlow *et al.* 2002; Barlow, Cullen and Rowe 2002). Conversely, the study by Cooper, Smith and Hancock (2008) found that patients viewed written information in a negative light, which may have been due to the information not being individualised or acceptable to the patient. In that sense, personalised handouts may be preferred by patients. Similarly, the systematic review by Connelly *et al.* (2019) illustrated that it is of importance that information is appropriate, directed at the patient, and easy to read and understand (Winslow 2001; Hoffmann and McKenna 2006). As a result, patients highly appreciated written information since they could review it later and consolidate their understanding (Winslow 2001; Kyngas, Kukkurainen and Makelainen 2004; Mercieca, Cassar and Borg 2014; Connelly *et al.* 2019).

As leaflets allowed patients to refer to the information at a later stage, it seems reasonable that videos may serve the same purpose in that regard, while patients could use online resources to refer to additional information in their leisure time. Similar to visual aids, anatomical models could be used for visual learners as an illustration of what is on the inside of their bodies. These could also be used to explain to patients the cavitation process that occurs during an adjustment or manipulation and illustrate that a vertebra is not being put back into place, as explained previously (section 2.5.3.1).

Biofeedback allows for patient education by giving feedback on a physiological level and, in turn, they can change physiological activity by using the feedback provided (Huang, Wolf and He 2006; Frank *et al.* 2010; Brennan, Dorrnzoro Zubiete and Caulfield 2019). This allows the patient to develop an awareness of a technique required for a specific task, which aids in motor learning (Brennan, Dorrnzoro Zubiete and Caulfield 2019). In this context, biofeedback allows the patient to perform and practice a specific task, such as muscle

contraction or exercise, and the patient learns to perform the specific task correctly through feedback. Therefore, such devices may be helpful in patient education as it allows the patient to develop the correct technique, which they would have to apply at home.

2.11 PERCEPTION AND ITS RELATION TO PRACTICE OF PATIENT EDUCATION

The systematic review by Roussel and Frenay (2019) found that difficulty has been noted around the implementation of patient education for 20 years according to the literature (Kai *et al.* 2008; Hoving *et al.* 2010; Chambouleyron *et al.* 2013). The authors propose that investigating the perception of healthcare providers in relation to patient education may explain why the implementation of patient education proves to be difficult (Roussel and Frenay 2019). This is due to the association that exists between perception and practice, with perception guiding practices (Rosenstock 1974; Ajzen and Fishbein 1980; Abric 1987; Schwarzer 2008) while practices shape perception (Festinger 1957; Joule and Beauvois 2010; Roussel and Frenay 2019).

Their systematic review identified that 85% of studies indicated a direct correlation between perception and practice of patient education (Roussel and Frenay 2019). The choice of educational practice is associated with the perceptions of the individual patient and perceptions of what the healthcare provider's role is and their skills (Roussel and Frenay 2019). Thus, as chiropractic students represent the future of our profession, research that involves students may provide knowledge as to future intentions and practice behaviour (de Luca *et al.* 2018).

CHAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

The aim of this chapter is to discuss the chosen methodology of this research study. Included in this chapter is the study sample, data collection, focus group, pilot study, measurement tool and data analysis.

3.2 RESEARCH DESIGN

The study was an anonymous web-based questionnaire with a cross-sectional design within a quantitative paradigm based on the study by Forbes *et al.* (2017a). Permission was obtained from the author to replicate the study in a South African context at the DUT CDC (Appendix A).

Quantitative research is important in generating data in studies regarding social science, such as in the cases of studies relating to communication (Allen 2017). Quantitative data also provide information regarding the frequency and magnitude of an effect on the population being studied (Allen 2017).

Cross-sectional design studies are the opposite of longitudinal studies, as they assess a study population at a given point in time (Allen 2017). Cross-sectional design studies are instrumental in identifying patterns, correlations, and incidence rates of a topic of interest to a researcher (Allen 2017).

3.3 SAMPLE

3.3.1 Sample Population

The sample population studied in this research study was chiropractic Master's degree students registered at the Durban University of Technology.

3.3.2 Sample Size

The minimum sample size of the study was defined as 40 students (Esterhuizen 2020). The total sample size of chiropractic Master's degree students participating in the study was defined to be between 70–80 students, accounting for the students who completed their degree in 2020 and early 2021, as well as those students who possibly did not meeting their 4th year requirements (Korporaal 2020). The total number of chiropractic students registered

for their Master's degree at the beginning of 2021 was 71, of which 43 were female and 28 male (Kisten 2021). The focus group and pilot study both included two Master's students so they were not eligible to participate in the study. Of the remaining 67 registered chiropractic Master's degree students, a total of 42 students participated in this study (63% response rate).

3.3.3 Recruitment

No advertising was used in the recruitment of this study. A total sampling method was used for chiropractic Master's students who met the inclusion criteria. An email was sent to the respective class representatives of each year of study to disseminate the email amongst their respective students (Appendix M). The email included a brief introduction to the study, a link to the letter of information (Appendix N), and a link to the final questionnaire (Appendix O) on the QuestionPro platform.

3.3.4 Characteristics

This research study sought to include both male and female students who met the inclusion criteria. The inclusion and exclusion criteria were:

3.3.4.1 Inclusion Criteria

- Students registered as chiropractic Master's degree students at the DUT CDC.

3.3.4.2 Exclusion Criteria

- Students who did not sign the informed consent.
- Students who participated in the focus group.
- Students who participated in the pilot study.

3.4 DATA COLLECTION

This study was granted full ethical approval by the Institutional Research Ethics Committee (ethical clearance reference number IREC 047/21) (Appendix B). After full ethical approval was granted, gatekeeper's permission was provided by the DUT Chiropractic Head of Department (Appendix C) and the Post Graduate Research Director (Appendix D) to conduct the research study on chiropractic Master's degree students registered at the Durban University of Technology.

The final questionnaire (Appendix O) was then distributed through an online platform, QuestionPro, as provided by DUT. The online platform was preferred over a paper-based study due to the restrictions placed on the clinic and the number of persons allowed on the premises at any given time due to the COVID-19 pandemic.

There was no predetermined period for how long the study should be running. Therefore, the data collection period was increased by weekly increments until the minimum sample size requirement was eventually reached. The questionnaire was open from June 7th 2021, until July 4th 2021, during which weekly reminders were sent out to class representatives. There was a total of 50 responses, of which only 42 students completed the questionnaire (63% response rate), and eight dropouts (partially completed questionnaires where only the demographics section were filled out) were documented.

3.5 MEASUREMENT TOOL

As this research study's measurement tool is based on that constructed by Forbes *et al.* (2017a) and utilises an adaptation of the questionnaire constructed by the authors, this section describes the original measurement tool (Appendix E) and its development as outlined by the authors in their study.

3.5.1 Research Process

To design and construct the survey and determine relevant items, the researchers identified six key constructs representative of physiotherapy and the practice of patient education through of a literature review and consultation process. A review of the literature within physiotherapy and other health professions allowed for overarching constructs of professional practice and perceptions regarding the content of education and related activities, as well as existing measures of patient education to be identified. These overarching constructs included (Forbes *et al.* 2017a):

- Physiotherapy context.
- Time.
- Educational content and structure.
- Barrier perception.
- Perception of skill development.

3.5.2 The Consultation Team

The team consisted of a physiotherapist currently in practice (with clinical experience of 10 years), three academics (with educational and clinical experience of 10 years), a wide variety of physiotherapists in practice, and academic faculty from a variety of practice areas within physiotherapy.

3.5.3 Final Measurement Tool

The final survey measurement tool comprised of nine questions related to demographics, two multiple choice questions regarding time spent on educational activities and six sets of closed-ended 5-point Likert scale questions in matrix style tables.

Each matrix required that participants rate activities of patient education in terms of frequency (how often they use it) and perceived importance. The matrix related to perceived barriers to patient education and factors contributing to skills development required that participants rate the degree to which they agree with each 5-point Likert scale question. The survey questions also included free-text options that allowed participants to provide additional answers that might not have been included in the survey. The authors used SurveyMonkey as the online platform to distribute the survey and collect data (Forbes *et al.* 2017a).

3.5.4 Pilot Testing of Final Measurement Tool

Following the consultation process and development of the final measurement tool, the final survey was then subjected to a pilot study, which included eight experienced physiotherapists (who all had active roles in both clinical practice and the academic field). The participants of the pilot study were between the ages of 29–52 years of age and practised in various areas of physiotherapy settings, including musculoskeletal cardiorespiratory and neurological.

The aim of the pilot study was for participants to provide constructive criticism regarding the content of the survey, clarity of items, the structure of the items, as well as the wording of the items. To evaluate the test-retest reliability of the survey, the pilot study was conducted twice. As outlined by Fink (1995), the intraclass correlation (ICC) of >0.7 is acceptable. Therefore, all the individual items on the survey were acceptable as they all had an ICC of >0.7 (Forbes *et al.* 2017a).

In accordance with feedback from the pilot group, minor amendments were made to the items, which comprised of two more items being added: one related to the content of patient education, and the other related to perceived barriers. Subsequently, further pilot testing revealed that the two additional items had an ICC of >0.7 .

3.6 PRE-FOCUS GROUP CHANGES TO THE ORIGINAL QUESTIONNAIRE BY FORBES *ET AL.* (2017A)

The following changes were made to the original questionnaire (Appendix E) by Forbes *et al.* (2017a), as some questions were not relevant to chiropractic, while others were not applicable to a student population or to the DUT CDC setting.

Changes to Question 3:

- Instead of a scroll menu to capture the age of the participants, it was replaced with a free text response box so that participants could enter their age manually.

Changes to Question 4:

- The question 'Is English your primary language?' was removed.

Changes to Question 5:

- The question 'How many years have you been practicing as a physiotherapist?', was changed to 'What is your year of study?'.

Changes to Question 6:

- The question 'What is your highest physiotherapy award?' was removed.

Changes to Question 7:

- The question 'Which of the following would best describe your primary area of practice?' was removed, as the chiropractic students only practice in the musculoskeletal field.

Changes to Question 8:

- The question 'What is your primary state or territory of practice?' was removed, as all the students practice in the same area, namely the DUT CDC in Durban, KwaZulu-Natal.

Changes to Question 9:

- The question 'How would you best describe the location of your practice', was removed, as all the students practice were at the same location of inner city, when on campus and the outer city during community outreach or ad hoc events.

Changes to Question 10:

- The question 'What is your average time per initial visit engaging specifically in patient education related activities (minutes)?' was changed to 'What is your

average time spent on patient education activities specifically during the initial visit (in minutes)?’.

Changes to Question 11:

- The question ‘What is your average time per follow-up visit engaging specifically in patient education related activities (minutes)?’ was changed to ‘What is your average time spent on patient education activities specifically during the follow-up visit (in minutes)?’.

Changes to Question 14:

- The question in the main heading ‘What methods do you use for delivery of patient education?’ was changed to ‘What strategies do you use to deliver patient education?’.
- The sub-question ‘anatomy models or pictures’, was changed to ‘anatomy models’.
- The sub-question ‘generic handouts/pamphlets’, was changed to ‘handouts/pamphlets’.
- The sub-question ‘links to online websites or other online content’, was changed to ‘links to online websites’.
- The sub-question ‘formal group education activities’ was removed, as the chiropractic students are not allowed to see patients in groups.
- The sub-question ‘use of physiotherapy assistant’ was removed, as the students do not have assistants.

Changes to Question 15:

- In the sub-question ‘ask the patient to repeat or discuss content in their own words’, was changed to ‘ask the patient to repeat in their own words what has been discussed’.
- The sub-question ‘ask family members or care-givers’ was removed.
- The sub-question ‘analyse patient tasks through video’, was removed.

Changes to Question 16:

- The sub-question ‘lack of participation by family members’ was removed.

Changes to Question 17:

- The sub-question ‘training and/or experience before physiotherapy studies’, was reworded to replace ‘physiotherapy’ with ‘chiropractic’.
- The sub-question ‘academic/university studies physiotherapy studies’, was reworded to replace ‘physiotherapy’ with ‘chiropractic’.

3.7 FOCUS GROUP

3.7.1 Procedure

A focus group discussion is helpful in determining the validity and reliability of a questionnaire (Vogt, King and King 2004; Lapinski and Orbe 2007; Cyr 2016; Connell *et al.* 2018; Shiyabola *et al.* 2019). Following the adaptation of a questionnaire, it should have its face validity tested (Alumran, Hou and Hurst 2012) and the feasibility (Leon, Davis and Kraemer 2011) of the questionnaire prior to the commencement of data collection for the main study.

Focus groups provide valuable information to quantitative research questionnaires when implemented as a preliminary phase (Morgan 2019). With regards to questionnaire development, focus groups help to determine the relevance of the questionnaire to the research aims and objectives and the wording of questions to ensure proper understanding and, therefore, appropriate responses (Morgan 2019). This ensures that words and concepts used in the questionnaire are aligned with those of a specific target group (Sagoe 2012) and provide the researcher with accurate and reliable data. Therefore, based on their relevance to the chiropractic students and the DUT CDC, several questions were removed from the original questionnaire (Appendix E) of Forbes *et al.* (2017a), while others were adapted to fit chiropractic (and the teaching clinic aspect).

The adapted questionnaire (Appendix F), as described in the previous section, was subjected to a focus group, of which the purpose was to determine further whether some questions in the existing questionnaire still did not apply to the Durban University of Technology Chiropractic Day Clinic and whether they should be removed, adapted, or remain as is, and whether it is necessary to add additional questions.

Possible participants were asked to participate in the focus group study via personal communication. An email containing a Letter of Information (Appendix G), Informed Consent Form (Appendix H) and Confidentiality Statement (Appendix I) were sent to those who agreed to participate. Once the focus group participants emailed the necessary signed documents back to the researcher, they received a hard copy version of the pre-focus group questionnaire (Appendix F) in a Microsoft Word document via email. They were required to read the hard copy prior to the focus group meeting so that they had enough time to read over the questionnaire and think about suggestions. The meeting, which was recorded, took place over Microsoft Teams due to COVID-19 restrictions to ensure the safety of the participants.

During the meeting, each question was read aloud, after which participants were allowed to provide constructive criticism and feedback. Where feedback was given, a vote was held for each question on whether all the participants agreed with the feedback; if most of the participants agreed, the questionnaire was amended accordingly.

3.7.2 Focus Group Participants Characteristics

In the past, focus groups in the marketing domain required between 10–12 participants (Morgan 2019). However, research related to social sciences required fewer participants, between 6–8, whereas an even smaller group of 4–5 participants may be used (Morgan 2019). Smaller focus groups are typically recommended in social sciences as this may allow for engagement to a higher degree compared to bigger groups (Morgan 2019). Increased engagement is due to more time for each participant to talk (Morgan 2019).

Thus, the focus group for this research study included a sample of seven participants in total, one clinician (clinical supervisor), two recently graduated students, two chiropractic Master's students, the researcher, and the co-supervisor of this study.

3.7.3 Focus Group Changes to the Questionnaire

- A fourth question was added to the demographics section 'Do you have prior qualifications or studied another degree before chiropractic?'. Initially (on the pre-focus group questionnaire), this question was part of Question 11 (skills development).
- Question 4 'What is your average time spent on patient education activities specifically during the initial visit (in minutes)?' and Question 5 'What is your average time spent on patient education activities specifically during the follow-up visit (in minutes)?' on the pre-focus group questionnaire, was moved to after the strategies of delivery section (now Question 8 and Question 9 on the final questionnaire).
- The sub-questions of Question 6 (frequency), Question 7 (perceived importance), Question 8 (strategies of delivery), Question 9 (effectiveness), Question 10 (barriers), and Question 11 (skills development) were all organised alphabetically.

Changes to Question 6 and Question 7 (now Question 5 and Question 6 on the final questionnaire):

- The words 'bracing', 'strapping' and 'crutches' were added to the sub-question 'Advice on use of assistive devices or equipment'.
- The words 'gradually increasing activities', was added to the sub-question 'advice or teaching activity pacing'.

- In the sub-question ‘counselling about stress, emotional or psychosocial problems’ was changed to ‘counselling about psychological problems (e.g., stress, depression, emotional distress)’.
- The sub-question, ‘pathoanatomical explanations (e.g., bone-out-of-place or “your spine is out of alignment”’, was added.
- The sub-question ‘providing verbal or written instruction needed to perform basic exercise program’ on the preliminary questionnaire, was divided into three separate questions ‘providing demonstration needed to perform basic exercise programme’, ‘providing verbal instruction or information needed to perform basic exercise program’, and ‘providing written instruction or information needed to perform basic exercise programme’.

Changes to Question 9 (now Question 10 on the final questionnaire):

- The words ‘e.g., questionnaire’, was added to the sub-question ‘objective measures or standards’.

Changes to Question 10 (now Question 11 on the final questionnaire):

- The sub-question, ‘age of the patient (e.g., paediatric vs elderly)’, was added.
- An example, ‘e.g., Down’s syndrome or inebriation’, was added to the sub-question ‘Cognitive status of the patient’.
- The sub-question ‘knowledge or literacy of the patient’ was changed to ‘health knowledge or literacy of the patient’.
- The sub-question ‘patient assuming a passive role’, was changed to ‘patient assuming a passive role in student patient interaction’.
- The sub-question ‘patient not understanding English language’, was changed to ‘language barrier’.

Changes to Question 11 (now Question 12 on the final questionnaire):

- The sub-question ‘academic/university chiropractic studies’, was changed to ‘chiropractic studies’.
- An example, ‘CPD courses’, was added to the sub-question ‘continuing education courses’.
- The sub-question ‘interaction with colleagues’, was divided into two separate questions ‘interaction with colleagues (e.g., clinicians)’ and ‘interaction with colleagues (e.g., peers)’.
- The sub-question ‘professional in-services’, was changed to ‘institutional opportunities for professional interpersonal skills’.

- The sub-question 'limited patient interaction (e.g., COVID-19 or absence from clinic)' was added.
- The sub-question 'post graduate academic/university studies (leave blank if not applicable)', was changed to 'post school training and/or experience outside of chiropractic studies (leave blank if not applicable)'.

3.8 PILOT STUDY

3.8.1 Procedure

A pilot study is a small-scale study that is performed to test the feasibility and face validity of a research tool before the commencement of the main study (Arain *et al.* 2010). The pilot study included two chiropractic Master's students, as previously determined by the Departmental Research Committee and approved by the Faculty Research Committee and Institutional Research Ethics Committee. The pilot study participants were not included in the main study. If a question was deemed irrelevant to either chiropractic or students or difficult to read, the questionnaire was adapted accordingly.

Both students were sent an email to request their participation in the pilot study. The email also contained a Letter of Information (Appendix J), an Informed Consent Form (Appendix K) and a Confidentiality Statement (Appendix L). Once the researcher received the signed Confidentiality statement and Informed Consent Form from the students, the link to the online questionnaire was emailed to the participants. The participants were able to provide feedback on how the questionnaire may be improved, which is discussed below.

3.8.2 Pilot Study Participants Characteristics

The pilot study included a sample of chiropractic Master's students. Both students met the inclusion criteria of the study. The one participant was male, and the other was female. The male student was a 9th year student. The female student was a 7th year student.

3.8.3 Pilot Study Changes to the Questionnaire

- Due to the nature of the focus group meeting, and respondents having a hard copy of the questionnaire, anonymity was not a requisite. However, anonymity was required for the main study. Consequently, a respondent anonymity assurance was enabled on the online version of the questionnaire to ensure anonymity. In addition, if the participants did not agree (by not ticking the 'I Agree' box at the bottom), the platform did not allow participants to continue to answer the questionnaire. Thus, the respondent anonymity assurance served as the informed consent form. The

previously approved informed consent form was copied into the respondent anonymity assurance introductory paragraph. This was done prior to the pilot study to ensure that it worked smoothly (pilot study participants could provide feedback if this presented a problem).

- In question 12, related to the development of patient education skills, the Likert scale options were changed from 'strongly disagree, disagree, neutral, agree and strongly agree' to 'not important, slightly important, moderately important, important, and very important'.

3.9 ETHICAL CONSIDERATIONS

- Confidentiality: All the potential participants needed to provide Informed Consent which was ensured by enabling the respondent anonymity assurance on the QuestionPro platform. Enabling this function on the platform allowed the researcher to include a box that needed to be ticked which then allowed participants to continue to the questionnaire. Enabling the anonymity assurance on the platform provides a prewritten text of assurance of anonymity and a tick box that served as acknowledgement of the prewritten statement that indicated that anonymity was guaranteed. The platform refused any participant from moving on to the questionnaire if this box was not ticked. Consequently, the prewritten text was erased and replaced with the Informed Consent Form for the main study.
- Autonomy: The Informed Consent Form informed all participants that they are allowed to withdraw from the study at any point. Individuals were not be pressured to participate in this study.
- Non-maleficence: Participants were not be harmed in this study in any way and participants were informed that they are allowed to withdraw from the study at any point in time without having to provide a reason as to why they wish to withdraw.
- Beneficence: This study will benefit Master's degree students as well as the Chiropractic programme, as it sheds light on possible areas of improvement of the patient communication skills of students.
- Justice: All participants were treated equally, and every participant received the same questionnaire.

3.10 DATA ANALYSIS

SPSS version 27 was used for data analysis of this research study. A p -value <0.05 was considered statistically significant. To compare the time spent on patient education at initial consult to time spent on patient education at follow-up consult, a Wilcoxon signed ranks test for paired ordinal data was used (Esterhuizen 2020). Item medians were reported, as well as frequency and percentage of response per item. To assess internal consistency of scales, Cronbach's alpha was used. For perceptions and practices, the scale scores were computed by averaging the 18 items for Question 6 and Question 5 respectively (Esterhuizen 2020). T-tests were used to compare these scores between the demographic variables, where the demographic variable was binary (i.e., gender and having a prior qualification), ANOVA, where the demographic was ordinal (i.e., year of study), and Pearson's correlation analysis, where the demographic variable was quantitative and normally distributed (such as age) (Esterhuizen 2020).

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter describes the statistical analysis and findings of the information collected from chiropractic Master's students through the questionnaire. In addition to the results from this study, this chapter will also include a discussion of the findings (namely, this chapter presents what would traditionally be chapters four and five in one chapter). The findings are presented and discussed per objective of the study. These objectives were:

Objective one: To evaluate the perception of chiropractic students' regarding the strategies that they use to educate their patients.

Objective two: To evaluate chiropractic students' self-reported practice behaviour regarding patient education strategies.

Objective three: To investigate chiropractic students' perceived barriers that they experience regarding the provision of patient education to patients at the DUT CDC (such as language or the attitude of the patient).

Objective four: To investigate chiropractic students' perceived factors that enable them to develop their patient education skills.

Objective five: To determine the association between demographics and the perception and practice of patient education.

4.2 OBJECTIVE ONE

Question 6 was used to answer the first objective 'To evaluate the perception of chiropractic students' regarding the strategies that they use to educate their patients. The individual responses to each item and the median score for each item are illustrated in Tables 4.1 and 4.2; and Figures 4.1 and 4.2. Overall, the items were answered positively, with most of the ratings being 'important' or 'very important'. The median score were 4 or 5. A high level of agreement was found between these 18 items (Cronbach's alpha = 0.882). Only one participant did not provide a rating for the question related to information regarding prognosis.

Table 4.1: Item responses and medians for Question 6

		Not important	Slightly important	Moderately important	Important	Very important	Median item score
Q6 - Advice on social support.	n	0	2	17	18	5	4
	%	0.0%	4.8%	40.5%	42.9%	11.9%	
Q6 - Advice on use of assistive devices or equipment (e.g., bracing, strapping, crutches).	n	0	4	12	17	9	4
	%	0.0%	9.5%	28.6%	40.5%	21.4%	
Q6 - Advice or strategies to perform activities of daily living (ADL's).	n	0	1	4	20	17	4
	%	0.0%	2.4%	9.5%	47.6%	40.5%	
Q6 - Advice or teaching activity pacing (e.g., gradually increasing activities).	n	0	1	2	19	20	4
	%	0.0%	2.4%	4.8%	45.2%	47.6%	
Q6 - Advice or teaching correct posture and movement	n	0	0	2	14	26	5
	%	0.0%	0.0%	4.8%	33.3%	61.9%	
Q6 - Advice or teaching problem-solving strategies	n	1	1	12	18	10	4
	%	2.4%	2.4%	28.6%	42.9%	23.8%	
Q6 - Advice or teaching self-management strategies.	n	0	2	3	17	20	4
	%	0.0%	4.8%	7.1%	40.5%	47.6%	
Q6 - Asking the patient their concerns and discussing these specifically.	n	0	0	5	14	23	5
	%	0.0%	0.0%	11.9%	33.3%	54.8%	
Q6 - Counselling about psychological problems (e.g., stress, depression, emotional distress).	n	0	2	8	18	14	4
	%	0.0%	4.8%	19.0%	42.9%	33.3%	
Q6 - Explaining pain neurophysiology/mind-body description of pain.	n	0	3	9	17	13	4
	%	0.0%	7.1%	21.4%	40.5%	31.0%	
Q6 - Exploring patient ideas and perceptions.	n	0	2	7	19	14	4
	%	0.0%	4.8%	16.7%	45.2%	33.3%	
Q6 - General health promotion.	n	0	0	2	16	24	5
	%	0.0%	0.0%	4.8%	38.1%	57.1%	
Q6 - Pathoanatomical explanations (e.g., bone-out-of-place or 'your spine is out of alignment').	n	3	4	9	18	8	4
	%	7.1%	9.5%	21.4%	42.9%	19.0%	
Q6 - Providing information about the patient's condition or diagnosis	n	0	0	1	12	29	5
	%	0.0%	0.0%	2.4%	28.6%	69.0%	
Q6 - Providing information about the patient's prognosis.	n	0	0	3	17	21	5
	%	0.0%	0.0%	7.3%	41.5%	51.2%	
Q6 - Providing demonstration needed to perform a basic exercise programme.	n	0	1	2	18	21	5
	%	0.0%	2.4%	4.8%	42.9%	50.0%	
Q6 - Providing verbal instruction or information needed to perform a basic exercise programme.	n	0	1	4	17	20	4
	%	0.0%	2.4%	9.5%	40.5%	47.6%	
Q6 - Providing written instruction or information needed to perform a basic exercise programme.	n	1	6	12	14	9	4
	%	2.4%	14.3%	28.6%	33.3%	21.4%	

Table 4.2 Composite score of perception, practice and strategies to deliver patient education

Rank	Question 6 Perception		Question 5 Practice		Question 7 Strategies
	Highest	Lowest	Highest	Lowest	Highest to lowest
1	Diagnosis (n= 41)	Social support (n= 23)	Diagnosis (n= 40)	Social support (n= 11)	One-on-one discussion (n= 40)
2	Correct posture or movement (n= 40)	Written instruction needed for exercise (n= 23)	Prognosis (n= 38)	Assistive devices (n= 15)	Physical demonstration (n= 37)
3	General health promotion (n= 40)	Assistive devices (n= 26)	Demonstration needed for exercise (n= 38)	Written instruction needed for exercise (n= 16)	Anatomy models (n= 23)
4	Activity pacing (n= 39)	Pathoanatomical explanations (n= 26)	Verbal instruction needed for exercise (n= 38)	Problem-solving (n= 17)	Websites (n= 12)
5	Demonstration needed for exercise(n= 39)	Problem-solving (n= 28)	Activity pacing (n= 35)	Exploring patient ideas and perceptions (n= 21)	Photography or video (n= 8)
					Personalised handouts (n= 4)
					Biofeedback equipment (n= 1)
					Generic handouts (n= 0)

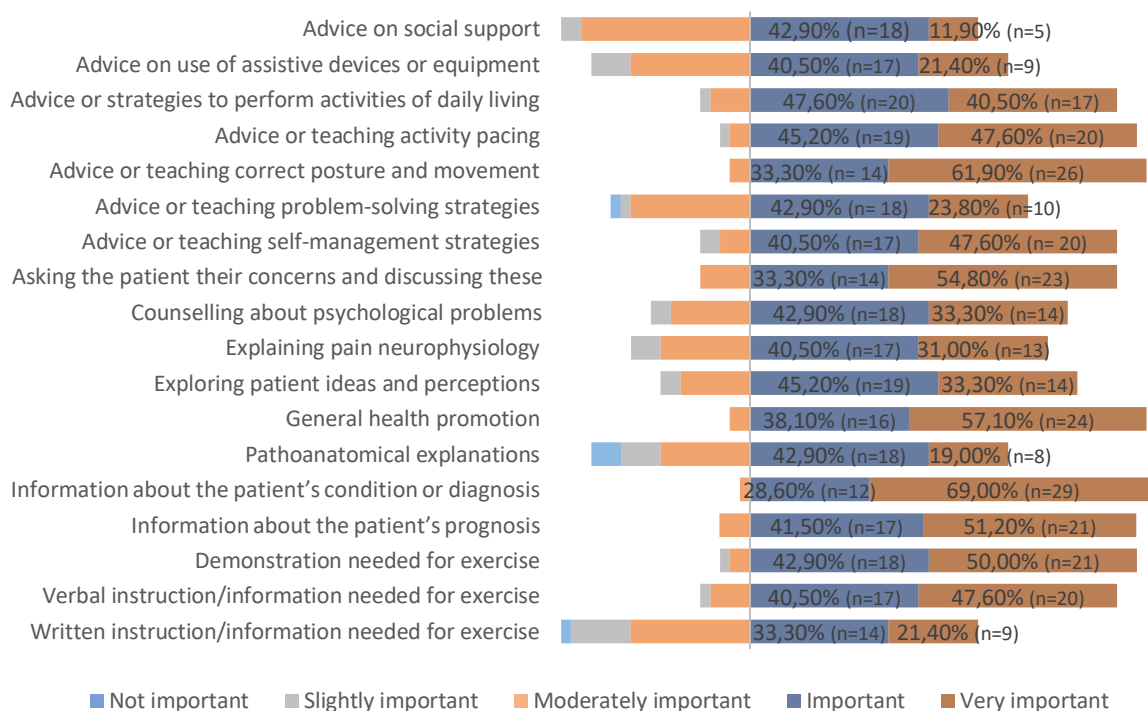


Figure 4.1: Perceived importance of patient education content according to students

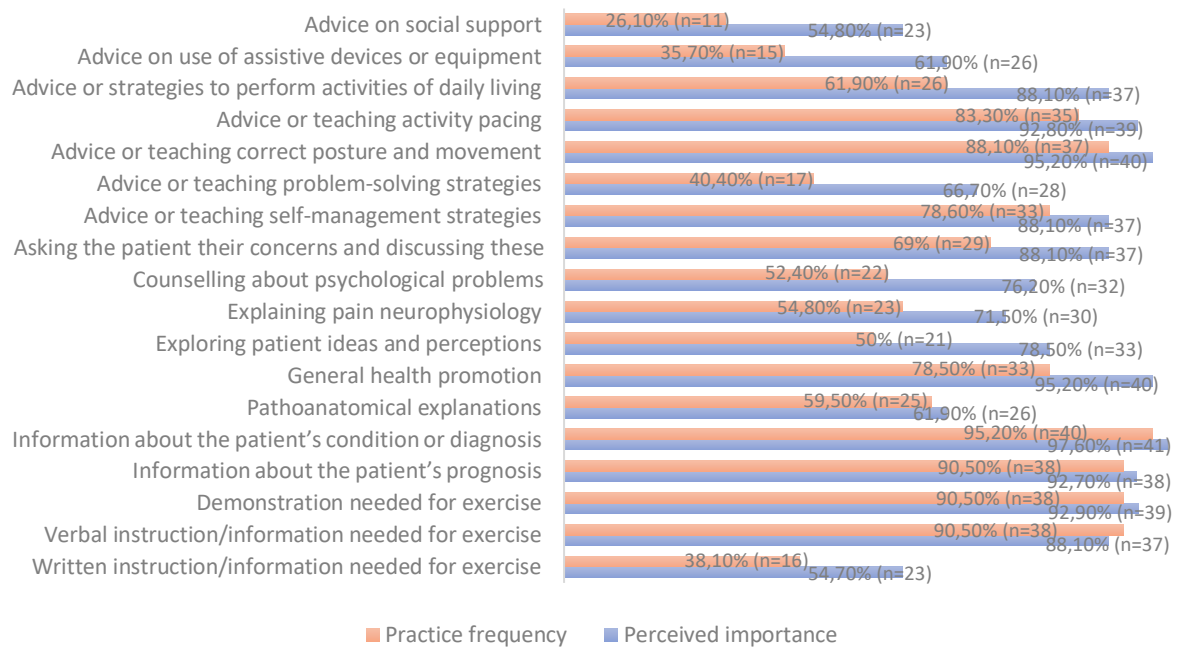


Figure 4.2: Comparison of perceived importance (important and very important) and practice frequency (very often and always)

4.2.1 Discussion

The five items perceived as most important included providing patients with information regarding their condition or diagnosis; advice or teaching patients correct posture and movement; general health promotion; advice or teaching activity pacing, and demonstration needed to perform a basic exercise programme. Over 90% of participants perceived these items as essential to patient education, with:

- 97.6% of participants rating information regarding the patients' condition or diagnosis as 'important' or 'very important'.
- 95.2% of participants rating advice or teaching correct posture and movement as 'important' or 'very important'.
- 95.2% of participants rating general health promotion as 'important' or 'very important'.
- 92.8% of participants rating advice or teaching activity pacing as 'important' or 'very important'.
- 92.9% of participants rating demonstration needed to perform a basic exercise programme as 'important' or 'very important'.

Advice on social support and written instruction or information needed to perform a basic exercise programme were equal in terms of perceived importance, with:

- 54.8% of participants rated advice on social support as 'important' or 'very important'.
- 54.8% of participants rated written instruction or information needed to perform a basic exercise programme as 'important' or 'very important'.

The five items perceived as least important in Question 6 included advice on social support; written instruction or information needed to perform a basic exercise programme; advice on use assistive devices or equipment; pathoanatomical explanations, and advice or teaching problem-solving strategies. Advice on the use of assistive devices or equipment and pathoanatomical explanations were also equal in terms of perceived importance, with 61.9% of participants rating these as important. This contrasts with 66.7% of participants rating advice or teaching problem-solving strategies as 'important' or 'very important'.

For most of the items in this questionnaire, in terms of the existing literature, particularly, those related to patient education activities, little is known about chiropractic students' perception of patient education or their practice behaviour in this regard. Thus, the chiropractic studies available for comparison are very limited, especially in a South African context. Apart from a previous study at DUT (Jamison 1996), existing research on chiropractic students did not focus on musculoskeletal conditions exclusively and mostly explored health promotion (Hawk *et al.* 2004; Evans, Ndetan and Williams 2009; Ndetan *et al.* 2010; Evans *et al.* 2011; Grand, Morehouse-Grand and Carter 2016), which only correlates with two of the questions of this current study. Studies conducted in the field of physiotherapy (Holmes 1999; Forbes *et al.* 2017a; Forbes *et al.* 2017b) could also be used for comparison and discussion.

The results from the current study are comparable to a previous study conducted at DUT (known then as the Technikon Natal) (Jamison 1996). There is good congruence among the chiropractic students regarding providing patients with information regarding their condition or diagnosis and advice on social support. As Table 4.2 illustrates, the results indicate a general agreement, as providing information about the patient's condition or diagnosis was perceived as the most important activity, and it was also practised the most. In addition, the data from the question related to strategies of delivery indicates that these are through one-on-one discussion, physical demonstration and anatomy models. Likewise, advice on social support was perceived as the least important activity, and it was also practised the least.

Advice or teaching correct posture and movement and general health promotion are ranked second and third in the top five activities perceived as most important, respectively. However, they do not fall into the top five practised activities category. These items may be perceived to be so important because this perception may be driven by the fact that the chiropractic students are driven by a principally musculoskeletal background and that patients are likely to see them for a musculoskeletal condition. For instance, related to correct posture and movement, there is an emphasis on corrective measures for various causes of musculoskeletal pain during the 4th and 5th year of study of the students' academic coursework, which includes posture and specific movements (Durban University of Technology 2020), such as the Brugger relief position for those working behind a desk. At the same time, general health promotion may become important for the students from early on, where subjects like Diagnostics 3 and 4 heavily emphasise the impact of lifestyle issues, as well as how these may extend to musculoskeletal health, such as diabetes, for instance (Durban University of Technology 2020).

The three remaining activities of the top five perceived to be most important, general health promotion, activity pacing, and demonstration needed to perform a basic exercise programme, indicate that students value the lifestyle and behaviour of patients, which reflects the students' recognition that patients have an active role to play in their own care. In addition to an emphasis on disease profiles within the context of a third world country, the chiropractic curriculum is underpinned by the concepts of evidence-based practice, biopsychosocial model, wellness, holism and prevention (Durban University of Technology 2020). This provides a paradigm context of patient management that supports health promotion and rehabilitation.

Regarding the item of general health promotion, the perceived value placed on the lifestyle of patients may, in part, be due to diseases of lifestyle covered in the curriculum and how these may impact musculoskeletal health. If this is weighed against the top five practised activities, it is reflective of a greater need for focusing on patient education strategies related to the chief complaint of patients. If advice on diagnosis, prognosis, demonstration and verbal instruction for exercise and activity pacing were the actual practical focus, as opposed to the lifestyle concerns that were perceived to be important.

In essence, the data indicate that the students' perceptions of lifestyle (general health promotion) do not correspond with their actions. Although one-on-one discussions are the most commonly used strategy, the chiropractic students' practical focus during consultations is on the condition and its prognosis and management (exercise instruction and activity pacing), rather than the lifestyle issues they recognise as important. Therefore, even though the students perceive lifestyle as important, they do not actually address it

during consultations to the same extent and do not reinforce it through their strategies. The high use of physical demonstration reaffirms this assertion.

Language could be a possible explanation for this incongruence. Instructing a patient on how to perform an exercise could be achieved relatively well through verbal instruction by using basic terms and demonstration. For example, one could explain the exercise in an understandable manner, demonstrating the exercise after explaining and then letting the patient do it themselves and then cue them with yes or no. In contrast, it may not be as easy to elicit a deep understanding of a patient's concerns or to explore and discuss the patient's general health promotion in-depth. This will be revisited under objective two, in order to affirm whether this is indeed the case.

The remaining two items in the top five items, regarding advice or teaching activity pacing and demonstration needed to perform a basic exercise programme, are related to the management of patients. These two items are indicative of a view that is in line with an active approach to patient care (Antcliff *et al.* 2018; Hawk *et al.* 2020; Lin *et al.* 2020b), which is in line with current practice guidelines (Globe *et al.* 2016; Whalen *et al.* 2019; Hawk *et al.* 2020; Lin *et al.* 2020b) and, therefore, indicates a partnership perspective that enables patients actively participate in their care (Hawk 2017).

As outlined earlier in this section, as well as the discussion under Chapter Two, students are taught a biopsychosocial and patient-centred approach to care to develop comprehensive treatment plans that include adjunctive treatment (such as graded exercise) and undergo examinations that assess their treatment plans accordingly (Durban University of Technology 2020). Consequently, it is not surprising that students value activity pacing and exercise. The results from Table 4.1 clearly indicate that chiropractic students value exercise, yet activity pacing appears to be more important. As it was beyond the scope of this study to assess the students' understanding of the concept of 'activity pacing', it is unknown whether the students in this study were aware of the multifaceted nature of activity pacing (i.e., overactivity-underactivity cycling, planning and organising activities etc.). However, the example of 'gradually increasing activities' was used as an example in the questionnaire; therefore, the discussion will follow that example that was provided.

It may be that the students are aware that not all patients are capable of performing exercises right away (maybe due to level of pain and function, fear avoidance or the extent of an injury), which may impact on their perception of graded activity, thereby making it more important. Simply put, it is important to the students, but not all patients can perform exercise. Activity pacing could then be seen as a means to get patients to a point where they are able to do so. Additionally, for those who are able to perform exercise, activity

spacing could be implemented to progress towards the goal of optimal function within their contexts (considering age and abilities).

In terms of educational activities related to exercise instruction, the results from this study are somewhat different compared to the research in physiotherapy (Forbes *et al.* 2017a; Forbes *et al.* 2017b). The question used in the questionnaire from the abovementioned studies addressed verbal and written instruction simultaneously, whereas the question from the current study at DUT was split separately into three questions that addressed verbal instruction, written instruction and demonstration needed for a basic exercise. Although almost 90% of students perceived verbal instruction to be important, only one of these three activities, demonstration needed to perform a basic exercise programme, was included in the top five items perceived as important. In contrast, written instruction falls into the category of the five items perceived to be least important.

The perception of demonstration being more important compared to verbal and written instruction may stem from the structure of the chiropractic curriculum at DUT, which includes a large practical component (Durban University of Technology 2020), which requires a lot of demonstration in itself. Thus, if the students placed a high value on demonstration during their own learning experience, it may have an influence on their perception regarding patient instruction.

The perceived importance of 'written instruction or information needed to perform a basic exercise programme' was slightly higher than the practice of this activity. However, both are in the bottom five categories. This indicates that although there is a difference, students were still in agreement. This indicates that although there is a difference, students were still in agreement, which could possibly explain why 'personalised handouts' being used as a strategy to deliver patient education was ranked so low.

Chiropractic students at DUT perceived advice on social support as the least important activity. Unfortunately, there is no literature available on perceptions of advice on social support among chiropractic students or practising chiropractors. Although the studies conducted by Forbes *et al.* (2017a, 2017b) pertain to physiotherapy, they could provide some insight regarding advice on social support. Forbes *et al.* (2017b) investigated and compared the perceptions regarding patient education of novice and experienced physiotherapists. Novice physiotherapists share the same perception as chiropractic students in that they also perceived advice on social support as the least important activity. In contrast, experienced physiotherapists did not perceive it to be the least important activity, in fact, it was not even included in their 5 least important activities (Forbes *et al.*

2017b). This finding would suggest that experience is a factor that may influence this perception.

Conversely, a different study that assessed experienced physiotherapists exclusively revealed that advice on social support was the least important activity to them as well (Forbes *et al.* 2017a). Despite being from different studies, novice (Forbes *et al.* 2017b) and experienced physiotherapists (Forbes *et al.* 2017a) appear to be in agreement. Thus, it could be interpreted that this perception is not influenced by experience. Interestingly, although the order of the top five activities perceived as most important differs, it includes the same 5 activities across both studies. However, there is a difference of opinion regarding the activities perceived as least important, though they agree on three of the top five activities perceived as least important. Among these differences is advice on social support. Although this is the case, the authors from the first study did not explain why experienced physiotherapists perceived it as unimportant (Forbes *et al.* 2017a), nor did the second study (Forbes *et al.* 2017b) address why the experienced physiotherapists in that study think differently.

While it cannot be ignored that clinical experience may impact this perception, the incongruity among experts indicates that clinical experience may not fully explain how this perception is influenced. The next logical question is, what influences the perception of advice on social support being rated as the least important activity in three different studies and two different professions? It may be that the chiropractic students are not aware of the concept of social support or the role that it may have in patient management. Ailliet *et al.* (2016) state that there is a paucity in the literature regarding the impact of 'social' on outcomes within the framework of the biopsychosocial model. With reference to a chiropractic setting specifically, Ailliet *et al.* (2016) cite the study by Hurwitz *et al.* (2006) as the only study that finds some evidence that associates specific coping strategies and types of social support with outcomes of pain and disability, mainly in subacute and chronic neck pain patients. If literature regarding the impact of the social aspect of the biopsychosocial model is lacking, more specifically, even more so within a chiropractic context, then a lack of awareness from the context of students could certainly explain the perception of it being unimportant among the students.

As demonstration and verbal instruction of exercise are clearly valued by students, it is therefore interesting that written instruction for exercise is rated so low in this study. There might be several factors responsible for the low rating. First, a language barrier or the literacy of patients should be considered. If students think that their patients would not be able to read what has been written down for them (literacy) or understand the language in which instructions were written (in this case, English), consequently the students may think

their efforts in writing down such information for these patients may be futile. However, if a language barrier or literacy of patients influences this perception, conversely, one can argue that this is exactly when written instruction becomes essential so that patients have a visual to which they can refer during their own time after the consultation.

Second, it is possible that the students may think that verbal instruction and demonstration are sufficient. If this is the case, students must be made aware of the value of written information. For instance, as stated, patients will be able to refer back to what has been discussed during the consultation, or patients seeing the instructions lying around in itself may serve as a reminder to do the exercises. Third, students may prefer social media or websites through written instruction. Consequently, the students may refer patients to websites or other sources of exercise, such as Instagram, which patients can access at home.

The low perceived importance of written instruction explains the low utilisation of generic handouts/pamphlets and personalised handouts. However, generic and personalised handouts do not pertain to exercise instruction exclusively. When viewed collectively, it indicates a dislike of written material in general. Perhaps it could be that the lack of generic handouts (such as exercises or health promotion) in the clinic that could explain this. If students do not even have generic pamphlets to hand out to patients, there has never been an opportunity for them to witness the beneficial effects. This, in turn, may also affect their motivation for constructing personal handouts of their own, such that of exercise instruction, and may be the driver for social media or website instruction.

In view of the top five most important activities, it is evident that chiropractic students prefer an active approach; hence, they may consider assistive devices or equipment as a last resort or that these are only needed for severe injuries. Perhaps there may be a correlation between this perception and the students' case mix if, for example, the students see more patients with acute conditions that are not as incapacitating as chronic and degenerative conditions. However, from a South African perspective, the study by Johl, Yelverton and Peterson (2017) reports that the most common aetiology of patients' complaints is overuse/repetitive stress related, followed by activities of daily living, sports/exercise/recreation and work-related activities.

These patients may possibly benefit from assistive devices, although activity modification or therapeutic exercises could be considered superior to these devices. Although the article did not describe the content of advice provided to the patients of chiropractors specifically, activity modification may very well be an essential point to consider, as advice on activities of daily living was reported to be used frequently by practising chiropractors. Alternatively,

it may be that the students prefer to use strapping/taping instead of advising patients on assistive devices. Unfortunately, the South African study provides little clarity on this topic, as there is little mention of advising patients on or prescribing assistive devices since it only assessed how often taping or strapping is utilised (Johl, Yelverton and Peterson 2017).

A contrary explanation is that the availability of these devices and, possibly, more importantly, the cost thereof may also influence this perception. As the DUT CDC provides a service to the community and accommodates those of socioeconomic classes with fee reductions for those who cannot pay the full amount, if the students think that their patients cannot afford these devices, they may be less inclined to advise patients accordingly.

In terms of patho-anatomical explanations provided to patients, of which the examples of the questionnaire included bone-out-of-place and spinal misalignment, the current study did not aim to assess the philosophical beliefs of the chiropractic students at DUT. However, the notion of the bone-out-of-place model or spinal misalignment as an explanation for the presenting complaints of patients (and or treatment) is indicative of a belief that is aligned with the 'traditional' subgroup of chiropractic as clearly described in the literature review. Furthermore, spinal misalignment, bone-out-of-place and subluxation are outdated concepts that have seemingly no relevance today other than historical purposes (Murphy *et al.* 2008; Innes, Leboeuf-Yde and Walker 2016a; Funk *et al.* 2018; Leboeuf-Yde *et al.* 2019; Innes, Leboeuf-Yde and Walker 2020; Wiles 2020).

Additionally, these concepts serve no interdisciplinary function (Funk *et al.* 2018); as a matter of fact, it is confusing to other healthcare professionals. Hence, chiropractors should use the term 'subluxation' correctly, which refers to a true partial dislocation (Wiles 2020). Likewise, the term 'adjustments' was initially used to explain chiropractic treatment, which refers to the repositioning of bone structures, and should be replaced with alternative terminology, such as manipulative therapy (Wiles 2020). Nonetheless, chiropractic students at DUT are well aware of the different concepts of 'subluxation', as a clear distinction is made between the chiropractic and medical concepts during their education (Durban University of Technology 2020). In the same vein, the DUT chiropractic programme is aligned with an evidence-based approach to education and practice.

Given what has been discussed above, it is thus surprising that 61.9% of the chiropractic students rated pathoanatomical explanations (bone-out-of-place and spinal misalignment) as 'important' or 'very important'. Thus, in the evidence-based context, DUT students should explain to patients what is wrong with them instead of using the bone-out-of-place analogy. Despite 'pathoanatomical explanations (e.g., bone-out-of-place or "your spine is out of alignment")' being perceived as the fourth least important activity, it is still higher than what

has been described in other chiropractic literature. The study by Gliedt *et al.* (2012) assessed chiropractic students' perception regarding such explanations at another chiropractic college. In their study, the questionnaire asked students whether "bone-out-of-place/vertebral misalignment is a satisfactory explanation as to why a chiropractic physician performs spinal manipulation". The study found that 3.5% of students strongly agreed, and 18.2% of students agreed with this statement (Gliedt *et al.* 2012). Although a strong emphasis is placed on scientific evidence at the DUT chiropractic, the number of students from DUT who believe it to be an important explanation is three times higher than what was described by Gliedt *et al.* (2012).

The fifth least important content topic of patient education in this study at DUT was advice or teaching problem-solving strategies. In previous literature, experienced physiotherapists concur with respect to the importance of teaching problem-solving strategies, as the rating of 'important' and 'very important' is slightly more than 70% in both studies, while the novice group's ratings were slightly more than 50% (Forbes *et al.* 2017a; Forbes *et al.* 2017b). The chiropractic students' rating at DUT rating was over 65%. Thus, their view is more aligned with that of the experienced physiotherapist groups. Although this is the case, it is still in the bottom five category, as is the experienced physiotherapist group in one of the previously mentioned studies (Forbes *et al.* 2017a).

Given that problem-solving strategies are integral to self-management (Lorig and Holman 2003; Hutting *et al.* 2019), and that the skill can be transferred to future problems that may accompany musculoskeletal pain, it is surprising that students do not consider it to be more important, especially since they value lifestyle and behavioural aspects of care and an active approach to management, as previously . Before considering why students think it is not that important, patient participation during consultations should also be considered. If patients are reluctant to engage in such activities, it is possible that students may be unwilling to consider this approach in the future. This may very well be the case, as almost 70% of students reported that patients assume a passive role during the clinical interaction as a barrier to effective patient education.

Certainly, patients assuming a passive role does not solely apply to teaching problem-solving strategies, but it may be a factor to consider as they still think that general health promotion, activity pacing and exercise instruction are important. Clearly, chiropractic students recognise the benefit of self-management, as almost 90% rated it as 'important' and 'very important' and, therefore, the contrary argument is that the concept of 'problem-solving strategies' possibly did not receive the same attention as other self-management strategies during their academic training.

Another argument can be made that a language barrier could affect this perception, whereby if students failed to educate patients that speak a different language in the past, they might not have had success in this approach which may affect the perception of its importance.

4.3 OBJECTIVE TWO

4.3.1 Frequency of Chiropractic Students Undertaking Patient Education Activities

Question 5 was used to answer the second objective: To evaluate chiropractic students' self-reported practice behaviour regarding patient education strategies. Additionally, Question 7 is used to describe how patient education is delivered, Question 8 and Question 9 used to describe the time spent on patient education activities, and Question 10 is used to describe how students measure whether patient education is delivered successfully.

The individual responses to each item are illustrated below (tables 4.3, 4.4, 4.5 and 4.6), as well as the median score for each item. Free response items are also included. Overall, the items were answered positively, with most of the ratings being 'sometimes', or 'very often', or 'always'. The median score was all between 3 and 5. A high level of agreement was found between these 18 items (Cronbach's alpha = 0.827).

Table 4.3: Frequency of patient education activities

		Never	Rarely	Sometimes	Very often	Always	Median
Q5 - Advice on social support	Count (n)	1	13	17	8	3	3
	Row N %	2.4%	31.0%	40.5%	19.0%	7.1%	
Q5 - Advice on use of assistive devices or equipment (e.g., bracing, strapping, crutches)	Count (n)	1	10	16	14	1	3
	Row N %	2.4%	23.8%	38.1%	33.3%	2.4%	
Q5 - Advice or strategies to perform activities of daily living (ADL's)	Count (n)	1	1	14	16	10	4
	Row N %	2.4%	2.4%	33.3%	38.1%	23.8%	
Q5 - Advice or teaching activity pacing (e.g., gradually increasing activities)	Count (n)	0	1	6	25	10	4
	Row N %	0.0%	2.4%	14.3%	59.5%	23.8%	
Q5 - Advice or teaching correct posture and movement	Count (n)	0	0	5	20	17	4
	Row N %	0.0%	0.0%	11.9%	47.6%	40.5%	
Q5 - Advice or teaching problem-solving strategies	Count (n)	1	5	19	14	3	3
	Row N %	2.4%	11.9%	45.2%	33.3%	7.1%	
Q5 - Advice or teaching self-management strategies	Count (n)	0	3	6	21	12	4
	Row N %	0.0%	7.1%	14.3%	50.0%	28.6%	
Q5 - Asking the patient their concerns and discussing these specifically	Count (n)	0	2	11	14	15	4
	Row N %	0.0%	4.8%	26.2%	33.3%	35.7%	
Q5 - Counselling about psychological problems (e.g., stress, depression, emotional distress)	Count (n)	0	8	12	15	7	4
	Row N %	0.0%	19.0%	28.6%	35.7%	16.7%	
Q5 - Explaining pain neurophysiology / mind-body description of pain	Count (n)	1	5	13	16	7	4
	Row N %	2.4%	11.9%	31.0%	38.1%	16.7%	
Q5 - Exploring patient ideas and perceptions	Count (n)	0	7	14	17	4	4
	Row N %	0.0%	16.7%	33.3%	40.5%	9.5%	
Q5 - General health promotion	Count (n)	0	1	8	19	14	4
	Row N %	0.0%	2.4%	19.0%	45.2%	33.3%	
Q5 - Pathoanatomical explanations (e.g., bone-out-of-place or "your spine is out of alignment")	Count (n)	2	5	10	15	10	4
	Row N %	4.8%	11.9%	23.8%	35.7%	23.8%	
Q5 - Providing information about the patient's condition or diagnosis	Count (n)	0	2	0	15	25	5
	Row N %	0.0%	4.8%	0.0%	35.7%	59.5%	
Q5 - Providing information about the patient's prognosis	Count (n)	0	0	4	16	22	5
	Row N %	0.0%	0.0%	9.5%	38.1%	52.4%	
Q5 - Providing demonstration needed to perform a basic exercise program	Count (n)	0	0	4	18	20	4
	Row N %	0.0%	0.0%	9.5%	42.9%	47.6%	
Q5 - Providing verbal instruction or information needed to perform a basic exercise program	Count (n)	0	2	2	15	23	5
	Row N %	0.0%	4.8%	4.8%	35.7%	54.8%	

Q5 - Providing written instruction or information needed to perform a basic exercise program	Count (n)	3	7	16	11	5	3
	Row N %	7.1%	16.7%	38.1%	26.2%	11.9%	

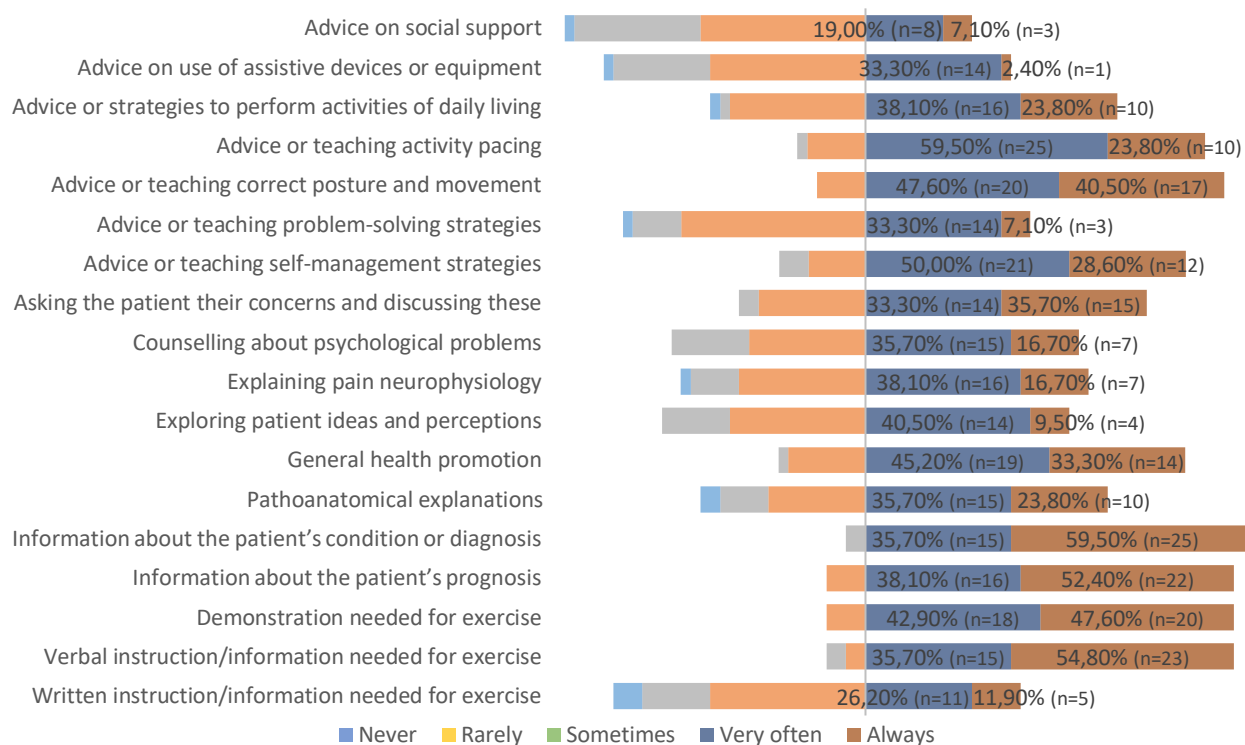


Figure 4.3: Self-reported frequency of practice of patient education according to students

The responses to Question 5 included:

- 'Motivation to do said management'.
- 'Utilisation of the aspects are based on patient need. I often educate the patient on the way therapeutic interventions work, and the aim and goals we have when using these interventions'.

Figure 4.3 illustrates the ratings for all the items on the questionnaire. According to the results, in terms of their ratings of 'very often' and 'always', the top five patient education activities that students undertake during consultations include providing information about the patient's condition or diagnosis; providing information about the patient's prognosis and providing demonstration needed to perform a basic exercise programme, verbal instruction needed for exercise and activity pacing:

- 95.2% of participants reported providing information about the patient's condition or diagnosis as 'very often' or 'always'.
- 90.5% of participants reported providing information about the patient's prognosis as 'very often' or 'always'.

- 90.5% of participants reported providing demonstration needed to perform a basic exercise programme as 'very often' or 'always'.
- Similar to the item of providing demonstration needed to perform a basic exercise programme, 90.5% of participants also reported providing verbal instruction or information needed to perform a basic exercise programme 'very often' and 'always'.
- 83.3% of students reported to educate patients on activity pacing 'very often' and 'always'.

As illustrated in Table 4.3 and Figure 4.3, the five patient education activities that students undertake the least, in terms of 'always' or 'very often', include advice on social support (26.1%); advice on the use of assistive devices or equipment (35.7%); providing written instruction or information needed to perform a basic exercise programme (38.1%); advice or teaching problem-solving strategies (40.4%); and exploring patient ideas and perceptions (50.0%).

A total of 26.1% of the participants reported providing advice on social support 'very often' or 'always'; 35.7% of participants reported providing advice on the use of assistive devices or equipment 'very often' or 'always'; 38.1% of participants reported providing written instruction or information needed to perform a basic exercise programme 'very often' or 'always'; and 40.4% of participants reported providing advice or teaching problem-solving strategies 'very often' or 'always'. Finally, 50.0% of participants reported exploring patient ideas and perceptions 'very often' or 'always'.

4.3.2 Strategies of Delivery

Question 7 was used to assess the strategies used by chiropractic students to educate their patients. The results for Question 7 are illustrated in Table 4.4. The responses to this scale varied widely. The most commonly used strategy was one-on-one discussion and physical demonstration. Strategies not commonly used included biofeedback equipment and handouts. Due to the wide variations, the Cronbach's alpha was thus lower for this scale, at 0.627.

Table 4.4: Self-reported frequency of using strategies of delivery

		Never	Rarely	Sometimes	Very often	Always	Median
Q7 - Anatomy models	Count (n)	0	2	17	19	4	4
	Row N %	0.0%	4.8%	40.5%	45.2%	9.5%	
Q7 - Handouts / pamphlets	Count (n)	19	16	7	0	0	2
	Row N %	45.2%	38.1%	16.7%	0.0%	0.0%	
Q7 - Links to online websites	Count (n)	8	5	17	11	1	3
	Row N %	19.0%	11.9%	40.5%	26.2%	2.4%	
Q7 - One-on-one discussion	Count (n)	0	0	2	14	26	5
	Row N %	0.0%	0.0%	4.8%	33.3%	61.9%	
Q7 - Personalised handouts	Count (n)	16	9	13	3	1	2
	Row N %	38.1%	21.4%	31.0%	7.1%	2.4%	
Q7 - Photography or video	Count (n)	4	13	17	6	2	3
	Row N %	9.5%	31.0%	40.5%	14.3%	4.8%	
Q7 - Physical demonstration of exercise, movement, posture or activity	Count (n)	0	1	4	13	24	5
	Row N %	0.0%	2.4%	9.5%	31.0%	57.1%	
Q7 - Use of biofeedback equipment	Count (n)	24	12	5	1	0	1
	Row N %	57.1%	28.6%	11.9%	2.4%	0.0%	

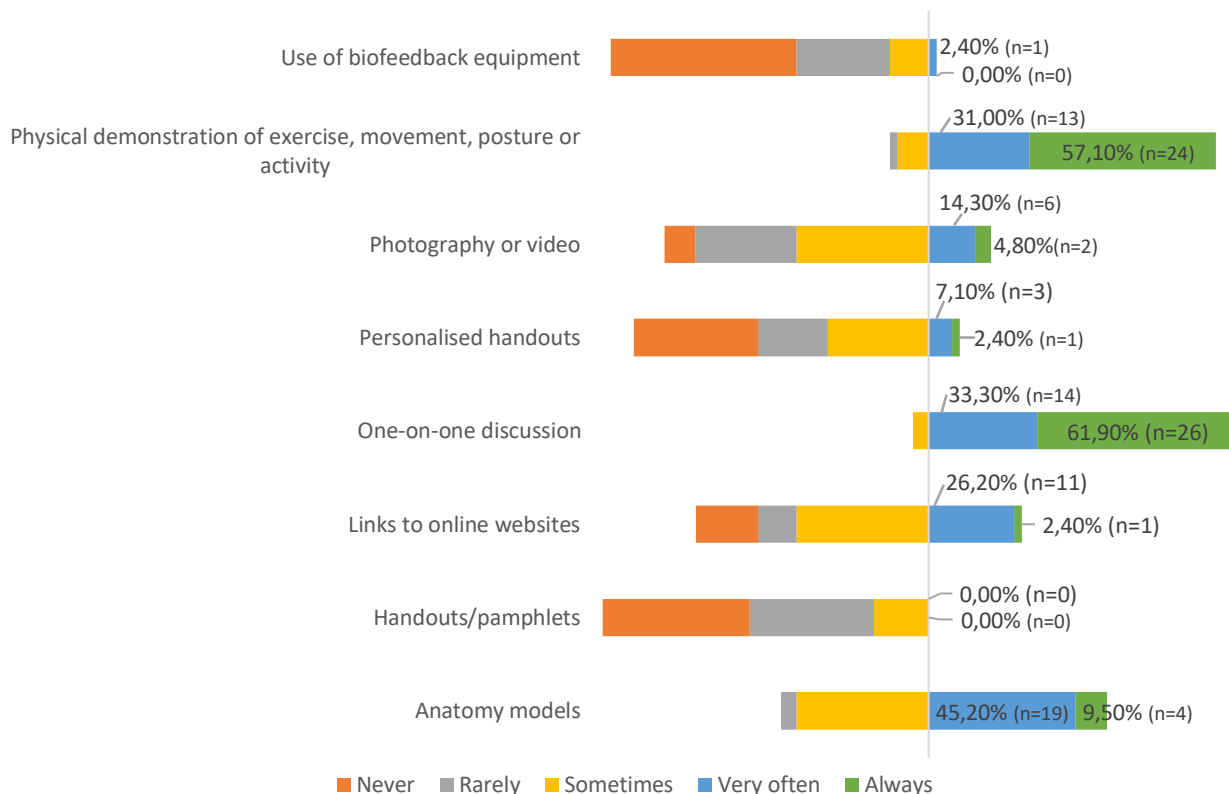


Figure 4.4: Self-reported frequency of using strategies of delivery

The open ended responses to Question 7 included:

- ‘Drawing the concepts I want to convey on paper during the consult’.
- ‘Dissemination of hyperlinks/URLs for patients to view linked exercises’.
- ‘Instagram videos of exercises, stretches and rehab protocol’.

According to the results as illustrated in Table 4.4, the strategies that students use to educate their patients include one-on-one discussion, physical demonstration of exercise, movement, posture or activity and anatomy models:

- 95.2% of participants reported using one-on-one discussion ‘very often’ or ‘always’.
- 88.1% of participants reported using a physical demonstration of exercise, movement, posture or activity ‘very often’ or ‘always’.
- 54.7% of participants reported using anatomy models ‘very often’ or ‘always’.

As illustrated in Table 4.4, the strategies that students use to educate their patients the least include use of handouts/pamphlets (0.0%), biofeedback equipment (2.4%) and personalised handouts (9.5%).

As illustrated in Table 4.4, the strategies that students use to educate their patients the least include use of handouts/pamphlets, biofeedback equipment and personalised handouts. None of the participants reported using handouts/pamphlets ‘very often’ or ‘always’; 2.4% of participants reported using biofeedback equipment ‘very often’, and 0.0% reported using it ‘always’; and 9.5% of participants reported using personalised handouts ‘very often’ or ‘always’.

4.3.3 Time Spent on Patient Education by Chiropractic Students

Question 8 and Question 9 were used to assess time spent on patient education activities. Question 8 assessed time spent during the initial visit, while Question 9 assessed time spent during the follow-up visit. The results are presented below.

Table 4.5: Time spent on patient education during initial and follow-up visits

		Count (n)	Column N %
Q8 - What is your average time spent on patient education activities throughout the consultation, specifically during the initial visit	Less than 1	0	0.0%
	1-5	6	14.3%
	6-10	12	28.6%
	11-15	12	28.6%
	16-20	7	16.7%
	21-25	1	2.4%
	>25	4	9.5%
	Total	42	100.0%
Q9 - What is your average time spent on patient education activities throughout the consultation, specifically during the follow-up visit	1-5	11	26.2%
	6-10	23	54.8%
	11-15	5	11.9%
	16-20	2	4.8%
	21-25	0	0.0%

	>25	1	2.4%
	Total	42	100.0%

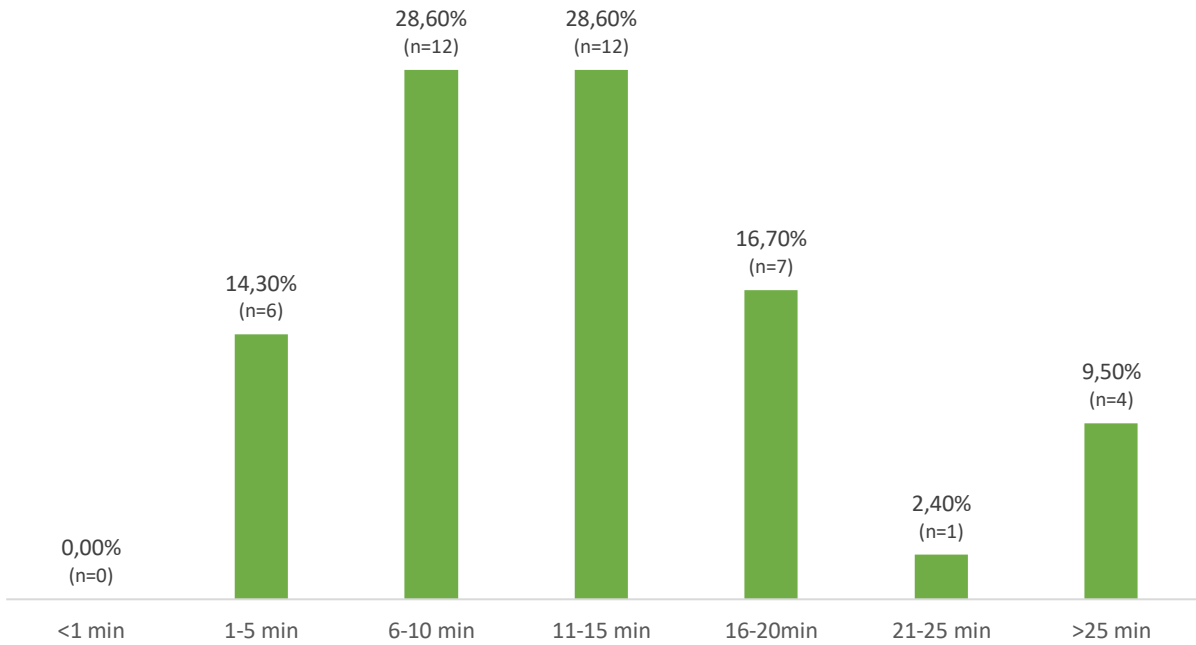


Figure 4.5: Time spent on patient education during the initial visit

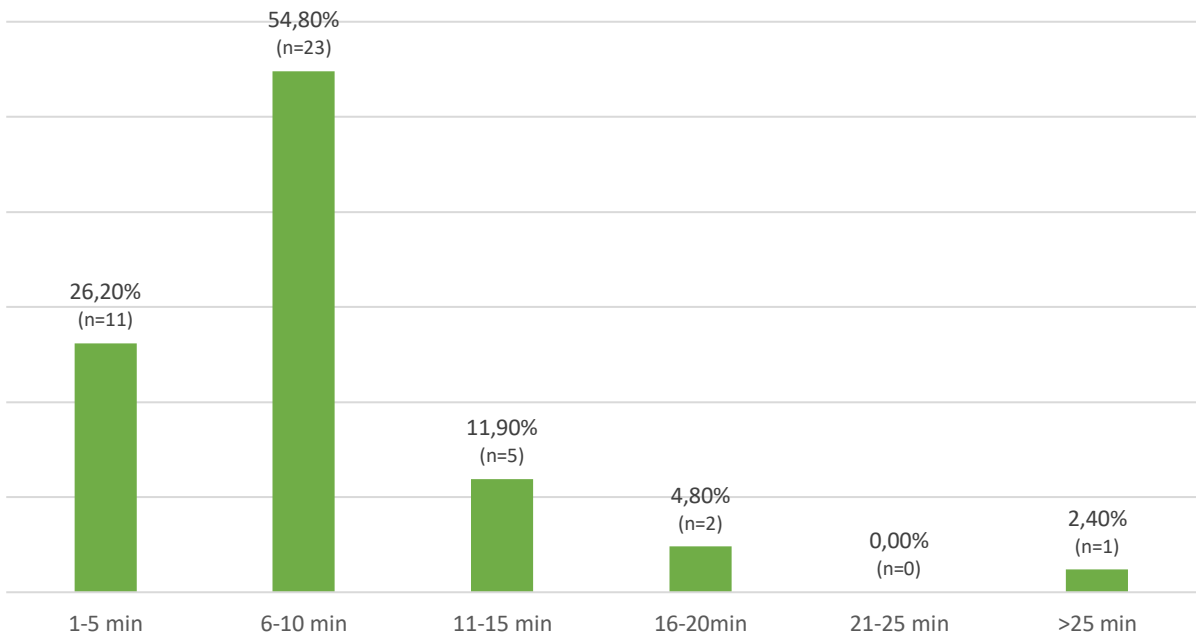


Figure 4.6: Time spent on patient education during follow-up visits

During the initial visit, the average amount of time spent on patient education was mostly between 6–10 minutes ($n=12$) and 11-15 minutes ($n=12$), as illustrated in Table 4.5 and Figure 4.5. During the follow-up visit, the majority of the participants reported spending between 6–10 minutes ($n=23$) on patient education, as illustrated in Table 4.5 and Figure

4.6. There was a significant reduction in the amount of time spent on patient education from initial visit to follow-up visit ($p < 0.001$ – Wilcoxon signed ranks test).

4.3.4 Students' Evaluation of the Effectiveness of Their Patient Education Efforts

Table 4.6: Methods used to evaluate the effectiveness of patient education

		Never	Rarely	Sometimes	Very often	Always	Median
Q10 - Ask the patient to demonstrate movement, position or activity	Count (n)	0	1	6	19	16	4
	Row N %	0.0%	2.4%	14.3%	45.2%	38.1%	
Q10 - Ask the patient to repeat in their own words what has been discussed	Count (n)	3	11	6	15	7	4
	Row N %	7.1%	26.2%	14.3%	35.7%	16.7%	
Q10 - Interpret signals from the patient that shows that they understand	Count (n)	3	4	10	19	6	4
	Row N %	7.1%	9.5%	23.8%	45.2%	14.3%	
Q10 - Objective measures or standards (e.g., questionnaire)	Count (n)	23	9	6	4	0	1
	Row N %	54.8%	21.4%	14.3%	9.5%	0.0%	

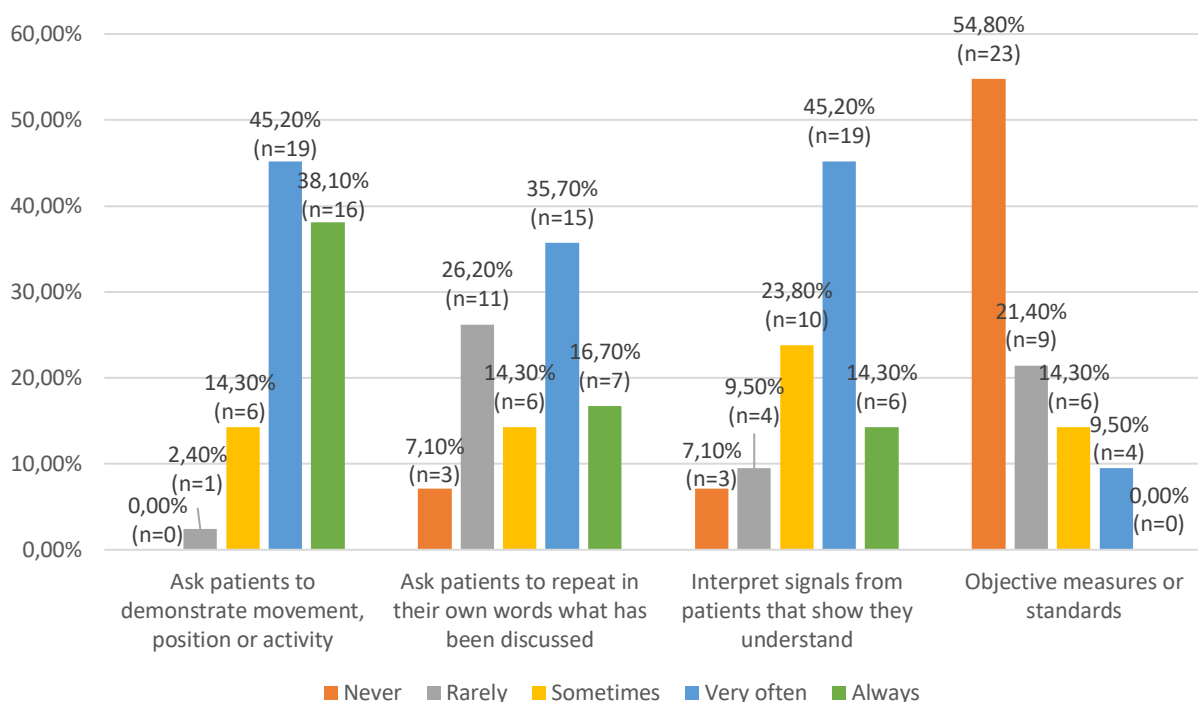


Figure 4.7: Methods used to evaluate the effectiveness of patient education

The open ended responses to Question 10 included:

- “I ask the patient: If they need me to repeat (something they misunderstood)? If they understand? If they have any questions? Do you think you can do this?”.

- “Ask for them to highlight any questions they may have in order to interpret their understanding”.

On average, asking the patient to demonstrate movement, position, or activity, asking the patient to repeat in their own words what has been discussed, and interpreting signals from the patient that shows that they understand were reported to be used ‘very often’. The remaining item relating to objective measures or standards, was mostly never used.

Generally, 83.3% of participants reported asking the patient to demonstrate movement, position, or activity to assess effectiveness ‘very often’ or ‘always’; compared to 52.4% of participants reported asking the patient to repeat in their own words what has been discussed to assess effectiveness ‘very often’ or ‘always’. Additionally 59.5% of participants reported to interpret signals from the patient that shows that they understand to assess effectiveness ‘very often’ or ‘always’. Lastly, 9.5% of participants reported using objective measures or standards to assess effectiveness ‘very often’ or ‘always’.

4.3.5 Discussion

4.3.5.1 Patient education content and practice frequency

Patient education is evidently part of clinical practice for practising chiropractors (Carlesso *et al.* 2015; Beliveau *et al.* 2017; Brockhusen *et al.* 2017; Johl, Yelverton and Peterson 2017). As chiropractors form part of the primary contact level in South Africa (Myburgh and Mouton 2007), their position within healthcare places them in a strong position and excellent resource to provide information and advice to patients (Jamison 2002; Foster, Hartvigsen and Croft 2012). This is significant for the profession and thus the students as future chiropractors, since patient education is an empowering process (Jotterand, Amodio and Elger 2016; Yeh, Wu and Tung 2018), through which patients are able to gain more control over their lives (Aujoulat, d’Hoore and Deccache 2007) and their health and management of their condition (Jotterand, Amodio and Elger 2016). Moreover, it prepares patients to engage in self-management strategies and may improve self-efficacy, which in turn may influence other outcomes, such as pain, for instance (Ndosi *et al.* 2015).

Despite reporting patient education as part of their practice, these studies do not describe the specific content of their patient education, apart from one chiropractic study that describes the content of this education in detail (Brockhusen *et al.* 2017). From a South African perspective, chiropractors report spending most of their time on direct patient care and patient education (Johl, Yelverton and Peterson 2017).

Similar to previously cited studies, the South African study also does not describe the content of patient education in great detail. The study did, however, partly assess the

content as advice on ADLs, nutritional and lifestyle counselling was explored. Apart from the general lack of detailed descriptions of chiropractic patient education in the literature, they also do not elaborate on the methods used to deliver patient education. Thus, the second objective of this study seeks to provide a deeper understanding of this subject.

The results of this study, as reported by the chiropractic students, clearly indicates that a diagnosis is an important issue to discuss with their patients. In addition to discussing a patient's diagnosis/condition with them being perceived as the most important activity, the students' actions confirm this perception as it is also the activity that they most frequently engage in. It has been repeatedly demonstrated in the literature that patients want an explanation for their musculoskeletal symptoms (such as pain) (Verbeek *et al.* 2004; Hush, Cameron and Mackey 2011; Fu *et al.* 2016; O'Keeffe *et al.* 2016; Wijma *et al.* 2017; Chou *et al.* 2018a; Chou *et al.* 2018b; Segan *et al.* 2018; Connelly *et al.* 2019; Lim *et al.* 2019; Erwin *et al.* 2020).

If the findings of this current study, in terms of what is important to chiropractic students, are compared to the study by Erwin *et al.* (2020), who explored what musculoskeletal patients want from their healthcare provider, there appears to be some overlap. An interesting finding in the study was that participants indicated their scepticism towards a GP's ability to answer their questions in terms of what is wrong with them or what is the cause of their problem. As an alternative, patients considered physiotherapists as musculoskeletal experts and, thus, probably better suited to answer these questions (Erwin *et al.* 2020). Given the musculoskeletal focus of the chiropractic profession's curriculum, it is not surprising that providing patients with information regarding their condition or diagnosis is not only perceived as the most important but also practised the most. This would indicate that the students are capable and comfortable in addressing this need of musculoskeletal patients, as indicated in the study by Erwin *et al.* (2020). Thus, it appears that the students' perception and practice are in line with the needs of patients.

The nature and content of communication are important during chiropractic consultations. As patients who were part of a study at DUT previously expressed the desire to receive information in lay terms, the patient needs to be provided with information in terms that they can understand, both linguistically and conceptually, to reach a mutual understanding (Jamison 1996). Subsequently, it will be easier for the practitioner (or chiropractic student) and patient to reach a consensus about possible management options if they share the same understanding of the problem (Jamison 1996).

In this current study, 95% of students reported to provide their patients with information about their diagnosis or condition very often or always. This is comparable to the study by

Brockhusen *et al.* (2017), who found that 98% of the chiropractors in their study provided their patients with neck pain with information about their diagnosis. The discovery of high self-reported practice of providing patients with information about their condition is good, as doing so facilitates a shared understanding of the problem (Fu *et al.* 2016). Subsequently, patients realised that they have an active role to play in their care, as a result, they exhibited newly adopted behaviours and, thus, positive outcomes (Oosterhof *et al.* 2014).

As O'Keeffe *et al.* (2016) state, high quality patient education is essential when it comes to musculoskeletal conditions, especially since changing pain beliefs and improving the self-efficacy of patients are both closely linked to patients' understanding of pain (Louw *et al.* 2011). Educating patients about their diagnosis involves the manner it is done, such as the terminology used to explain it. The dialogue is of utmost importance as what is said to the patient may negatively impact a patient's perception regarding their condition and consequently further impedes their understanding and participation in treatment (for instance, fear-avoidance) (Nijs *et al.* 2013). Thus, in addition to the first question described above, two additional questions were asked to further understand how chiropractic students communicate a patient's diagnosis to them. The additional questions were pathoanatomical explanations (e.g., bone-out-of-place or 'your spine is out of alignment') versus pain neurophysiology.

While pain neurophysiology explanations and pathoanatomical explanations are very similar in frequency (Table 4.4), the results from this study indicate that most of the students use pathoanatomical explanations, such as bone-out-of-place or spinal misalignment. According to the section on strategies for delivering patient education, the results suggest that they do this through one-on-one discussion and anatomical models. Interestingly, more than 50% of students reported using pain neurophysiology and pathoanatomical explanations, which may indicate that some students may find themselves arguing in favour of both explanations.

Pathoanatomical explanations may increase fear in patients, which in turn leads to an increase in pain (Louw *et al.* 2011). Patho-anatomical explanations may also lead to a loss of self-efficacy in patients where they may start to think that they have no control over their pain (Gliedt *et al.* 2017). For instance, when patients are told that the pain is due to their spine being misaligned, it creates a dependence on the chiropractor where patients may think that they cannot do anything for their pain themselves and that only a chiropractor can fix the pain (because only chiropractors can realign the spine) (Gliedt *et al.* 2017). In contrast, an explanation of pain based on pain neurophysiology includes both a physiological and psychological component/perspective of pain to reconceptualise pain for patients (Louw *et al.* 2011). These explanatory models are, thus, contradictory to one

another (Louw *et al.* 2011). The finding that chiropractic students mostly use pathoanatomical explanations is concerning because, regardless of their intent, such explanations adversely affect both the beliefs and behaviour of patients (Gliedt *et al.* 2017). Such explanations imply that the spine is vulnerable and that only a chiropractor can correct this (Demoulin *et al.* 2018), which deters patients from self-management (Linton and Shaw 2011; Gliedt *et al.* 2017). As a result, it does not foster patient empowerment as it creates a sense of dependence in the patient on the chiropractor for routine correction (Gliedt *et al.* 2017). This is significant as what is relayed to the patient may have a long-lasting effect (Darlow *et al.* 2013; Lin *et al.* 2013; Darlow 2016). This may contribute to the iatrogenic maladaptive beliefs described in the literature (Lin *et al.* 2013; Demoulin *et al.* 2018).

This study found that the adoption of pain neurophysiology is low among chiropractic students at DUT. The following will explain why students may struggle with one-on-one explanations about pain neurophysiology. One explanation for the low uptake of pain neurophysiology education could be that the students are unfamiliar with the concept of pain neurophysiology. Carlesso *et al.* (2014) found that physiotherapists reported using pain education more frequently than chiropractors. The authors suggest that it is possible for clinicians to concentrate more on research conducted within the context of their own professional journals (i.e., research pertaining to their own professional context) compared to reading journals related to other professions. They further explain that as pain education (pain neurophysiology or pain neuroscience education) has emerged and developed in the literature of physiotherapy, which could account for more physiotherapists reporting its use compared to chiropractors in their study.

This explanation may especially be true for the chiropractic students in this study, as those in the clinic for the first time have busy schedules as they must attend classes, complete their community service at satellite clinics, write exams and have weekly clinic shifts. Meanwhile, older students are more likely to focus on staying clinically active, completing their research projects and write up of dissertations and completing their internship programme. Considering this, reading literature may not be an immediate priority and, as such, reading literature from other professions is further removed from the agenda.

The literature indicates otherwise, however, as studies on physiotherapists found that even they do not frequently use such explanations in practice (Forbes *et al.* 2017a; Forbes *et al.* 2017b). Their perceived importance regarding the topic of pain neurophysiology indicates an awareness of evidence in support of its efficacy; it was therefore suggested that a lack of training and skills in this area might contribute to the poor uptake in practice (Forbes *et al.* 2017a).

This suggestion is based on an earlier paper by Foster and Delitto (2011) that discussed the challenges in integrating psychologically informed management principles into physiotherapy. According to the paper, a fledgling professional culture is formed during entry-level education as biomedical models of health and illness are heavily emphasised. They are taught a biomedical view of musculoskeletal pain early on, where beliefs are promoted of a clear relationship between anatomical and pathological connections to pain and disability, even at institutions where a biopsychosocial model is implemented in the curriculum, there is a biomedical emphasis on assessment and treatment. As a consequence of its early introduction in education, as the course progresses and they gain more experience, it becomes increasingly difficult to change these beliefs. These notions are then further shaped by the perspectives of educators and clinicians whom students respect (Foster and Delitto 2011).

As indicated, the undergraduate programme's lack of emphasis on pain education is a more viable explanation for the low practice rate of explaining pain neurophysiology to patients than the journals that the students might consult. If this is the case, especially considering the number of students that provide pathoanatomical explanations, this finding may indicate scope for improvement during the chiropractic programme at DUT. Accordingly, as pain neurophysiology education is a complex matter (Butler and Moseley 2013), and patients may find it difficult to understand these explanations or these explanations may be construed as imaginary pain by patients (Oosterhof *et al.* 2014), it becomes evident that nuanced communication skills in this context are needed to effectively convey the correct message to patients, in this context, without adequate training, students and thus future practitioners, may not have the required skills knowledge or skills to relay such information to their patients.

Although one-on-one discussions are most frequently used to educate patients on pain neurophysiology, reading material for patients is also used (Louw *et al.* 2011; Moseley and Butler 2015; Malfliet *et al.* 2017). Consequently, a second explanation for the low uptake of pain neurophysiology education may relate to the written material. The readability of written material is a key aspect, as it can influence how well the reader understands the information that is presented to them (Wittink and Oosterhaven 2018). There is widespread advocacy for universal health literacy precautions, such as producing material that is written at a 6th or 7th grade level, since they ensure that patients, regardless of their level of literacy or education, can receive understandable information, yet many patient education materials are too complex and do not meet the acceptable reading level standards (Wittink and Oosterhaven 2018). Moreover, fluency in one language or culture does not necessarily translate to another language or culture and, for that reason, if a non-English patient

receives health information (education) or instruction in English, misunderstanding and confusion may still result irrespective of that patient's educational level (Johnson and Green 2009).

Janse van Rensburg (2020) investigated the health literacy and English comprehension of primary healthcare patients in South Africa. South Africa is a country with great diversity in terms of language and culture, but English is still the predominant language used to communicate, while health literacy is a new concept in South Africa's primary healthcare sector. Most participants in the study reported an education level of grade 11–12, which needs to be considered in the context of most participants being between the ages of 20 and 29 as they formed part of the new schooling system of post-apartheid South Africa.

Janse van Rensburg (2020) found a 3.35 difference between the level of education and the level of comprehension, meaning that the participants could only understand English words that were three points below their educational level (Janse van Rensburg 2020). As mostly younger patients participated in the study, the comprehension level of older adults, therefore, may be even less as they may not have received the same level of education as the younger participants (Janse van Rensburg 2020). Those findings are consistent with another study that found a school grade difference of four grades (Wasserman, Wright and Maja 2010).

The findings from both of these studies are in agreement with Badarudeen and Sabharwal (2010), who found that although patients may be able to read or pronounce English words used in patient education material, their comprehension levels may be five grades below their highest attained educational grade.

Although it has been shown that the complex information of pain neurophysiology can effectively be taught to middle school children (Louw *et al.* 2018), the study intervention consisted of a 30-minute lecture accompanied by a 32-slide PowerPoint presentation. Although the study proved that pain neurophysiology education could be successful even in those with a lower education grade level in South Africa, as described above, the study did not make use of reading material. The low literacy rate in KwaZulu-Natal may not be the highest in South Africa, but it has the highest number of illiterate people (Khuluvhe 2021). Students are, therefore, likely to see patients who are illiterate, and this needs to be taken into consideration.

In this context, it is possible for students to educate patients with lower literacy levels. However, if there is no reading material available to the students, or without formal training to adapt reading material to a level that their patients may understand, they may be reluctant to provide their patients with such material. Further to this, there is currently no mention in

the DUT chiropractic curriculum specific to formal training related to pain neuroscience education; it may also be that the students are not even aware that adequate reading material for patients exists. Alternatively, the low perceived importance and practice of providing patients with written, be it handouts or personalised handouts, confirms this. The second point in support of this argument is that the students clearly not only think that exercise instruction and information is important, but it is also practised frequently, thus, given that provision of written information or instruction is among the five least important and practised activities, it would suggest that there is a general perception that there is little or no use for written material in practice. This may be influenced generally by language barriers and literacy issues that students may experience with patients.

Most guidelines for low back pain make reference to patient education and patient education is not discussed in the same detail as other strategies for care (Lim *et al.* 2019). As a result, considering unclear clinical guidelines regarding patient education where overemphasis is placed on management or reducing the use of imaging, the lack of clarity on patient education content, there may be different interpretations as to the aspects that are important to discuss with patients (Lim *et al.* 2019). This is especially true for educational strategies that may result in positive behaviour change or teaching patients the necessary skills to cope with their pain (Lim *et al.* 2019). The resultant outcome is that there may be diverse variations in the clinical practice of patient education (Lim *et al.* 2019).

Providing patients with information about their prognosis was the second most practised activity in this study. However, despite being perceived as important by more than 90% of students, it was not among the top five important activities. The difference between perceived importance and implemented practice may be related to patients' need to know for knowing the outcome. It is clear from the research that patients do indeed wish to know about their prognosis (Fu *et al.* 2016; Connelly *et al.* 2019; Lim *et al.* 2019; Erwin *et al.* 2020). The reasons vary from wanting to know what to expect, including the likelihood and degree of future disability and how it will affect their ability to work (Lim *et al.* 2019; Erwin *et al.* 2020).

Another reason is that a significant fear is associated with the prognosis these patients' perceive regarding what the pain represents (i.e., something serious). As fear is a typical emotional reaction to pain and may have a strong influence on behaviour (i.e., fear-avoidance behaviour) and coping strategies (i.e., resting or decreasing activity when pain arises, where resting may alleviate pain in the short term), as the pain subsides when these coping strategies are used, each time a patient experience pain after that, they may employ these coping strategies (Linton and Shaw 2011). However, ultimately, they may develop persistent problems (Linton and Shaw 2011), which may lead to a perpetuating cycle of fear

of pain and thus fear of movement, avoidance, disuse and pain (Field, Newell and McCarthy 2010; Linton and Shaw 2011). This further emphasises the criticism of guidelines that mention patient education, but fails to provide clinicians with clear methods and instructions on helping patients improve their function and teaching them how to live well with pain (Lim *et al.* 2019).

Croft *et al.* (2015) argue that although diagnosis is an important driver for clinical decisions that may affect the outcomes of acute serious illness, the evidence suggests that patients' outcomes may be affected by factors other than disease, and focusing on diagnosis may not always benefit the patient. Therefore, as an alternative framework for clinical practice, the author proposes that a prognostic model is arguably more important for informing clinical decisions as such a framework with a wider inclusion of non-health factors such as psychological health (Croft *et al.* 2015), which is important in musculoskeletal conditions (Moseley 2007; Linton and Shaw 2011; Nijs *et al.* 2013; Edwards *et al.* 2016; Hutting *et al.* 2019).

In low back pain, for example, no pathoanatomical cause can be identified in an estimated 90% of cases, in which case the diagnosis is 'non-specific low back pain' (Maher, Underwood and Buchbinder 2017; Lim *et al.* 2019). The article by Croft *et al.* (2015) is therefore significant as it illustrates that, for some patients, it may be more important to discuss what they can do or what can be done for them, as opposed to telling them what is wrong with them.

In referring to providing patients with information regarding their diagnosis, an important issue is to reach a shared understanding of the pain. This is evidenced by a previous study at the DUT teaching clinic, where both patients and chiropractic students emphasised the importance of reaching a mutual understanding of the patient's problem (Jamison 1996).

By using the example of low back pain provided above, Gliedt *et al.* (2017) recommend that chiropractors reach a shared understanding by explaining that although there is no identifiable cause of the pain, it has a favourable prognosis and benign nature and that there are several things that can be done to improve the outcome. For instance, explaining why several physical exercises could help with pain management (Fu *et al.* 2016), as it is important for patients to believe that it is safe to exercise and that it is meaningful (Lotze and Moseley 2015).

The next topic of discussion is directly related to this. Patients' informational needs include exercise prescription (Zuidema *et al.* 2015; Chou *et al.* 2017; Wijma *et al.* 2017; Connelly *et al.* 2019; Davenport, Dickinson and Minns Lowe 2019; Lim *et al.* 2019), especially as part of treatment beyond medication that could help them manage the pain and to take control

of their condition (Erwin *et al.* 2020) and how to do them safely (Connelly *et al.* 2019). The informational need of exercise prescription and demonstration thereof concurs with an earlier study at DUT, where 45% of patients thought it is important for their chiropractor to show them what exercises to do (Jamison 1996).

Chiropractors often make use of exercise as an adjunct to their treatment. They frequently prescribe home exercise programmes for their patients as exercise is thought to contribute to the therapeutic success and degree of recovery of chiropractic therapy (Ainsworth and Hagino 2006). Research has shown exercise to be a crucial part of treatment for chiropractors (Ainsworth and Hagino 2006; Ailliet, Rubinstein and de Vet 2010; Humphreys *et al.* 2010; Nielsen, Kongsted and Christensen 2015; Brockhusen *et al.* 2017), including in South Africa (Johl, Yelverton and Peterson 2017), and that even chiropractic students practising at a teaching clinic frequently prescribe exercise as well (Lishchyna and Mior 2012). The findings from this study agree with these studies, as not only was demonstration of exercise perceived as important by more than 90% of students, but their practice also reflected their perception as verbal instruction and demonstration of exercise were practised by more than 90% of the chiropractic students as indicated by Figure 4.2.

A total of three of the 18 activities were related to advice or information regarding exercise, which included demonstration, verbal instruction, and written instruction. For demonstration and verbal instruction, more than 90% of students reported undertaking these activities 'very often' or 'always'. The high reported rate of physical demonstration and one-on-one discussion as delivery methods confirms this. Hence, it can be concluded that the students do not solely rely on manipulative therapy, as they report instructing their patients on exercise frequently and demonstrating these to them.

This is a positive finding, especially considering that a recent systematic review found that patients frequently lack confidence, as they are too uncertain or apprehensive about developing their own exercise programmes; as such, they appreciate guidance through clear explanations and demonstration followed by guided practice (Davenport, Dickinson and Minns Lowe 2019). In addition, some patients may also experience anxiety while doing therapeutic exercises, particularly when they are unsure of how to do these correctly (Eilayyan *et al.* 2019), which makes the students' demonstration of exercises valuable.

Besides patients looking for guidance, exercise reduces disability and dependency on healthcare (Buchbinder *et al.* 2018). In terms of the healing process, merely doing the therapeutic exercises may result in a double benefit for patients. The exercises themselves can have a direct effect on their recovery as well as active participation from patients in their

own rehabilitation (Hawk 2017). Thus, exercise allows patients to actively manage their symptoms (Hawk 2017).

It was beyond the scope of this study to assess the conditions for which the students prescribe exercise versus those they do not, as well as the exact exercises that students discuss and or prescribe to their patients. Considering this, the present study cannot speak to whether the students take an individualised approach to exercise prescription or whether they use a 'one-size-fits-all' approach.

The fifth most practised patient education activity is activity pacing, which is an active approach of rehabilitation that relates to the activity levels of patients to keep levels regular; to minimise overactivity-underactivity cycling (doing too much or too little) and to reduce the occurrence of flare-ups (Antcliff *et al.* 2018). While for exercise (as well as other activities), informing patients not to pace up too quickly, but more importantly, relate to them how pacing up correlates to modulation of pain (Booth *et al.* 2017). As discussed under the previous objective (section 4.3.5.1), gradually increasing activities and exercises (intensity, frequency etc.) is a part of the 'active care' subject of chiropractic students during their 4th year (Durban University of Technology 2020). The subject is articulated in the rehabilitation aspect of chiropractic care, which may influence their perception of active strategies, which appears to also influence their practice.

Activity pacing may be used as a strategy to address symptoms that impair a patient's ability to engage in activities (Murphy *et al.* 2010), such as activities of daily living. For instance, to break up large tasks into smaller ones (Knittle, De Gucht and Maes 2012), or to prioritise one activity over another or to alternate activities (Antcliff *et al.* 2018). As a fairly low frequency of advice on ADLs was reported by the chiropractic students, it can be assumed that their advice on activity pacing mostly relates to advice to engage in exercise within their respective contexts (i.e., starting at a tolerable level for those who cannot yet do advanced exercises; as in early stages of rehabilitation, while for those who can do advanced exercise, to aim for optimal function).

An equally important point to discuss concerning the top five practised activities are the two activities that were part of the top five important activities but were not among the top five practised activities. These activities are advice or teaching correct posture and movement and general health promotion. Advice or teaching correct posture and movement differs very little from its perceived importance and use in practice, while general health promotion differs by almost 17%. Correct posture and movement could be seen as aspects that are directly related to musculoskeletal conditions, whereas general health promotion could be seen as an aspect that could affect musculoskeletal health and conditions indirectly.

According to a previous study at DUT, chiropractors are less likely to engage in public health or health promotion discussions if they do not directly relate to musculoskeletal conditions (Ford 2013).

In this context, given the students' musculoskeletal background and the fact that patients are likely to see them for a musculoskeletal condition, the students might resort to advice regarding correct posture and movement before they address general health promotion. For instance, the students might deal with issues that they think may affect the patient's complaint at that given time (such as posture). At the same time, the still high reported practice of general health promotion could indicate that students may decide to address these later, as the patient's symptoms and function improve.

Another point to consider is that because patients are likely to see the students for a musculoskeletal issue, they might want to address this issue first rather than the additional health benefits. This argument is evidenced by a previous study which found that patients at DUT are far more likely to think that issues such as explaining their problem to them in lay terms, strategies of avoiding the problem in the future and therapeutic exercises are more important to them compared to general health promotion (Jamison 1996).

Similar to providing information about diagnosis being the most important and being practised the most, providing advice on social support was perceived as the least important and also practised the least. This finding does not relate to the chiropractic students alone, as it was also perceived as the least important and practised the least by novice and experienced physiotherapists (Forbes *et al.* 2017a; Forbes *et al.* 2017b), which implies that it is not an issue related to how much experience one has, but perhaps one's familiarity with the concept of social support and how to implement it in practice.

In terms of the biopsychosocial model, the influence of the social component of this model is yet to be studied in depth and has not been well studied (Ailliet *et al.* 2016) and pales in comparison to research that addresses the biological and psychological components (Campbell, Wynne-Jones and Dunn 2011). In relation to the biopsychosocial model and factors that predict or influence outcomes, Ailliet *et al.* (2016) state that research in the context of chiropractic has largely focused on biomedical factors, fear, catastrophising, self-efficacy and depression, and due to a lack of research related to social factors, only one chiropractic study was found that provided evidence for social support being associated with pain and disability (Hurwitz *et al.* 2006). Given that these two articles are ten years apart, with only one study finding a correlation between social support pain and disability in a chiropractic population, it appears that the topic has not yet found traction in the profession as the first, which supports the explanation of their familiarity with the concept may be an

issue. In addition, with chiropractors specialising in musculoskeletal conditions, their perspective may be limited to musculoskeletal issues and they do not consider other factors, which is supported by Ford (2013).

Advice on the use of assistive devices or equipment was another activity where students' practice reflected their perception. It was among the 5 least important activities, and the 5 least practised activities. According to Brockhusen *et al.* (2017), the majority of chiropractors in their study rarely used orthoses and other supportive devices in the management of neck pain, irrespective of it being either acute or chronic neck pain. The results from this study are reflective of what Brockhusen *et al.* (2017) found, as 36% of students reported to provide patients with advice about such devices.

If this is to be interpreted alongside the studies of Forbes *et al.* (2017a, 2017b), in both studies, advice on the use of assistive devices or equipment is included in the activities least performed by experienced physiotherapists; however, the reported practice frequency is comparable across both studies and is used more frequently compared to the DUT chiropractic students. While for the novice physiotherapists, the reported practice was even higher than the experienced physiotherapists (Forbes *et al.* 2017a; Forbes *et al.* 2017b). This would indicate that physiotherapists are more likely to use assistive devices and to advise their patients accordingly. This finding is consistent with previous research that found that physiotherapists are more likely to use orthoses compared to chiropractors (Carlesso *et al.* 2014). This could be explained by the students' preference for active strategies as previously outlined. However, the perception also explained that other factors such as the availability and cost of these devices might prevent them from advising their patients to use these devices, therefore relying on active strategies that do not cost their patients anything and can be delivered equally to all their patients.

Providing patients with advice or teaching problem-solving skills was also found to be congruent. In addition to being included in the five least important activities, it was also ranked among the five least practised activities. This would indicate that the students' practice of teaching problem-solving skills appears to be influenced by their perception. As previously discussed, a language barrier and lack of awareness or low confidence in implementing it during consultations may explain their low perceived importance regarding this topic. However, the low practice of teaching problem-solving skills was also reported among novice and experienced physiotherapists (Forbes *et al.* 2017a; Forbes *et al.* 2017b). In this context, it is evident that the amount of experience is unlikely to influence the implementation of such education strategies more frequently. As South Africa is a linguistically diverse country, it may very well still explain its low reported use among the students and a lack of awareness of the concept or low confidence in implementing it during

consultations with patients. It may also be that the students are not able to individualise the teaching of problem-solving to their patients.

Problem-solving skills are an essential component of self-management for musculoskeletal disorders (Hutting *et al.* 2019); while the learning process facilitates behaviour change, developing problem-solving skills during the process strengthens a patient's confidence and resilience to persevere with these behaviour changes (Thompson 2017). Instead of reacting to a situation, by becoming proactive, patients anticipate what actions they need to take and when to do it as they notice that their symptoms are alleviated by their actions (Thompson 2017). For instance, using the symptom as a guide to inform decisions about what to do (problem-solving behaviour), should the outcome of that behaviour match the expectation and target goal (i.e., pain relief), the purpose of that representation will appear to be useful, therefore increasing the likelihood of engaging in the same behaviour the next time that symptom occurs (Caneiro, Bunzli and O'Sullivan 2021). In this context, it may be that the students themselves are unsure about what to tell their patients with regards to the markers (i.e., pain or swelling) that the patient needs to look out for in a recurring problem, and how these markers can be implemented. For instance, with a pain flare up, the patient should not refrain from exercises, but rather implement activity pacing and maintain physical activity, while actively monitoring the pain and making an informed decision regarding when it is necessary to consult a healthcare practitioner based on the pain intensity or progression.

However, chiropractors worldwide still do not meet the recommended standards of delivery of self-management strategies (Eilayyan *et al.* 2019). Chiropractic teaching clinics are no exception, as only 56% of patients reported that the chiropractic students advised them on what they could do to improve their pain or lifestyle and behaviour changes (Stomski *et al.* 2019). From a South African perspective, a previous study found that practising chiropractors frequently advise patients regarding postural habits, ergonomic risk reduction, weight control and dietary habits, exercise (disease prevention and fitness), personal stress, injury prevention and osteoporosis prevention (Ford 2013). Although the study by Ford (2013) focuses on health promotion and disease prevention, as opposed to problem-solving skills as part of self-management, it provides a context of general advice that can be applied to the patient's context (i.e., weight loss to decrease joint stress to improve pain). Nonetheless, while ergonomics and posture habits, for example, can be applied at work and at home, Ford's study did not address whether patients are taught how to apply problem-solving skills specifically. From a student perspective, almost 80% of the students in the current study at DUT reported to educate patients on self-management strategies frequently, but it appears that teaching problem-solving skills are not part of the self-

management education provided to their patients. In contrast, previous literature demonstrates that chiropractic students were more likely to provide patients with advice adapted to their work situation, but few provided patients with advice adapted to their living situation or family (Stomski *et al.* 2019). This may indicate that chiropractic students have difficulty in tailoring self-management advice, more specifically problem-solving strategies, to their patients in different contexts, suggesting that such advice provided by chiropractic students needs to be improved.

Exploring patient ideas and perceptions is the fifth least practised patient education activity and only practised by half of the students in this study. This finding is concerning, and there is room for improvement for students to undertake this activity more frequently, especially since it adds to patient-centeredness and individualised information. It will be beneficial to students and their patients to engage in this activity more frequently as it may not only involve the patient in their own care (for example, the patient having a different idea about treatment or what they might prefer, or asking why they would prefer a specific treatment, and then to advise accordingly). This is important as it is also an essential step for clearing up any preconceived misconceptions or erroneous iatrogenic beliefs.

Understanding what patients think and feel would allow the students to identify any erroneous beliefs or perceptions that may influence outcomes. In this context, exploring patient beliefs and perceptions is not necessarily patient education in itself but arguably the most important part of the process as it provides crucial information about what patients need to be educated about (i.e., aetiology, prognosis/duration, reassurance, self-management or that it is safe to exercise).

For example, active strategies, such as exercise, require patient participation and adherence. Should patients believe exercise is unsafe and exacerbates their pain or cause 'even further joint damage', they may refrain from undertaking exercise altogether (Nijs *et al.* 2013). It is also vital in terms of how patients perceive the cause of their pain, outcomes or duration (i.e., how long they expect the pain will last) (Setchell *et al.* 2017) as a strong correlation exists between a low perception of control over pain and outcomes (Foster *et al.* 2008; Setchell *et al.* 2017). Exploring patient ideas and perceptions is necessary because the information relayed to the patient needs to be patient-centred and individualised, which would require an exploration of what patients think. Therefore, as part of the patient education process, it is essential to explore patient ideas and perceptions, which would allow the students to tailor the information to the patient's context.

Setchell *et al.* (2017) found that most of the participants' views on low back pain in their study were shaped by biomedical views concerning the body and health. Patients were

inclined to think of their bodies in a “machinelike way” and that something mechanical was wrong, such as alignment. Associated with such a view was that once low back pain, damage or disease occurs, most of the participants thought that this would be the case for the rest of their lives. Moreover, many patients made reference to earlier damage (i.e., injury) which they thought to be permanent or thought of these incidents to continue to have an effect long after (Setchell *et al.* 2017).

The relevance of exploration of ideas and perceptions extends beyond painful conditions as well. Robertson, Hurley and Jones (2017) showed that patients with crepitus in their knees expressed anxiety regarding the noise, which was couched in the perception that it meant ‘bone-on-bone’ or ‘wear and tear’, which was subsequently interpreted by them as premature degeneration, and resultant avoidance of activities. This indicates that regardless of the patient’s presenting complaint, it is necessary to explore their perceptions as they may not necessarily express these perceptions or ideas as mentioned above during their consultations unless they are prompted. Similarly, healthcare providers are frequently unaware of the uncertainties their patients may have (Oosterhof *et al.* 2014), further emphasising its importance. Consequently, if one is not as attentive to patient’s agendas or what is important to them as they should be, such as underestimating their concerns, for example, wanting to avoid further damage to an already prematurely degenerated knee joint (as discussed previously in this paragraph), one may be less responsive to those needs (Stenner, Palmer and Hammond 2018).

The literature review discussed the importance of a wide variety of topics to be covered for musculoskeletal patients. Yet, students mostly focus on patient education activities directly related to the main complaint of patients (i.e., diagnosis, prognosis and exercise). This is supported by large discrepancies observed in the results, which show that students perceive several activities to be more important than their frequency in addressing these issues in practice. The activities with considerable variance between their importance and practice include advice on social support exploring patient ideas and perceptions, assistive devices, activities of daily living, problem-solving strategies and counselling about psychological problems.

The five least practised activities (namely, social support, written instruction, assistive devices, problem-solving skills and patient ideas and perceptions) mentioned earlier have already been discussed in this section. The remaining topics to be discussed are those with large discrepancies between the perceived importance and practice frequency, which include advice or strategies to perform ADLs and counselling about psychological problems. For advice on ADLs, there was a 26% difference between its perceived importance and practice frequency. The difference between perceived importance and practice frequency

of advice on ADLs is surprising, considering that it is an aspect of patient education that is an important issue to discuss with patients for chiropractic clinicians in South Africa compared to lifestyle counselling and nutritional counselling (Johl, Yelverton and Peterson 2017).

The difference may be due to the patients of students not needing such advice. A previous study shows that chiropractic students see the same patients as chiropractors in practice (Lishchyna and Mior 2012). The chiropractic programme in South Africa strives to do the same by exposing students to a diverse case mix through attendance at satellite clinics and impromptu sports and community service events, in addition to those they see at the campus clinic. Therefore, if the chiropractors in practice report to advise patients more frequently on ADLs, it can be extrapolated that the patients that consult with students at DUT would also require such advice. This may indicate that the students are unaware that their patients may need such advice or that they find it challenging to tailor such advice to the specific contexts of their individual patients. It may also be possible that advising patients on ADLs may be related to problem-solving strategies, as illustrated previously, where students may be struggling with their own problem-solving skills and applying it to the consultation context and putting it into perspective for their patients. Simply put, if the students are struggling with their own problem-solving skills, then it may be difficult for them to teach their patients how to solve problems.

There was a 24% difference between perceived importance and practice frequency for psychological counselling. In studying the future intentions of graduating chiropractic interns regarding health promotion, Evans, Ndetan and Williams (2009) found that 87% of interns intended to provide patients with advice about psychosocial and stress issues. The authors compare this intention regarding psychosocial advice against advice regarding exercise and healthy weight/diet. In this comparison, although most interns intended to advise their patients on psychosocial issues, there was still a significant difference between the intention of counselling on psychological issues and that of advice regarding exercise and healthy weight and diet. The authors state that this finding illustrates a gap in chiropractic education in terms of providing patients with counselling in this particular area, since psychosocial comorbidities are highly prevalent among patients with chronic pain (including chronic spine pain) (Von Korff *et al.* 2005; Evans, Ndetan and Williams 2009).

Question 6, the section regarding perceived importance, would indicate that students recognise the vital role that psychological issues play in musculoskeletal conditions, as outlined in the literature review (Linton and Shaw 2011; Nijs *et al.* 2013; Edwards *et al.* 2016).

In Question 5, the section related to the frequency of practising patient education, the self-reported practice of the same item would indicate that students do not exercise to the same extent. Although, for an item that is at least considered to be important, it is a cause for concern as the students appear to recognise its importance, it raises the question of why they are not addressing the issue in patient education activities. One possible explanation could be that the students do not have time. However, since lack of time was least perceived as a barrier to patient education activities out of 11 possible items in this study, it is highly unlikely that a lack of time explains the lack of practice. A second explanation could be that the students may feel they are not equipped with the necessary skills to address this issue during consultations effectively. This explanation is a possibility as Gliedt *et al.* (2017) state that the evaluation of psychosocial factors (and in-depth comprehension of such evaluation methods) is an area in chiropractic that requires improvement, as well as to prepare students (and practising chiropractors) accordingly in how to manage these factors. According to the authors, with respect to dealing with the psychosocial aspects of chiropractic care, efforts to educate students are inadequate.

The studies by Walker *et al.* (2005) and Haanstra and Miller (2011) contribute to understanding the claims made by Gliedt *et al.* (2017) about insufficient educational efforts and the need to equip students with methods to evaluate these factors.

The study by Haanstra and Miller (2011) assessed the perception regarding the inclusion of psychosocial factors during the overall management of their patients, which included the evaluation thereof. Although not addressing advice on psychosocial factors specifically, the study found that 91% of Dutch practising chiropractors regarded psychosocial factors as important in view of their patients' pain presentation. In terms of perceived importance, the findings by Haanstra and Miller (2011) were comparable to that of Walker *et al.* (2005), where 93.5% of chiropractors in Australasia and 80.6% of chiropractors in North America deemed emotional factors as important. Of note is that in the Dutch study, 68% of participants graduated from a European college, and 31% graduated from a North American college.

Even though regarded as an important aspect, only 45.8% of chiropractors in Australasia and 50.5% in North America reported using a technique to evaluate the presence of these factors (Walker *et al.* 2005). Furthermore, only 36.3% of those in Australasia and 33.3% of those in North America reported the ability to treat these factors (Walker *et al.* 2005). In the study by Haanstra and Miller (2011), 60% of chiropractors perceived that managing psychosocial factors is part of the chiropractic scope of practice, 57% reported feeling capable of adequately evaluating these factors, and 28 % reported feeling capable of adequately managing these factors. In terms of practice, 76% reported evaluating the

presence of these factors, yet only 39% reported managing these identified factors. The study also addressed perception concerning the adequacy of training in evaluating and managing these factors; the authors found that 28% felt that training was adequate in terms of evaluation, and 15% felt that training was adequate in managing these psychosocial factors. Additionally, 50% indicated they wanted more training in evaluating the presence of psychological factors, and 46% wanted more training in managing them (Haanstra and Miller 2011).

Similar to the statement by Gliedt *et al.* (2017), Haanstra and Miller (2011) also recommend that attention and focus on psychosocial issues are needed in chiropractic curricula. This recommendation is based on the reputation of chiropractic having a holistic approach to care. In the same vein, the previously mentioned study by Evans, Ndetan and Williams (2009) has a similar viewpoint in which they state, "how can one claim to be a specialist in an area of healthcare if part of what they do does not adequately address prevention of the specific conditions they treat?".

Although the present study at DUT assessed counselling regarding psychological problems, while Walker *et al.* (2005) and Haanstra and Miller (2011) addressed techniques/capability to manage psychosocial factors, a similar trend emerged in these studies. In both studies, there was a high agreement among chiropractors regarding the importance of psychosocial factors, but far less of them addressed this issue in patient management.

Similar to the content of patient education being important, the time spent on these patient education activities is also essential as one needs to spend an adequate amount of time on education. When time is limited, it might seem appropriate to deliver information and share skills quickly with patients; nevertheless, this is not sufficient to ensure the effectiveness of management in the long term (Thompson 2017). If students are to rush this process, patients may not retain the necessary information, as they must process the information as well. In addition, several issues may need to be discussed with patients but differ in terms of their context, how much information a specific patient wishes to receive, and how involved they want to be in decision-making and their care. Although patient education is reported to be a component of chiropractic management (Carlesso *et al.* 2015; Beliveau *et al.* 2017; Johl, Yelverton and Peterson 2017), the exact amount of time allocated to it has not been investigated in these studies.

Within a South African context, chiropractors reported spending most of their time on direct patient care and patient education (Johl, Yelverton and Peterson 2017) but the study did not report the specific amount of time allocated to patient education. Most of the participants in this study at DUT reported spending 6–10 minutes and 11–15 minutes on patient

education during the initial consultation with patients. These results are comparable to that of Forbes *et al.* (2017a), where the majority of practising physiotherapists in their study also reported spending between 6–10 minutes and 11–20 minutes on patient education during the initial consultation. Thus, experience appears not to influence the amount of time spent on patient education, such as allocating more time to it, but rather to the content being discussed with patients.

Further research is needed regarding how much time students allocate to specific topics and when they address these topics. For example, during the initial visits, they spend between 6–15 minutes on patient education, and since more than half of the students reported educating their patients on pain neurophysiology, where such education requires at least 30 minutes and may go up as high as 2–4 hours per session (Louw *et al.* 2011), students do not even meet the minimum requirement for such education. For those who implement pain neurophysiology, this raises the question of how thoroughly they discuss pain neurophysiology with their patients, as when it is not done correctly, it may create the impression that the pain is all in their minds and that they are only imagining the pain (Oosterhof *et al.* 2014), which may leave patients feeling like the students do not acknowledge their pain as real. In the case where the entire 6–15 minutes is allocated to pain neurophysiology, that leaves little room for additional topics, such as exercise, to be discussed.

4.3.5.2 Strategies of Delivery

The learning styles of patients and their preferences need to be considered for education to be successful, which should be used to adjust the educational process accordingly (Beagley 2011). As a result, different methods should be used to accommodate the needs and preferences of different patients (Beagley 2011; Caneiro *et al.* 2020). Interestingly, chiropractic students do not use a wide variety of strategies to deliver patient education.

There appears to be three strategies they favour, in which two are used considerably more frequently compared to the rest of the strategies. First, one-on-one discussions were reported to be used frequently by nearly all the students, followed by the physical demonstration of exercise, movement, posture or activity. The high reported frequency of one-on-one discussions is not surprising, as the DUT CDC does not allow group sessions for patients, coupled with the fact that there are no chiropractic assistants at the clinic to assist the students in patient education, which only leaves one-on-one discussions as a face-to-face interaction to impart information to patients. This finding concurs with previous research that found one-on-one patient education to be the most commonly used method by chiropractors (Carlesso *et al.* 2015). In contrast, almost 90% of the students used physical demonstration, while other studies found 56% to 67% of chiropractors to use

demonstration frequently (Ainsworth and Hagino 2006; Carlesso *et al.* 2015). The use of demonstration is in line with the recommendation for chiropractors made by Christensen (1999) according to (Ainsworth and Hagino 2006).

As simple diagrams or images may provide patients with a visual representation of what is happening within their bodies that they are unable to see in person (Thompson 2017), similarly, anatomical models can assist the students in explaining a patient's condition to them. However, these strategies were not popular among the chiropractic student population.

The third most commonly used strategy was anatomy models, which were used by just over half of the students. This strategy may not have been available to all the students, given that not every treatment room is equipped with an anatomy model, which may have impacted on its use in practice. For instance, the use of anatomical model models may have been higher, should they have been available in every treatment room. Anatomical diagrams, in contrast, are available in every room, and pictures or videos can easily be researched via Google, and shown to patients as there is Wi-Fi available to the students in the campus clinic, but less than 20% of the students reported using photography or videos frequently.

Less than one-third of the students reported frequently using any of the remaining strategies. Links to online websites were the fourth most commonly used strategy by students, but only 28% of students did so frequently. Less than 10% reported using personalised handouts frequently, while only a single student reported using biofeedback equipment frequently, and none of the students reported using generic handouts or pamphlets frequently.

As of January 2021, the South African population stood at 59.67 million, of which 38.19 million used the internet and 25 million used social media (DataReportal 2021). Although there was a 4.5% increase in internet users from 2020 to 2021 (DataReportal 2021), there is still a large portion of people who do not have access to the internet. There is no specific information/statistics available for internet access in Durban, including the rural communities. In addition to a large portion of people not having access to the internet, data costs have to be taken into consideration as data costs in South Africa are among the most expensive on the African continent, where they ranked 33rd out of 46 countries despite price reductions that came into effect in 2020 (Chinembiri 2020). Considering this, the low reported frequency of providing patients with links to websites may not be solely due to digital or health literacy issues or internet access, but data costs as well, especially as the DUT CDC provides care at a lower rate compared to chiropractors in private practice as

well as offering fee reductions to those who cannot afford the already lower rate (Durban University of Technology 2020), therefore students are likely to encounter patients of lower socioeconomic status.

As personalised handouts are more accessible to patients, as previously outlined, it is surprising that the students do not use this method more frequently, particularly since there is increasing support in the literature to supplement verbal communication with written material (Forbes *et al.* 2017b). Nevertheless, as previously explained, there appears to be a collective dislike toward written material. In the same manner, written material also includes generic handouts or pamphlets; since no generic handouts are provided in the clinic for students to distribute to their patients, this would explain why not a single student reported using this strategy frequently. Based on this, students may be unaware of the role that handouts can have in the clinical setting, which may have an impact on their time management as paper-based handouts can cover a lot of information, for instance, a summary of main aspects of self-management or strategies to introduce lifestyle changes and how to maintain these (Eilayyan *et al.* 2019). As explained previously in section 4.3.5.1, there may also be a relevance here to this issue in terms of language barrier and patient literacy, whereby students may perceive written information to be difficult for the patient to read or understand and, thus, they do not write down personalised information.

To understand why biofeedback equipment is rarely used, two points need to be considered: first, the students' familiarity with the equipment and their confidence in using it, and second, their approach to the rehabilitation process. First, although students are instructed on using biofeedback equipment, covered in the active care subject in the curriculum, during their 4th year of the program, they are not yet allowed to consult with patients in the clinic during their 4th year. As such, apart from instruction regarding the practical application of biofeedback equipment, the students do not get to test it on each other or on patients, as they are only allowed to do so in the following year when they have their weekly clinical rotations. Furthermore, they are taught to use the equipment from an exercise perspective, hence they may not understand that it can also be used as an educational tool.

Second, their approach to rehabilitation may also be interlinked with the first point discussed. A previous study at DUT found that most of the student participants expressed concerns about the rehabilitation protocols, specifically, that they were inadequate, the specificity and the practical implementation thereof (Ganesh 2017). At the beginning of their clinical practicum, students described a lack of knowledge and skills. Proficiency in rehabilitation practices was among the most challenging areas for students, their perception was that the education they received was too generic, making it difficult to adapt or apply to

different patients (Ganesh 2017). This also indicates that students are experiencing difficulty with their own regarding problem-solving skills and, despite their knowledge, they are unable to analyse and use generic information, which may be indicative that the students prefer to be taught prescriptive information that could apply to their patients in a generic manner. Considering that students had difficulty in adapting protocols that were taught to them, it seems unlikely that they would adapt a tool that is meant for exercise as an educational tool. Therefore, the students see the rehabilitation as a solution that can be applied to only stated situations as prescribed in their lectures, without themselves understanding the underlying principles; this means that they cannot use it as an educational tool as they themselves have not yet mastered the principles of care.

4.3.5.3 Evaluation of Effective Delivery of Patient Education

In order to achieve the intended effects of patient education, it is essential to determine whether patients understand what has been communicated to them (Flanders 2018), especially since not all patients learn in the same way, which could inform the students that another method of delivery is needed to facilitate learning (Beagley 2011). In this regard, it is crucial to gain the patient's understanding of what has been discussed and what they have learned to reinforce their learning and to present the opportunity to correct any misunderstandings from the patient's perspective (Thompson 2017).

Return demonstration of skills and the teach-back method are the preferred methods to evaluate patient education, as these serve to elicit both the effective delivery of information and teaching necessary skills (Brega *et al.* 2015; London 2016; Flanders 2018). This study found that chiropractic students primarily focus on physical aspects, such as return demonstration of skills, as opposed to actual information communicated to the patients.

The most common method to evaluate the effectiveness of their delivery by far was asking patients to demonstrate a movement, position, or activity. This agrees with their high perceived importance and practice of such activities (such as posture and exercises). Conversely, similar to practising chiropractors (Ford 2013), the students placed high importance on issues, specifically issues related directly to the main complaints of patients, for instance, diagnosis and prognosis and practised these to the same relative extent. However, the students do not assess patient understanding in this context to the same degree as they do with physical instructions. This is evidenced by just over half of the students indicating that they interpret signals from the patient that shows that they understand, followed by asking patients to repeat in their own words what has been discussed (teach-back method). At the same time, objective measures or standards were used the least to assess the effectiveness of delivery. According to the results of this study,

the importance of this strategy should be reinforced among the chiropractic students at DUT, and its application should be cemented within their practice behaviour.

In summary, generally, the results indicate that perception influences practice. At least in terms of the extremes of the spectrums of importance and practice, since three of the five most important activities are also practised the most. Similarly, four of the five least important activities are also practised the least. For example, the chiropractic students at DUT perceive the patient education content to be important, but their self-reported practice of patient education does not reflect the same extent as their perceived importance thereof. In other words, although those perceived as most important and least important may also be practised the most and least respectively, the extent to which they practice is not as great as their perceived importance thereof. The two exceptions, in this case, are the content related to 'providing verbal instruction or information needed to perform a basic exercise program' and 'pathoanatomical explanations', where students report practising it to a greater extent than their perceived importance.

In line with the study by Ford (2013), of practising chiropractors in South Africa, the results from this study reflect that the chiropractic students at DUT appreciate a biopsychosocial paradigm (as reflected in the perceived importance section), but their approach to patient care does not reflect a biopsychosocial approach. This is especially true for the items related to the advice on social support, the advice or strategies to perform activities of daily living, advice regarding problem-solving strategies, counselling about psychological problems and exploring and discussing patient ideas.

It appears that the patient education content of the chiropractic students at DUT is relatively diverse, as illustrated in Table 4.4 and Figure 4.3. Out of the 18 items in the questionnaire regarding the frequency of undertaking these items, 50% or more students reported undertaking 14 of these activities 'very often' or 'always'. Thus, the results indicate that at least half of the students at DUT include a little more than two-thirds of the items in their discussions with patients during consultations. A concerning finding was that a relatively high number of students reported providing patients with pathoanatomical explanations such as bone-out-of-place, which the literature strongly recommends against in the modern healthcare climate.

Regarding how students choose to deliver education to their patients, although several methods of delivery are available to students, they mainly reported using one-on-one discussions, physical demonstration of exercise, movement, posture or activity and anatomical models. The reported use of generic handouts (with information on conditions or exercises etc.) was mostly reported to be used never and rarely, which can be attributable

to the fact that no such handouts are made available to the students to provide to their patients. In their efforts to educate their patients, the students mostly reported to assess the physical aspects of their efforts, such as movements, for instance. Evidently, the results suggest that students need to be made aware of the teach-back method in order to ensure that patients understand what has been discussed so that they can effectively apply the information in their situations.

Additionally, even though students' practice of patient education is in line with current MSK guidelines in terms of providing patients with information about diagnosis, prognosis, and active management strategies, this is not the case for more personal aspects of care such as psychological issues (Lin *et al.* 2019). Overall, this study indicates that at least some training is needed for future chiropractic students to optimise their patient education skills.

4.4 OBJECTIVE THREE

Question 11 was used to answer the third objective: To investigate chiropractic students' perceived barriers that they experience regarding the provision of patient education to patients at the DUT CDC (such as language or the attitude of the patient). Item responses to the barriers are illustrated below (Table 4.7). On average, majority of the items were rated 3 or 4 out of 5. In addition, Cronbach's alpha was 0.861, indicating good reliability and agreement.

The results indicate the top five items perceived as barriers to effective patient education according to the students include the attitude of the patient, cognitive status of the patient; language barrier; emotional status of the patient, and the patient assuming a passive role during the interaction. Some 92.9% of participants reported to 'agree' or 'strongly agree' that the attitude of the patient is perceived as a barrier to using patient education effectively, whereas 85.7% of participants reported to 'agree' or 'strongly agree' that the cognitive status of the patient is perceived as a barrier to using patient education effectively. In contrast, 80.9% of participants reported to 'agree' or 'strongly agree' that a language barrier is perceived as a barrier to using patient education effectively. A further 73.8% of participants reported to 'agree' or 'strongly agree' that the emotional status of the patient is perceived as a barrier to effectively use patient education. Finally, 67.7% of participants reported to 'agree' or 'strongly agree' that the patient assuming a passive role during the interaction is perceived as a barrier to effectively use patient education.

The five items perceived to be the least obstructive included a lack of privacy in the clinic environment, lack of time allocated to treatment sessions, age of the patient, health knowledge or literacy of the patient and the students' lack of knowledge on the topic, with:

- 42.8% of participants reported to 'agree' or 'strongly agree' that lack of time allocated to treatment sessions is perceived as a barrier to effectively use patient education.
- 42.9% of participants reported to 'agree' or 'strongly agree' that lack of privacy in the clinic environment is perceived as a barrier to effectively use patient education.
- 47.6% of participants reported to 'agree' or 'strongly agree' that age of the patient is perceived as a barrier to effectively use patient education.
- 59.5% of participants reported to 'agree' or 'strongly agree' that health knowledge or literacy of the patient is perceived as a barrier to effectively use patient education.
- Finally, 59.5% of participants reported to 'agree' or 'strongly agree' that their own lack of knowledge on the topic is perceived as a barrier to effectively use patient education.

Open ended response to Question 11 included:

- 'Fear avoidance'.

Table 4.7: Perceived barriers to effective use of patient education

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Median
Q11 - Age of the patient (e.g., paediatric vs elderly)	Count (n)	3	5	14	17	3	3
	Row N %	7.1%	11.9%	33.3%	40.5%	7.1%	
Q11 - Attitude of the patient	Count (n)	1	1	1	18	21	5
	Row N %	2.4%	2.4%	2.4%	42.9%	50.0%	
Q11 - Cognitive status of the patient (e.g., Down's syndrome or inebriation)	Count (n)	0	2	4	21	15	4
	Row N %	0.0%	4.8%	9.5%	50.0%	35.7%	
Q11 - Emotional status of the patient	Count (n)	0	3	8	24	7	4
	Row N %	0.0%	7.1%	19.0%	57.1%	16.7%	
Q11 - Health knowledge or literacy of the patient	Count (n)	1	7	9	21	4	4
	Row N %	2.4%	16.7%	21.4%	50.0%	9.5%	
Q11 - Lack of privacy in the clinic environment	Count (n)	2	10	12	12	6	3
	Row N %	4.8%	23.8%	28.6%	28.6%	14.3%	
Q11 - Lack of time allocated to treatment session	Count (n)	5	11	8	10	8	3
	Row N %	11.9%	26.2%	19.0%	23.8%	19.0%	
Q11 - Lack of trust or rapport between the patient and yourself	Count (n)	0	5	10	22	5	4
	Row N %	0.0%	11.9%	23.8%	52.4%	11.9%	
Q11 - Language barrier	Count (n)	1	3	4	15	19	4
	Row N %	2.4%	7.1%	9.5%	35.7%	45.2%	
Q11 - My lack of knowledge on the topic	Count (n)	1	5	11	17	8	4
	Row N %	2.4%	11.9%	26.2%	40.5%	19.0%	

Q11 - Patient assuming a passive role in student patient interaction	Count (n)	1	3	10	21	7	4
	Row N %	2.4%	7.1%	23.8%	50.0%	16.7%	

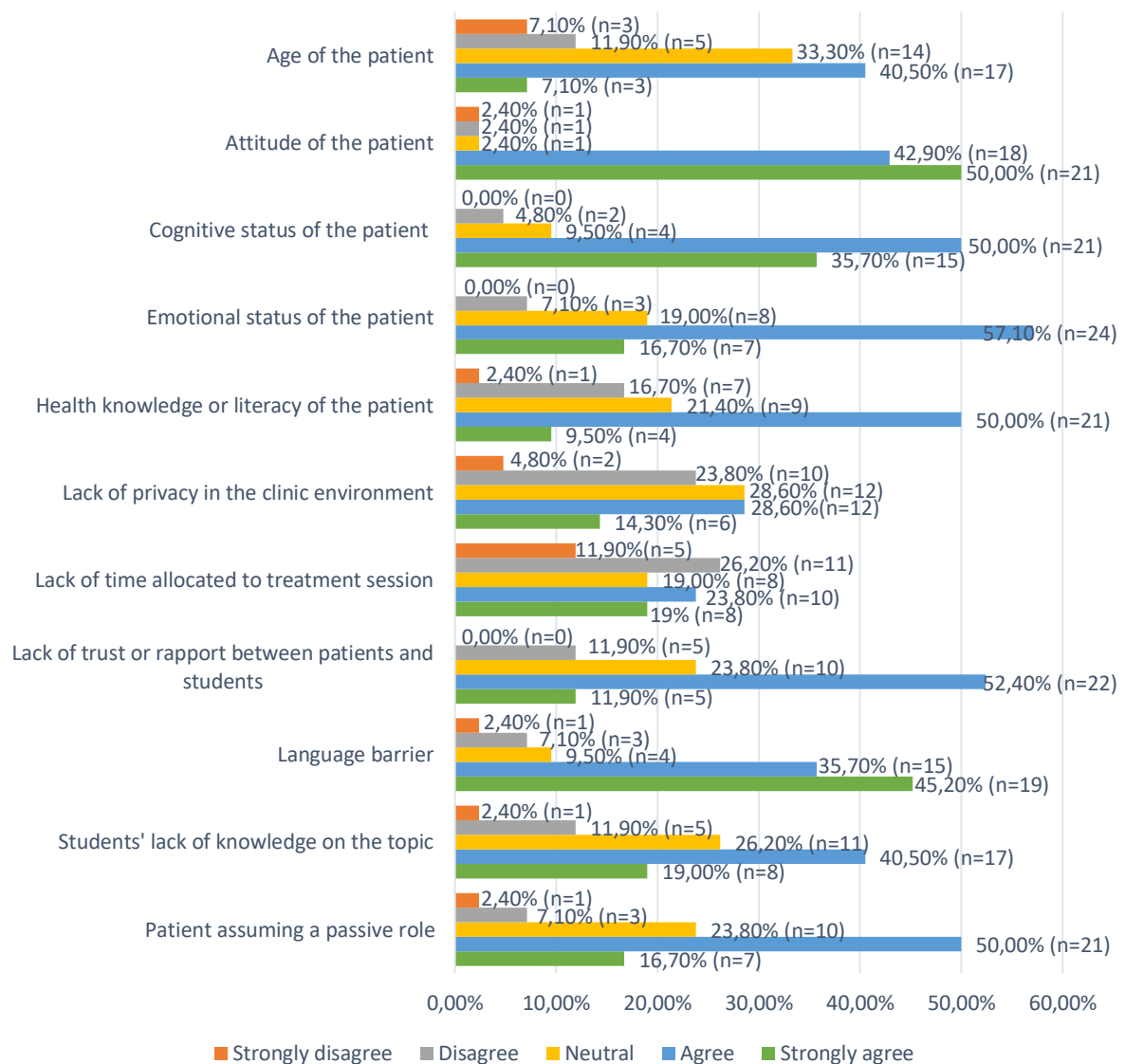


Figure 4.8: Perceived barriers to effective use of patient education

4.4.1 Discussion

This section of the study assessed the barriers that students face while engaging in patient education and thereby to possibly inform about future training opportunities to make patient communication/education easier for students. In modern healthcare, there must be a balance between practical and communication skills (Nicholls *et al.* 2018; Muddle, O'Malley and Stupans 2019). Moreover, the role as a competent communicator and educator during consultations requires that professionals be effective at communicating (i.e., not only being able to explain complex information to the patient but still being able to tailor the information to the patient), regardless of the complexity of a consultation (Wouda and van de Wiel

2015). This includes being aware of potential barriers and being able to identify them but, more importantly, overcoming these barriers by making the necessary changes to information delivery to facilitate the learning process (Beagley 2011). According to Wilesmith, Lao and Forbes (2020), within this framework, it is crucial to understand the factors that may present a barrier to effective patient education, as previous literature has demonstrated that these perceived barriers negatively affect how students may engage in patient education (Sluijs, van der Zee and Kok 1993).

As a healthcare provider, in order to communicate with patients while they are angry, experiencing pain, or those who present with difficult questions, one requires refined communication skills (Nicholls *et al.* 2018). For example, patient education may be avoided altogether by those who are inexperienced due to fear of receiving unpredictable questions or due to them feeling insecure in an unfamiliar situation (Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015). For all practitioners, performing these skills becomes extremely challenging in cases where a language barrier exists or where a patient is cognitively challenged (intellectual disability), or when a patient is stressed or anxious (Kai 2005; Catana 2014; Nicholls *et al.* 2018). In this context, it is also relevant to chiropractic students as they will be future healthcare providers.

This study found that lack of privacy in the clinic environment and lack of time allocated to treatment sessions were reported to be the least obstructive to effective patient education delivery. In contrast, the age of the patient was reported to be a challenging factor for almost half of the students in this study, while the remaining eight barriers included in this study, more than half of the students found these to be challenging and hinder effective delivery of patient education. Among the barriers found to be most challenging for students, most of the perceived barriers are associated with the characteristics of patients, most notably the patient's attitude, cognitive status and language. These findings are not exclusive to chiropractic students alone, as physiotherapy students (Holmes 1999), novice physiotherapists (Forbes *et al.* 2017b) and experienced physiotherapists (Forbes *et al.* 2017a).

Authors from all three of these studies concluded that these findings demonstrate a need for future training specific to patient education, as it is evidence of the perception among therapists (and students) that the characteristics of a patient and how they present have more influence on the outcome of patient education (whether it is successful or unsuccessful), rather than aspects which they can actually control (such as their own knowledge) (Holmes 1999; Forbes *et al.* 2017a; Forbes *et al.* 2017b). Thus, efforts are needed to ensure that professionals are equipped with the necessary life skills and strategies to identify, manage, and improve their self-efficacy regarding these barriers

(Forbes *et al.* 2017a). Although the discussion appears heavily reliant on research within physiotherapy, the findings are both important and relevant, especially when viewed alongside the systematic review of Muddle, O'Malley and Stupans (2019), who found that as a result of the paradigm shift in healthcare towards patient-centred care, more than 20 years ago, the medical profession completely remodelled their curricula to include communication skills training for students prior to their clinical placements. The authors found that the research field regarding communication skills training is dominated by physiotherapy. At the same time, there is a clear lack of research that indicates any changes similar to the medical profession have occurred in chiropractic (Muddle, O'Malley and Stupans 2019).

Considering the statement by Nicholls *et al.* (2018) that not all communication skills are learnt naturally, and as shown in the abovementioned physiotherapy studies (Holmes 1999; Forbes *et al.* 2017a; Forbes *et al.* 2017b), the results of this study at DUT also indicates the need for future training for patient education. For instance, the training, as proposed by Forbes *et al.* (2018a; 2018b), aids students in navigating the communication aspect of the clinical encounter more efficiently and facilitates the patient education process.

4.5 OBJECTIVE FOUR

Question 12 was used to answer the fourth objective: To investigate chiropractic students' perceived factors that enables them to develop their patient education skills. All items were rated between 'important' and 'very important' on average. The Cronbach's alpha was 0.693.

According to the results, the factors contributing the most to the skills development of students include interaction with clinicians, chiropractic studies, CPD courses, interaction with peers and personal experience with patients. The percentages reflected that:

- 92.8% of participants reported interaction with clinicians as 'important' or 'very important' in their patient education skills development.
- 85.7% of participants reported chiropractic studies as 'important' or 'very important' in contributing to their patient education skills development.
- For all three of the remaining factors, CPD courses, interaction with peers and personal experience with patients, 78.6% of participants reported these to be 'important' or 'very important' in contributing to their patient education skills development.

According to the results, the factors contributing the least to the skills development of students include limited patient interaction (e.g., COVID-19 or absence from clinic) and institutional opportunities for professional interpersonal skills. Of these activities the following percentages indicate the range:

- 57.1% of participants reported limited patient interaction as ‘important’ or ‘very important’ in their patient education skills development.
- 69.1% of participants reported institutional opportunities for professional interpersonal skills to be ‘important’ or ‘very important’ in contributing to their patient education skills development.

Only two of the eight items related to Question 12 had ratings of ‘not important’. These include item 6 ‘limited patient interaction (e.g., Covid-19 or absence from clinic)’ ($n=2$) and item 8 ‘post school training and/or experience outside of chiropractic studies (leave blank if not applicable)’ ($n=1$). In addition, only 29 of the 42 participants answered item 8, as this item required participants to leave the item blank if it was not applicable. Of the 29 participants that answered item 8, 79.3% of the participants rated post-school training and/or experience outside of chiropractic studies as ‘important’ or ‘very important’.

Open ended responses to Question 12 included the response that that the respondent had a BSc with one of the majors in Psychology and that this had played a big role. The same respondent felt that it was an important component in patient interaction and developing patient empathy.

Table 4.8: Perceived factors contributing to patient education skills development

		Not important	Slightly important	Moderately important	Important	Very important	Median
Q12 - Chiropractic studies	Count (n)	0	0	6	15	21	5
	Row N %	0.0%	0.0%	14.3%	35.7%	50.0%	
Q12 - Continuing education courses (CPD courses)	Count (n)	0	1	8	13	20	4
	Row N %	0.0%	2.4%	19.0%	31.0%	47.6%	
Q12 - Interaction with colleagues (e.g., clinicians)	Count (n)	0	2	1	14	25	5
	Row N %	0.0%	4.8%	2.4%	33.3%	59.5%	
Q12 - Interaction with colleagues (e.g., peers)	Count (n)	0	1	8	17	16	4
	Row N %	0.0%	2.4%	19.0%	40.5%	38.1%	
Q12 - Institutional opportunities for professional interpersonal skills	Count (n)	0	5	8	16	13	4
	Row N %	0.0%	11.9%	19.0%	38.1%	31.0%	
Q12 - Limited patient interaction (e.g., COVID-19 or absence from clinic)	Count (n)	2	5	11	10	14	4
	Row N %	4.8%	11.9%	26.2%	23.8%	33.3%	

Q12 - Personal experience with patients	Count (n)	0	1	8	11	22	5
	Row N %	0.0%	2.4%	19.0%	26.2%	52.4%	
Q12 - Post school training and / or experience outside of chiropractic studies (leave blank if not applicable)	Count (n)	1	1	4	9	14	4
	Row N %	3.4%	3.4%	13.8%	31.0%	48.3%	

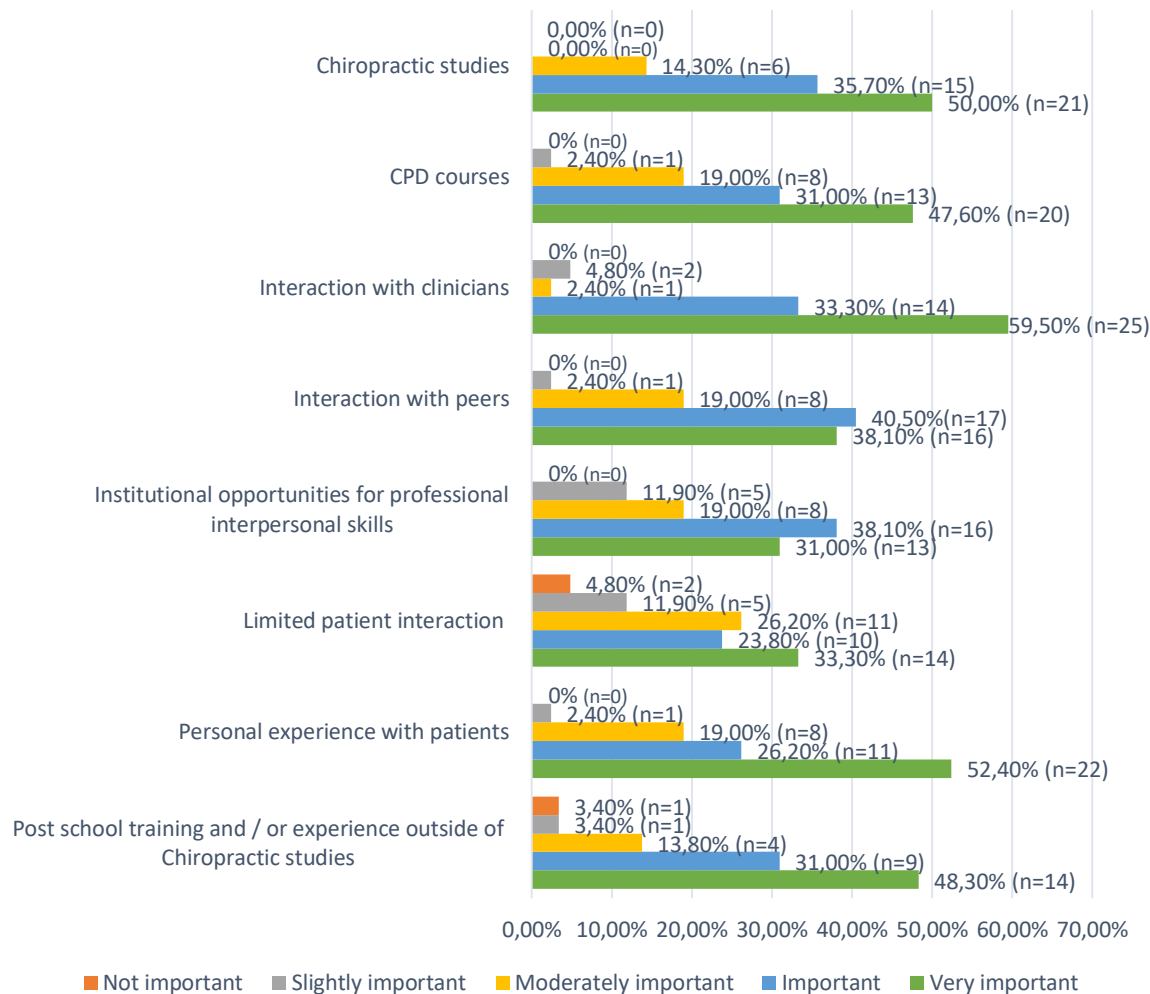


Figure 4.9: Perceived factors contributing to patient education skills development

4.5.1 Discussion

Now that patient-centred care is at the forefront of professional education, it is imperative that a balance exists between the clinical (psychomotor) skills that are required to be a competent practitioner and effective communication skills (Nicholls *et al.* 2018). According to a recent systematic review, there is abundant evidence regarding how communication skills are delivered to medical and physiotherapy students and how they develop their patient-centred communication skills (Muddle, O'Malley and Stupans 2019). For chiropractic, however, this is not the case, as insufficient evidence exists to describe

whether chiropractic students are trained in communication skills or how they are trained (Muddle, O'Malley and Stupans 2019). This is particularly noteworthy as several communication skills are not acquired naturally and therefore warrant training to provide the best possible clinical encounter for both patients and practitioners (Aspegren 1999; Muddle, O'Malley and Stupans 2019). To illustrate, earlier research on chiropractic students has demonstrated that patient education can be improved (Grand, Morehouse-Grand and Carter 2016; Stomski *et al.* 2019). The importance is further emphasised by Hecimovich and Volet (2012), who found that during their clinical internship (which is generally their first encounter with real patients), chiropractic students' primary focus was on manipulative procedures.

Prior to entering clinical practice, chiropractic students need to master their communication skills and become confident in these skills since the profession relies heavily on patient communication during all clinical encounters (Hecimovich and Volet 2009), especially since refined communication skills are a specific requirement to educate patients effectively (Nijs *et al.* 2013). This study investigated the factors that contribute to the students' development of patient education skills, given that there is a paucity in the literature regarding how communication skills are taught to chiropractic students and how they develop communication skills, specifically in the context of patient education.

Previous literature investigating how chiropractic students develop professional confidence in their skills outlines that enactive mastery, or the personal experience, is the most powerful contributor to self-efficacy to master a skill, which becomes relevant to chiropractic students during their clinical internship when working with patients under supervision by clinicians (Hecimovich and Volet 2009). Similarly, various studies have identified direct experience with patients as the most significant factor in developing patient education skills (Holmes 1999; Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015; Forbes *et al.* 2017a; Wilesmith, Lao and Forbes 2020). Interestingly, this study found that the most influential factor in developing their patient education skills for chiropractic students was their interaction with clinicians. As this study was conducted during the COVID-19 pandemic, one possible explanation for this, in terms of the 5th and possibly 6th year students, could be that students were not being able to interact with patients as much as they would have previously and that most of their interactions were with the clinicians. This explanation is less likely for the senior years as they would have had several interactions with patients in clinic and sports/community events prior to the pandemic.

In the paper by Hecimovich and Volet (2009), the interaction between the clinicians and students is referred to as a vicarious experience, as described by Bandura (1986). Within

this context, the supervising clinicians serve as a role model who have the ability to inspire beliefs in the students and may influence their lives (Hecimovich and Volet 2009). A previous study at DUT concurs with the authors in this regard. As part of the clinical experience at DUT, the role of the supervising clinicians was regarded by chiropractic students as an integral part of professional, academic and professional development, and they viewed the clinicians as a valuable resource (Ganesh 2017).

It is imperative that clinical supervisors are made aware of the shortcomings in the patient education of students since they play a significant role in developing those skills. In particular, there is a widespread misconception among the students that bone-out-of-place theory or spinal misalignment is important, but more importantly because students communicate such information to patients despite recommendations not to do so. Additionally, the clinicians themselves may hold such beliefs and pass them on to the students. Within the context of DUT, the beliefs of the supervising clinicians are unknown; therefore, commenting on their beliefs, practice and subsequent advice they provide to students is beyond the scope of this study. However, both instances discussed above would necessitate intervention, regardless of which possible explanation may be true (i.e., clinicians need to be made aware, followed by providing appropriate advice to students, or the beliefs that they may pass on to students need to change and be up to date). It would be beneficial for future studies to explore the topic of beliefs of supervising clinicians.

While the study by Ganesh (2017) found that most students agreed that their clinical experience improved their confidence and competence, the current study adds to this understanding that the clinical experience primarily applies to the practical skills of students, as the same experience did not translate to the patient education skills to the same extent. Perhaps the perceived barriers, particularly the patient characteristics as previously discussed, make it more difficult for students to navigate the process and to apply their skills accordingly. If the attitudes of patients, cognitive status, language or emotional status make it difficult to effectively educate their patients, it may negatively impact their perception of these situations, thereby making the personal experience component less effective, at least in terms of their ability to communicate with patients in these circumstances. In that case, there is an indication of a lack of skills to overcome these barriers.

As Hecimovich and Volet (2009) point out, a person's successes help to instil a strong sense of confidence in that person's own abilities, while failures erode the sense of confidence, even more so when self-efficacy in relation to a particular task is still developing. As such, a resilient sense of efficacy then depends on overcoming challenges through perseverance with effort, which is especially important for chiropractic students during their clinical

experience when they are only starting to apply their skills in a clinical context (Hecimovich and Volet 2009). The finding of personal experience not contributing to the same extent to patient education skills from more than one profession, as well as practical skills, concurs with the recommendation under perceived barriers where future training is needed. This recommendation for future training is since students do not appear to have the necessary skills to overcome those barriers yet, which leads to decreased impact of those personal experiences contributing to their skill development.

When taking this into account, it was therefore surprising that the second most contributing factor in this study was chiropractic studies, as no specific subject or module is dedicated to teaching patient communication or education (Durban University of Technology 2020), whereas the perceived barriers would indicate that there is an apparent need. According to Levinson, Lesser and Epstein (2010), in the absence of systematic communication skills training, one is left to their own devices to acquire these skills, but more importantly, one may not even realise that the current skills could be improved, or that additional skills exist. Perhaps the contribution of chiropractic studies to their patient education skills is the content provided to patients rather than how to overcome perceived barriers. However, the section that assessed the frequency of content delivered to patients also identified areas in need of improvement, in addition, other studies concerning chiropractic students also found information delivered to patients to be in need of improvement (Grand, Morehouse-Grand and Carter 2016; Stomski *et al.* 2019). Perhaps it needs to be considered that the underlying need in students is the need for them to be given scripted information to give to patients as the students' own problem-solving skills are lacking and, therefore, they cannot deal with situations that are constantly changing in patients. However, considering Levinson, Lesser and Epstein (2010) indicating the importance of systematic training of communication skills, and Muddle, O'Malley and Stupans (2019) outlining a lack of evidence and reporting on communication skills training in chiropractic, as well as the frequency and perceived barriers included in this study, the chiropractic studies do not contribute to the extent that patients perceive it to. Similarly, institutional opportunities for developing interpersonal skills (guest lectures or in-services provided by the university) were among the factors that contributed the least to their skills development.

Other factors that were important to students in contributing to their skills development were CPD courses and interaction with peer students. For the students to graduate, they are required to attend CPD courses as part of their internship programme. Apart from the requirements set by DUT, the governing body of chiropractic in South Africa (the Allied Health Professions Council of South Africa) also set requirements that students need to meet before they can graduate. Students need to complete an internship portfolio that

consists of 900 hours of activities, for instance, additional lectures/courses that do not form of DUT requirements/programme (AHPCSA 2019). These lectures/courses/sessions include 'life skills' (i.e., 'personal growth and development') where 'development of interpersonal skills' is one of many options (AHPCSA 2019) that students can choose from to complete the 'life skills' component. However, courses or lectures regarding patient communication skills are not a specific requirement for their internship portfolio (AHPCSA 2019). Although it was reported among the top contributors, the importance may have been affected by 5th year students still occupied with their academic component of their Master's qualification. For them, CPD courses may not be as important compared to their senior students as they may not necessarily want to add learning extra information on top of their academic requirements. The finding of the significant contribution of peer students is in line with the paper by Hecimovich and Volet (2009), which illustrates the vicarious experience of students in their development of confidence and competence through peer modelling and social comparison.

The two least contributing factors were limited patient interaction (i.e., COVID-19) and post-school training or experience outside of chiropractic studies. This study was conducted during the COVID-19 pandemic, with restrictions in place to reduce personal contact to limit the spread of the virus. As such, this study investigated whether only being able to help patients over WhatsApp or social media had an impact on their patient education skills. According to the results, this had little effect on the students' development of patient education skills, while post-school training contributed even less.

4.6 OBJECTIVE FIVE

4.6.1 Description of the Participants' Demographics

In total, 42 participants completed the questionnaire. Most participants were female (68.3%) with no previous qualification (90.5%) and were in their 6th year or 7th year of study (29% respectively). Their mean age was 26, ranging from 22 years of age to 33 years of age. The four students studied a prior qualification, including a Bachelor's Degree in Social Science, Bachelor's Degree in Life Science, Bachelor's Degree in Sports Science and Personal Training.

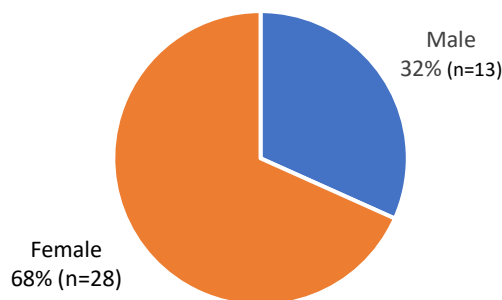


Figure 4.10: Gender of participants

Table 4.9: Demographics description of the sample (n=42)

		Count (n)	Column N %
Q1 - 1. What is your gender?	Male	13	31.7%
	Female	28	68.3%
Q3 - 3. What is your year of study?	5th year (first Master's registration)	10	24.4%
	6th year (second Master's registration)	12	29.3%
	7th year (third Master's registration)	12	29.3%
	8th year (fourth Master's registration)	4	9.8%
	9th year (fifth Master's registration)	3	7.3%
Q4 - 4. Do you have prior qualifications or studied another degree before chiropractic	Yes	4	9.5%
	No	38	90.5%

Table 4.10: Descriptive statistics of age of the sample (n=42)

Q2 - 2. What is your age?	Mean	26
	Standard Deviation	3
	Minimum	22
	Maximum	33

Table 4.11: Age of the sample (n=42)

Age	22	23	24	25	26	27	28	29	30	31	32	33
N	2	5	9	6	5	5	3	0	5	0	1	1

4.6.2 Gender

With regards to the previously mentioned chiropractic studies, due to a lack of gender-specific demographical data (Hawk *et al.* 2005; Grand, Morehouse-Grand and Carter 2016; Hawk, Ramcharan and Kruger 2017; Haworth, Horstmanshof and Moore 2021) and students not being accessed directly (Ndetan *et al.* 2010; Evans *et al.* 2011), the gender of participants can only be compared to the studies by Hawk *et al.* (2004) and Evans, Ndetan and Williams (2009). In terms of studies that assessed patient education by Forbes *et al.* (2017a); Forbes *et al.* (2017b), which had a similar structure to this study, these studies had twice as many females participating in their studies, which was like the findings in this study at DUT.

In total, 42 participants completed the questionnaire. Of the 42 participants, 31.7% were male ($n=13$) and 68.3% were female ($n=28$). The high prevalence of female student participants in this study contrasts with Hawk *et al.* (2004) and Evans, Ndetan and Williams (2009), where male students were more prevalent.

4.6.3 Age

The mean age of students in this study was 26 years. Of the participants, two were 22 years of age, five were 23, nine were 24, six were 25, five were 26, five were 27, three were 28, five were 30, one was 32 and one was 33.

The estimated mean age of the students in the Hawk *et al.* (2004) study is 27 years, which is comparable to the students in this study. Students in this study at DUT were younger compared to those of Evans, Ndetan and Williams (2009), with a mean age of 29 years. The reason for students in the study by Evans, Ndetan and Williams (2009) being older may be explained by the fact that the cohort was that of graduating students and, thus, they are expected to be among the older students, whereas a smaller portion of students in this study at DUT were as close to graduating as the students in the study by (Evans, Ndetan and Williams 2009).

4.6.4 Year of Study

The DUT chiropractic programme is a five year academic course, in which the students are required to consult with a set number of patients (Durban University of Technology 2020; DUT Chiropractic clinic manual 2020). If after the five years of study students have not completed their patient numbers or failed a certain subject, they need to re-register each year until they have done so. Students are also required to write a partial Master's thesis in order to graduate (Durban University of Technology 2020). If students have not completed

their thesis, they are also required to re-register each year until they have completed their thesis. Hence, the year of study may go beyond the 5th year.

Of the 42 participants in this study, 10 were in their 5th year of study, 12 were in their 6th year, 12 were in their 7th year, four were in their 8th year, and three were in their 9th year of study. Most of the student participants of this research study were in 6th and 7th year. The response rate of 5th year students was 50%. The reason for the low number of participants in 8th and 9th year is that the majority of students graduate around their 6th or 7th year of study at DUT, while some of these were excluded from the main study due to their participation in the focus group and pilot study.

The reason for including higher year students in the focus group and pilot study was that those who were approached to participate were close to graduation but also because they have been practising in the clinic for a significant amount of time and treated a diverse spectrum of patients. Thus, their input is of high value, compared to that of 5th or 6th year students, for instance, with less experience.

Compared to the other chiropractic studies, the study by Hawk *et al.* (2004) included students one year into the chiropractic programme ($n=36$), two years into the programme ($n=38$) and three years into the programme ($n=17$) from 10 of the 16 accredited (from 2000-2001) chiropractic colleges in the United States. Evans, Ndetan and Williams (2009) conducted their study on graduating chiropractic interns ($n=255$) at the Parker College of Chiropractic, while Haworth, Horstmanshof and Moore (2021) conducted their study on a student cohort of chiropractic students in their final six months of their clinic programme ($n=15$) from two university chiropractic programmes in Australia.

4.6.5 Prior qualifications

Only four of the 42 students participating in this study had prior qualifications. These qualifications included a Bachelor's Degree in Social Science, Bachelor's Degree in Life Science, Bachelor's Degree in Sports Science and Personal Training. These results could only be compared to one other chiropractic study (Hawk *et al.* 2004), which included less than 23 BS/BA degrees, 68 BS/BA degrees, three MS/MA/MPH degrees and less than one PhD.

4.6.6 Association Between Demographics and the Perception and Practice of Patient Education

To answer the fifth objective: To determine the association between demographics and the perception and practice of patient education, parametric summary statistics and statistical tests were used. The averaged scores for perceptions and practices were normally

distributed, thus parametric summary statistics and statistical tests were used to describe and compare these scores between the demographic groups. For categorical demographic variables, the mean and median scores are illustrated below. There was no association between the perceptions of students (Table 4.1) and their demographics, nor their practices (Table 4.3).

Table 4.12: Association between demographics and perception and practice of patient education

			Perceptions score	p-value	Practice score	p-value
Q1 - 1. What is your gender?	Male	Mean	4.09	0.421	3.75	0.502
		Standard Deviation	±.34		±.42	
	Female	Mean	4.21		3.85	
		Standard Deviation	±.50		±.46	
Q3 - 3. What is your year of study?	5th year (first Master's registration)	Mean	3.95	0.198	3.53	0.085
		Standard Deviation	±.50		±.41	
	6th year (second Master's registration)	Mean	4.05		3.78	
		Standard Deviation	±.57		±.45	
	7th year (third Master's registration)	Mean	4.39		4.02	
		Standard Deviation	±.32		±.44	
	8th year (fourth Master's registration)	Mean	4.14		3.97	
		Standard Deviation	±.29		±.16	
9th year (fifth Master's registration)	Mean	4.33	3.96			
	Standard Deviation	±.40	±.38			
Q4 - 4. Do you have prior qualifications or studied another degree before chiropractic	Yes	Mean	3.88	0.213	3.63	0.380
		Standard Deviation	±.29		±.37	
	No	Mean	4.18		3.83	
		Standard Deviation	±.47		±.44	

Correlation coefficients and p -values for the relationship between age and perceptions scores and age and practice scores are illustrated in Table 4.13. There were no correlations between age and either of the two scores.

Table 4.13: Perception and practice scores compared to age

		Q2 - What is your age?
Perceptions score	Pearson Correlation	0.079
	Sig. (2-tailed)	0.621
	N	42
Practice score	Pearson Correlation	-.020
	Sig. (2-tailed)	.902
	N	42

4.6.7 Discussion

The majority of the participants in this study were female, which concurs with another study (Ford 2013), which found that previous questionnaire studies in South Africa have demonstrated a high prevalence of women in the chiropractic profession in South Africa (Mathews 2006; Bunge 2009; De Gouveia 2009; Fletcher 2009). Surprisingly, this study did not reveal any association between demographics and the perception and practice of patient education. In part, this finding concurs with a recent study conducted at the

University of Johannesburg (Ismail *et al.* 2022), in which the authors also found no association between demographics and attitudes toward patient-centred care. Similar to this study at DUT where the students agreed that most of the items in the questionnaire were important and should be discussed with patients, the students in the UJ study also exhibited a positive attitude towards patient-centred care overall. However, in contrast to this study at DUT, the authors did find an association between demographics and patient-centred care, where sharing power, responsibility and information with patients were more prevalent among the male students compared to the female students (Ismail *et al.* 2022).

In contrast to previous studies, apart from the UJ study mentioned above, this study at DUT found no association between demographics and patient education perception and practices. Previous studies found clinical experience (years that they have been in that role, that is clinical practice and as an educator for patients) to play a role in the competence of patient education as well as a more patient-centred approach to it in clinical practice (Holmes 1999; Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015; Forbes *et al.* 2017b). Thus, it was expected that as the students in this study progressed through the chiropractic programme (from 5th year to 6th, 7th, 8th and 9th) at DUT, their perception and practices might change. According to Svavarsdóttir, Sigurðardóttir and Steinsbekk (2015) healthcare providers with extensive experience in patient education agree that further continuing education is needed for them not only to maintain their competence but also to continue to refine their ability to teach patients (Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015). This recognition for ongoing professional development could indicate how these professionals' views change, and subsequently how they realise that they need to improve their skills.

Leisure time is often used to improve patient education skills; those with heavy workloads or limited time may not be motivated to pursue formal continuing education (Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015). Therefore, since the 5th year chiropractic students are under heavy workloads, a new chiropractic programme started in 2020, of which the 5th year class was a part of, which had a less intense workload compared to senior students' (6th, 7th, 8th and 9th) programme. Thus, this argument may not apply to them entirely. While the argument for senior students are that they are likely to be preoccupied with their research studies and internship portfolio, as such refining communication skills, may not be a priority, especially in patient education, as patient communication is not a specific requirement for the internship portfolios (AHPSCSA 2019). Moreover, given that chiropractic students tend to focus on developing clinical (joint manipulation) skills rather than communication skills during their course (Hecimovich and Volet 2012), it is reasonable to assume that there is also a possibility that the continuing education they pursue is aimed at improving their manipulation skills or other aspects of patient management.

Furthermore, a lack of interest in patient education also impedes further development of this skill, and this characteristic may explain why some are experts at educating patients while others are not (Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015). Therefore, should the chiropractic students lack an interest in the subject of patient education, they may not be motivated to further improve this skill. Future research should explore whether chiropractic students are interested in this topic and how they intend to improve this skill if they are indeed interested, and how their development has affected perceptions or practice.

As discussed in this chapter previously, if students themselves are struggling with problem-solving, they cannot help their patients to solve problems effectively and, thus, the students do not address issues that they should during the patient interaction, the education of the patient, and their own education. Another explanation for no association between demographics and the perception and practice of patient education may be related to a lack of training specific to patient education. According to the studies mentioned above, experience translates into competency in educating patients (Holmes 1999; Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015; Forbes *et al.* 2017b), which is similar to Levinson, Lesser and Epstein (2010), illustrating the importance of systematic teaching of communication skills.

Dandavino, Snell and Wiseman (2007) argue that experience alone is insufficient and the teaching of communication is required which essentially prepares students to communicate with patients, as communication skills are not a personality trait. The finding of no association between demographics and perceptions and practice in this study agrees with Dandavino, Snell and Wiseman (2007) since the students in this study have different levels of clinical experience at the DUT CDC, but all of them followed the same curriculum. It is possible that experience alone does not have a sufficient impact on their development of this skill, as there was no apparent improvement from 5th year to 9th year students. However, the number of student participants in each year in this study was too small to draw this conclusion, and needs to be confirmed by a qualitative study in the future. In addition, since this study is only reporting on the average scores, it needs to be taken into consideration that the learned practices of the senior students may have been negated by the junior students (who did not report the same).

Being good at educating patients requires an active role, whereby the teacher/educator (in this case, the chiropractic students) take on the role of a learner as well, where they reflect on their own learning needs and actively search for knowledge to improve their skill as an educator (Svavarsdóttir, Sigurðardóttir and Steinsbekk 2015). Dandavino, Snell and Wiseman (2007) make a valid argument in this context; similar to how a clinician would help a patient to acquire knowledge that they need to help themselves, a teacher would help the

students to acquire the knowledge to help themselves. Therefore, the teaching of communication skills should initially focus on teaching global skills prior to local skills; then the complexity should increase, followed by an increase in diversity where a broad range of strategies are required; and it should be explained and made clear to students the necessary skills to be used and the reasons why they are used (Dandavino, Snell and Wiseman 2007).

Given that there is no evidence of systematic communication skills training in the curriculum (Durban University of Technology 2020), their preparation to effectively communicate complex information or tailoring information to the different contexts of different patients can be questioned. As no association was found between the demographics and perceptions and practice, this would support the fact that the students need communication skills training to prepare them for their role as future educators and to communicate effectively.

4.7 SUMMARY AND CONCLUSION

In general, the students perceived most of the items to be important to discuss with their patients. Although they perceived most items to be important, they practiced few of them to the same extent. In terms of their practice behaviour, the students mostly focussed their educational efforts towards issues that relate directly to the musculoskeletal complaints of patients, which was consistent with other studies from South Africa (chiropractors) and Australia (physiotherapists). Students mostly used one-on-one discussions, physical demonstration and anatomy models to educate their patients, and spent between 6–10 minutes and 11–15 minutes on education during initial visits, and 6–10 minutes during follow-up visits. Students mostly identified characteristics of patients as a barrier to effectively educating them. The interaction with their supervising clinicians played the biggest role in their skills development. No association was found in this study for demographics and perceived importance and practice behaviour.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

This study was the first to explore the perceptions and practices of chiropractic students at the Durban University of Technology. Considering the paradigm shift in healthcare, patient-centred care is now a cornerstone of modern healthcare and has become a core value for professionals. The framework of patient-centred care calls for healthcare professionals to be equally skilled in their communication skills with patients as they are with their practical skills.

Patient education is an essential aspect of communication skills, particularly in the information era, where patients want to be more informed regarding their conditions and steps that they can take to improve their health. Patient education focuses on supporting and empowering patients by influencing their choices to achieve a permanent change that is in their best interest rather than persuasion. Considering there is a paucity in the literature about the communication skills of chiropractic students, particularly regarding patient education, this study sought to bridge the gap in the literature.

There is a real opportunity to instil resilience in patients in the face of difficulties associated with musculoskeletal conditions and to reduce the burden of these conditions, especially cost, pain, and function, through appropriate patient education. In their roles as future clinicians, the chiropractic students will be responsible for showing patients how to help themselves. As the literature review revealed, patient education goes far beyond what it appears to be on the surface. It involves much more than simply informing patients about their diagnosis or prognosis. This study aimed to explore the perceptions and practices of patient education among chiropractic students, the methods used to educate patients, perceived barriers to providing it effectively and the factors associated with developing patient education skills. In addition, the study explored whether there is any association between the demographics of students and their perceptions and practices.

Most of the participants in this study were female, and most were in their 6th and 7th year of study. With regards to the perceptions of chiropractic students, this study found that the students consider most topics to be important. However, most of these topics considered to be important are directly related to the main complaints of their patients, with more complex topics such as social support, problem-solving strategies, counselling on psychological problems, pain neuroscience education and exploring patient ideas and

perceptions not being perceived as important as those directly related to the complaint such as diagnosis.

The results indicate that at DUT, the topics that chiropractic students discuss with their patients seem to be diverse. Although students report to address a diverse range of topics during consultations, the content they engage in the most frequently are those that are directly related to the main complaints of patients. That is diagnosis, prognosis, demonstration and verbal instruction needed for exercise and activity pacing. Within this context, the chiropractic students meet the current clinical practice guidelines for musculoskeletal pain in terms of explaining diagnosis and prognosis, but less so for addressing psychological issues.

Based on this study, it appears that more complex topics, which are not directly related to the main complaint but rather to long-term self-management, beliefs and concerns of patients, are being avoided, compared to issues directly related to the main complaints of patients. These topics include advice on social support, activities of daily living, problem-solving strategies, as well as topics that are more personal, such as exploring patient ideas and perceptions, asking patients about their concerns, and counselling about psychological problems. In relation to this, it is also necessary to consider student maturity (which is unrelated to age) and life experiences: for example those who are attached to technology/social media may have a limited scope in dealing with interpersonal issues and being able to consider issues outside of the immediate when they have a patient sitting in front of them during consultations.

Overall, the results of this study suggest that perception does appear to influence the practice of patient education, as three of the five content topics perceived to be most important were also practised the most, while four of the five topics perceived to be the least important were practised the least. However, since all practice frequency results are self-reported and may not be a true reflection of actual practice, a degree of caution should be used with the interpretation of these results.

Among the findings of this study, the perceived importance and practice frequency of providing pathoanatomical explanations, such as bone-out-of-place theory or spinal misalignment, is a significant discovery of this study. Current evidence does not support these explanations and recommends against them (Funk *et al.* 2018; Gíslason *et al.* 2019; Leboeuf-Yde *et al.* 2019; Innes, Leboeuf-Yde and Walker 2020). Moreover, these theories are currently taught only in a historical context, which is thus surprising that the students perceive it to be important to provide patients with such explanations. Although fewer students actually provide patients with such explanations compared to those who perceive

it to be important, this is still significant as it may negatively impact the self-efficacy of patients and create a dependent relationship upon the chiropractic students for routine correction.

Instead, there should be a focus on correct, current and evidence-based explanations for patients, emphasising self-management and directing their attention to self-management rather than routine correction. Perhaps it may be that the students see these theories as the essence of chiropractic, simply put, what makes chiropractic, chiropractic, and sets it apart from other professions.

Students reported mainly spending between 6–10 minutes and 11–15 minutes on patient education during initial consultations. They rarely reported spending more than 20 minutes on patient education during initial consultations with a patient. There is a notable decrease in time spent on patient education from the initial consultation to the follow-up visit. During follow-up visits, students are less likely to spend more than 10 minutes on patient education, instead spending between 1–5 minutes or 6–10 minutes on patient education.

In terms of the delivery of patient education, students mostly reported delivering patient education through one-on-one discussion, physical demonstration, and anatomy models. The chiropractic students were less likely to deliver patient education through methods allowing patients to refer to what has been discussed or read in their own time, such as links to online websites or personalised handouts. None of the students reported using generic handouts

Simply providing information to patients without an assessment of a patient's understanding of what has been discussed is not a true reflection of patient-centred care. For information to be truly individualised, the information should be presented in a manner that accommodates the learning styles of patients. By evaluating the patient's understanding, the chiropractic students can identify the information that needs to be addressed differently to facilitate understanding. The most common method that students used to assess their patients' understanding by far was to ask them to repeat the demonstration of movement, position, or activity. This was followed by slightly more than half of the students reporting to interpret signals from patients indicating that the patient understands, and asking patients to repeat in their own words what has been discussed.

This would indicate that the students are more concerned with physical activity rather than discussions. If chiropractic students are indeed more focused on their practical skills rather than their communication skills, as suggested by previous literature (Hecimovich and Volet 2012), it is surprising that they do not assess the patient's understanding of what has been discussed more frequently. These results could serve as a basis for future research on

whether they are more confident in their explanations and that patients understand or whether they do not give as much importance to patients' understanding of communication as much as they do to physical activities.

Student perceptions of barriers to providing patient education are important since these barriers may prevent students from engaging in patient education to a lesser extent or altogether. To educate patients, the students need to be effective communicators, which would require them to be able to adjust to any situation regardless of complexity. This does not necessarily mean they should not experience any difficulty, only that these factors should be challenges rather than actual barriers. Previous studies indicate that experience is a significant factor in being able to adjust to difficult situations, while others argue that it is not enough and that teaching communication skills are needed prior to clinical placement. In agreement with previous research on perceived barriers to patient education, this study found that patient characteristics present the greatest barrier. This is indicative of future training needs of students to equip them with the necessary skills to navigate the patient education process effectively and presents an opportunity to shape the perceptions of students so that they do not perceive patient characteristics as a barrier to educating the patient.

Considering that a structured approach to teaching communication skills is not part of the current DUT curriculum for chiropractic students, one of the objectives of the study was to identify the factors that contribute to the patient education skills of students. According to the students, supervising clinicians contributed the most to their skills development. Although there is no specific subject dedicated to communication skills training or patient education, students rated chiropractic studies as the second most important in contributing to their skills development. In addition, two-thirds of the students reported institutional opportunities to be important in their skills development. This presents another opportunity for patient education to improve at DUT, where the chiropractic student council or WCCS could play a role in organising guest lectures for students.

Lastly, the study sought to investigate the correlation between the demographics of students and their perceptions and practice. Unfortunately, this study revealed no correlation between demographics and perceptions or practice. This is in contrast to previous studies that found that experience was necessary for moving toward a more patient-centred approach and being able to better adapt patient education to different patient contexts. As no association was found between the demographics of students in this study, perhaps a different methodological approach such as a qualitative study should be considered for future research on this topic. Another issue may have been the response rate.

Although 63% of registered students participated in the study, most participants were either in their 6th or 7th year of study, making up 60% of the total study sample. Consequently, the results are heavily influenced by only those two years. Considering the low participation rate from the 5th year students, it is strongly advised for future studies to include more students in their first year of the clinical practicum, which should allow for a more accurate measurement of an association between demographics and perceptions and practice. Nonetheless, as no association was found in the current study, it may suggest that experience alone indeed is not enough for communication skills development and that future training is needed, as is well documented in the literature.

5.2 RECOMMENDATIONS

As this was a cross-sectional study, which provides information to improve understanding of a phenomenon at a given point in time, a longitudinal study may provide a better understanding of how patient education evolves among the chiropractic student population.

For future studies, because of the findings of this study:

- Qualitative research may be better able to describe the perceptions of students regarding the importance of patient education content, barriers and skills development.
- A better description of an association between demographics, perception and practice may be best represented by a qualitative study.
- Since the perceived importance of pathoanatomical explanations is considerably higher among the DUT chiropractic students, compared to that reported at another chiropractic programme, future research is needed to determine why the students not only perceive it to be important but also why students continue to provide such explanations to patients.
- Future research is also needed to determine why the adoption of pain neuroscience education is so low among chiropractic students.
- Future research is warranted to establish whether students perceive the following topics to be part of their scope of practice or not, for which this study provides a strong foundation: social support, problem-solving strategies, counselling on psychological problems, pain neuroscience education and exploring patient ideas and perceptions. A more in-depth description of self-management strategies and exercise programmes provided to patients is needed. This study only addressed self-management or exercise as 'umbrella' terms. The methodology did not allow for

an in-depth description of what exactly it is that they consider to be self-management or which exercises or programmes they prescribe to patients.

- As none of the students reported using printed handouts, future studies are needed to determine the most patient-friendly and informative material to include in the development of such handouts, which the students can use in the future.
- Patient perspectives of the education they receive during consultations also need to be evaluated, as this would give an indication as to whether their needs are indeed being met, more specifically, in terms of their understanding.

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APPENDICES

Appendix A: Email Correspondence from Dr Roma Forbes Providing Permission to Replicate Study at DUT

Roma Forbes <r.forbes2@uq.edu.au>

Jun 3,
2020,
12:07 AM

No problem Hardus

Do you have the survey? I think it is in the paper?

Otherwise, I can find something to send.

Cheers

Appendix B: IREC Full Ethical Clearance



4 June 2021

Mr H Nieuwenhuis
31 Ridge Road
La Lucia
4051

Dear Mr Nieuwenhuis

Chiropractic students' perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic
Ethics Clearance number IREC 047/21

The Institutional Research Ethics Committee acknowledges receipt of your final data collection tool for review.

We are pleased to inform you that the data collection tool has been approved. Kindly ensure that participants used for the pilot study are not part of the main study.

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



Prof J K Adam
Chairperson: IREC

Appendix C: Permission from Chiropractic Head of Department

MEMORANDUM

To : Prof Adam
Chair: IREC

From : Dr Desiree Varatharajullu
Head of Department: Chiropractic
Clinic Director: Chiropractic Day Clinic: Chiropractic

Date : 12.04.2021

Re : Request for permission to use the Chiropractic Day Clinic for research purposes

Permission is hereby granted to:

Mr Hardus Nieuwenhuis (Student Number: 21350044)

Research title: "Chiropractic students' perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic".

Mr Nieuwenhuis, is requested to submit a copy of his FRC/IREC approved proposal along with proof of his M.Tech: Chiropractic registration to the Clinic Administrator/s before he starts with his research in order that any special procedures with regards to his research can be implemented prior to the commencement of him seeing patients.

Thank you for your time.

Kind regards



Dr D Varatharajullu

Head of Department: Chiropractic

Clinic Director: Chiropractic Day Clinic: Chiropractic

Cc: Mrs Linda Twiggs: Chiropractic Day Clinic

Dr P. Maharaj: Supervisor

Dr C. Korporaal: Co-supervisor

Appendix D: Permission from Post Graduate Research Director



*Directorate for Research and Postgraduate Support
Durban University of Technology
Tromso Annexe, Steve Biko Campus
P.O. Box 1334, Durban 4000
Tel.: 031-3732576/7
Fax: 031-3732946*

13th April 2021
Mr Hardus Nieuwenhuis
c/o Department of Chiropractic and Somatology
Faculty of Health Sciences
Durban University of Technology

Dear Mr Nieuwenhuis

PERMISSION TO CONDUCT RESEARCH AT THE DUT

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research and Innovation Committee (IRIC) has granted **Gatekeeper Permission** for you to conduct your research "Chiropractic students' perception and practice of patient education management of musculoskeletal conditions at a tertiary education teaching clinic" at the Durban University of Technology. **Kindly note that this letter must be issued to the IREC for approval before you commence data collection.**

The DUT may impose any other condition it deems appropriate in the circumstances having regard to nature and extent of access to and use of information requested.

We would be grateful if a summary of your key research findings would be submitted to the IRIC on completion of your studies.

Kindest regards.
Yours sincerely



DR LINDA ZIKHONA LINGANISO
DIRECTOR: RESEARCH AND POSTGRADUATE SUPPORT DIRECTORATE

Appendix E: Original Questionnaire by Forbes *et al.* (2017a)

Patient education practice of physiotherapists; a national survey

Information for participants

Eligibility

We are seeking registered physiotherapists working in Australia in outpatient or private practice physiotherapy settings to complete this survey. This includes all areas of practice excluding hospital inpatient services.

Voluntary participation

Participation in the research will involve completing an anonymous online survey, which should take about 5-10 minutes. Your involvement in this research project is voluntary. Once you start, you can withdraw from the study at any time without any penalty or loss of benefits by closing the web link at any stage of the survey.

About the research project

Patient education is a major component of physiotherapy practice. As primary care providers, physiotherapists are positioned to educate patients and deliver tools and skills to maximise health outcomes. This study aims to better understand patient education perceptions and practices of Australian physiotherapists who have a role in primary care and gain a picture of the content and structure of its practice to inform physiotherapy practice and education.

Confidentiality and use of data

All information relating to your participation in the project will be treated confidentially and reported anonymously. All data is stored on secure web servers and within a password protected computer. All information relating to your participation in the project will be treated confidentially and reported anonymously.

Feedback

As data collected will be anonymous, it will not be possible to directly inform and provide feedback to participants of the research findings. However, the results of the research are intended to be communicated via conference presentations and journal publications. If you would like to request a short summary of the key research findings, please email the researcher directly

Ethical Clearance

This study adheres to the Guidelines of the ethical review process of The University of Queensland and the National Statement on Ethical Conduct in Human Research. Whilst you are free to discuss your participation in this study with project staff (contactable on 0459219330), if you would like to speak to an officer of the University not involved in the study, you may contact the Ethics Coordinator on 3365 3924

Researcher Contact

Roma Forbes, School of Health and Rehabilitation Science, University of Queensland,
r.forbes2@uq.edu.au

Dr Allison Mandrusiak, School of Health and Rehabilitation Science, University of Queensland,
a.mandrusiak@uq.edu.au

Dr Trevor Russell, School of Health and Rehabilitation Science, University of Queensland,
t.russell1@uq.edu.au

Dr Michelle Smith, School of Health and Rehabilitation Science, University of Queensland,
m.smith5@uq.edu.au

*** 1. I have read and understood the above information consent to participation**

- Yes
- No

Demographics

2. What is your gender?

- Female
- Male

3. What is your age?

[scroll menu]

4. Is English your primary language?

[scroll menu]

5. How many years have you been practising as a physiotherapist?

[scroll menu]

6. What is your highest physiotherapy award?

[scroll menu]

Clinical Practice

7. Which of the following would best describe your primary area of practice?

- Musculoskeletal
- Cardiorespiratory
- Neurological
- Paediatrics
- Women's health
- Aged care
- Sports

Other (please specify)

8. What is your primary state or territory of practice?

- New South Wales
- Queensland
- Victoria
- Western Australia
- ACT
- Northern Territory
- Tasmania
- South Australia

9. How would you describe the location of your practice?

- Major City
- Inner Regional
- Outer Regional
- Remote

Patient Education

Patient education is defined as; “a planned learning experience using a combination of methods such as teaching, counselling and behaviour modification techniques which influence patients’ knowledge and health behaviour”

This may include any of the following;

Teaching or demonstration of specific skills, exercise, movements and postures, or specific activities to improve knowledge, beliefs or behaviours.

10. What is your average time per initial visit engaging specifically in patient education related activities (minutes)?

- less than 1
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-30
- 31-40
- 41-50
- 51-60
- >60

11. What is your average time per follow up visit engaging specifically in patient education related activities (minutes)?

- less than 1
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-30
- 31-40
- 41-50
- 51-60
- >60

12. During patient consultation time, how often do you undertake the following?

	Never	Rarely	Sometimes	Very often	Always
Providing information about the patient's condition or diagnosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing verbal or written instruction needed to perform basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching correct posture and movement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching self-management strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asking the patient their concerns and discussing these specifically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing information about the patient's prognosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or strategies to perform activities of daily living (ADL's)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploring patient ideas and perceptions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching activity pacing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on social support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Counselling about stress, emotional or psychosocial problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General health promotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching problem-solving strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explaining pain neurophysiology/mind-body description of pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on use of assistive devices or equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

13. Please rate the following patient education activities according to your perceived importance:

	Not Important	Slightly Important	Moderately Important	Important	Very Important
Providing information about the patient's condition or diagnosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing verbal or written instruction needed to perform basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching correct posture and movement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching self-management strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asking the patient their concerns and discussing these specifically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing information about the patient's prognosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or strategies to perform activities of daily living (ADL's)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploring patient ideas and perceptions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching activity pacing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on social support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Counselling about stress, emotional or psychosocial problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General health promotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching problem-solving strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explaining pain neurophysiology/mind-body description of pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on use of assistive devices or equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. What methods do you use for delivery of patient education?

	Never	Rarely	Sometimes	Very often	Always
One-to-one discussion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anatomy models or pictures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generic handouts/pamphlets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personalised handouts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical demonstration of exercise, movement, posture or activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of biofeedback equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photography or video	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Links to websites or other online content	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Formal group education activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of physiotherapy assistant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

15. How do you evaluate the effectiveness of your patient education?

	Never	Rarely	Sometimes	Very often	Always
Ask the patient to repeat or discuss content in their own words	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ask the patient to demonstrate a movement, position or activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interpret signals from the patient that show they understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Objective measures or standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ask family members or care-givers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analyse patient tasks through video	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

16. Please indicate to what extent you feel the following factors would be a barrier to your effective use of patient education:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Cognitive status of patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotional status of patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attitude of patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient assuming a passive role	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge or literacy of patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of trust or rapport between patient and therapist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient not understanding English language	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My lack of knowledge of the topic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of time allocated for treatment session	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of participation by family members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of privacy in clinic environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

17. What is the relative importance of the following items in contributing the development of your patient education skills?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Training and/or experience before Physiotherapy studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Academic/University Physiotherapy studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Post-graduate Academic/University studies (leave blank if not applicable)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuing education courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional in-services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaction with colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal experience with patients'	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

The University of Queensland thanks you for your participation in this research. If you would like to receive a copy of the results of this project please email the lead researcher r.forbes2@uq.edu.au

Appendix F: Pre-Focus Group Questionnaire



Demographics

1. What is your gender?

- Male
- Female

2. What is your age?

Please specify [Click or tap here to enter text.](#)

3. What is your year of study?

- 5th year (first Master's registration)
- 6th year (second Master's registration)
- 7th year (third Master's registration)
- 8th year (fourth Master's registration)
- 9th year (fifth Master's registration)

Patient education

Patient education is defined as “a planned learning experience using a combination of methods such as teaching, counselling and behaviour modification techniques which influence patients' knowledge and health behaviour”.

Activities related to patient education may include the following:

Providing an explanation of diagnosis, improving the knowledge, beliefs or behaviours of patients or teaching and demonstrating exercises, specific skills, activity or posture modification.

4. What is your average time spent on patient education activities specifically during the initial visit (in minutes)?

- Less than 1
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- >25

5. What is your average time spent on patient education activities specifically during the follow up visit (in minutes)?

- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- >25

Frequency

6. During patient consultation time, how often do you undertake the following?

	Never	Rarely	Sometimes	Very often	Always
Providing information about the patient's condition or diagnosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing verbal or written instruction needed to perform basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching correct posture and movement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching self-management strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asking the patient their concerns and discussing these specifically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing information about the patient's prognosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or strategies to perform activities of daily living (ADL's)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploring patient ideas and perceptions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching activity pacing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on social support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Counselling about stress, emotional or psychosocial problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General health promotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching problem-solving strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explaining pain neurophysiology / mind-body description of pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on use of assistive devices or equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (Please specify) [Click or tap here to enter text.](#)

Perceived importance

7. Please rate the following patient education activities according to your perceived importance:

	Not Important	Slightly Important	Moderately Important	Important	Very Important
Providing information about the patient's condition or diagnosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing verbal or written instruction needed to perform basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching correct posture and movement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching self-management strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asking the patient their concerns and discussing these specifically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing information about the patient's prognosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or strategies to perform activities of daily living (ADL's)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploring patient ideas and perceptions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching activity pacing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on social support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Counselling about stress, emotional or psychosocial problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General health promotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching problem-solving strategies	<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explaining pain neurophysiology / mind-body description of pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on use of assistive devices or equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Methods of delivery

8. What methods do you use to deliver patient education?

	Never	Rarely	Sometimes	Very often	Always
One-on-one discussion Why are these highlighted in yellow ??	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anatomy models	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Handouts / pamphlets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personalised handouts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical demonstration of exercise, movement, posture or activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of biofeedback equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photography or video	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Links to online websites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (Please specify) [Click or tap here to enter text.](#)

Effectiveness

9. How do you evaluate the effectiveness of your patient education?

	Never	Rarely	Sometimes	Very often	Always
Ask the patient to repeat in their own words what has been discussed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ask the patient to demonstrate movement, position or activity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interpret signals from the patient that shows that they understand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Objective measures or standards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (Please specify) [Click or tap here to enter text.](#)

Barriers to patient education

10. Please indicate to what extent you feel the following factors would be a barrier to your effective use of patient education:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Cognitive status of the patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotional status of the patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attitude of the patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient assuming a passive role	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge or literacy of the patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of trust or rapport between the patient and therapist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient not understanding English language	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My lack of knowledge on the topic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of time allocated to treatment session	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of privacy in the clinic environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (Please specify) [Click or tap here to enter text.](#)

Development of patient education skills

11. What is the relative importance of the following items in contributing to the development of your patient education skills?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Training and / or experience before Chiropractic studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Academic / University Chiropractic studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Post-graduate Academic / University studies (leave blank if not applicable)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuing education courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional in-services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaction with colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal experience with patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (Please specify) [Click or tap here to enter text.](#)

Appendix G: Focus Group Letter of Information



LETTER OF INFORMATION

Title of research study: Chiropractic students' perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic.

Principal investigator/researcher: Hardus Nieuwenhuis B. Tech Chiropractic (DUT)

Co-Investigators/supervisors: Dr Praveena Maharaj M. Tech Chiropractic (DUT) and
Dr Charmaine Korporaal M. Tech Chiropractic (DUT)

Good day

You are kindly requested to take part in the focus group of my research study. This letter serves to provide you with some background of my study as part of my Master's degree in Chiropractic at the Durban University of Technology.

Brief introduction of the study:

Chiropractic students treat patients with musculoskeletal conditions at the Durban University of Technology as part of their clinical practicum. The management plan of these conditions often includes patient education in addition to manual therapy. Patient education is an important aspect of the clinical encounter as it serves to empower patients to take control of their condition and to improve their quality of life. Patient education has not studied in the Chiropractic student population of South Africa. This study will provide insight into the patient education perception and practice of Chiropractic students.

Objective of the main study:

The aim of this study is to describe Chiropractic students' perceptions and practice of patient education of musculoskeletal conditions and to identify the strategies used to educate patients and possible barriers that students experience when educating their patients.

Objective of the focus group:

The focus group will help determine the validity of the questionnaire. The focus group will provide information regarding the relevance of the questions as they pertain to Chiropractic students as well the scope of practice at Durban University of Technology. Any feedback as to how the questionnaire can be improved will be considered in the development of the final questionnaire.

Outline of the procedures:

A virtual meeting will be held on Monday the 26th of April over Microsoft Teams at 7pm (SAST). Prior to the meeting, please read over the Informed Consent Form and Confidentiality Statement provided in the email. Should you agree to participate in the study, please sign the Informed Consent Form and Confidentiality Statement electronically and submit the forms to me via email at hardusnieuwenhuis@gmail.com. Please take some time ahead of the meeting to read over the preliminary questionnaire provided, so as to allow the meeting to proceed efficiently.

The questions will be covered systematically during the virtual meeting, whereby a question will be read aloud, followed by an opportunity to discuss the question. The discussion will include the relevance and wording of the question as well as whether any information should be removed or added to the questionnaire. The virtual meeting will be recorded for analysis purposes.

Risks of the focus group:

There are no risks associated with the focus group.

Withdrawal from the study:

Please note that you are able to withdraw from the focus group if you wish to do so.

Benefits of the main study:

A thorough description of the current perceptions and practice of patient education by Chiropractic students may lead to improvement of future patient education skills.

Remuneration:

There will be no remuneration.

Costs of the focus group:

Participation in the focus group may incur data costs.

Confidentiality:

Confidentiality throughout the focus group will be ensured by keeping information related to identity anonymous. Such information will not be included in the published study and will remain confidential. The recording of the focus group discussion will be treated confidentially. The data collected during the focus group will only be accessible by the researcher, supervisor and co-supervisor.

Results of the study:

The final results of this study will be available as a dissertation at the DUT library.

Storage of the recording of the focus group:

The recording will be downloaded onto a password protected flash drive. The flash drive will be kept safe in the Chiropractic Department for 5 years after which it will be destroyed.

Persons to contact in the Event of Any Problems or Queries: Please contact the researcher Hardus Nieuwenhuis (076 424 1417), my supervisor Dr Pravēena Maharaj (031 262 7490 or 073 256 7399), my co-supervisor Dr Charmaine Korporaal (031 373 2611) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr Linda Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

Your assistance is greatly appreciated.

Hardus Nieuwenhuis

Appendix H: Focus Group Informed Consent Form



INFORMED CONSENT

Title of the study: Chiropractic students’ perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic

Principal investigator/researcher: Hardus Nieuwenhuis B. Tech Chiropractic (DUT)

Co-Investigators/supervisors: Dr Praveena Maharaj M. Tech Chiropractic (DUT) and Dr Charmaine Korporaal M. Tech Chiropractic (DUT)

Statement of Agreement to Participate in the Research Study

- I hereby confirm that Hardus Nieuwenhuis, the researcher, informed me about the nature, conduct and benefits of the study - Research Ethics Clearance Number: **IREC 047/21**
- I confirm that I have received a Participant Letter of Information regarding the study, which I have read and understood.
- I agree that I had an opportunity to voice any concerns.
- I am aware that my personal details including sex, date of birth, age and initials will be treated confidentially and excluded from the published version of the study.
- I agree that I am participating in this study willingly.

Full Name of Participant	Date	Time	Signature/Right Thumbprint
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I, _____(name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Full Name of Researcher	Date	Signature
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Full Name of Witness (If applicable)	Date	Signature
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Full Name of Legal Guardian (If applicable)	Date	Signature
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Appendix I: Focus Group Confidentiality Statement



CONFIDENTIALITY STATEMENT

- I agree to keep the information of the questionnaire private.
- The personal details of participants will be kept confidential and will be processed anonymously.

If you have read the document and agree with above statements, please confirm by providing relevant details below.

_____	_____	_____	_____
Full Name of Participant	Date	Time	Signature/Right Thumbprint
_____	_____	_____	_____
Full Name of Researcher	Date		Signature
_____	_____	_____	_____
Full Name of Witness (If applicable)	Date		Signature
_____	_____	_____	_____
Full Name of Legal Guardian (If applicable)	Date		Signature

Appendix J: Pilot Study Letter of Information



LETTER OF INFORMATION

Title of research study: Chiropractic students' perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic.

Principal investigator/researcher: Hardus Nieuwenhuis B. Tech Chiropractic (DUT)

Co-Investigators/supervisors: Dr Praveena Maharaj M. Tech Chiropractic (DUT) and
Dr Charmaine Korporaal M. Tech Chiropractic (DUT)

Good day

You are kindly requested to take part in the pilot study of my research study. This letter serves to provide you with some background of my study as part of my Master's degree in Chiropractic at the Durban University of Technology.

Brief introduction of the study:

Chiropractic students treat patients with musculoskeletal conditions at the Durban University of Technology as part of their clinical practicum. The management plan of these conditions often includes patient education in addition to manual therapy. Patient education is an important aspect of the clinical encounter as it serves to empower patients to take control of their condition and to improve their quality of life. Patient education has not studied in the Chiropractic student population of South Africa. This study will provide insight into the patient education perception and practice of Chiropractic students.

Objective of the main study:

The aim of this study is to describe Chiropractic students' perceptions and practice of patient education of musculoskeletal conditions and to identify the strategies used to educate patients and possible barriers that students experience when educating their patients.

Objective of the pilot study:

The pilot study will help determine the face validity and feasibility of the questionnaire before the main study is carried out on Chiropractic Master's students. If any of the questions seem

impractical or are difficult to understand, please inform the researcher. Any feedback as to how the questionnaire can be improved will be considered in the development of the final questionnaire.

Procedure of the pilot study:

Please read the consent form and confidentiality statement that needs to be signed, and emailed back to the researcher at hardusnieuwenhuis@gmail.com. Once the researcher has received the signed documents, the researcher will send the participants the link to the questionnaire. Upon opening the questionnaire, a consent box will appear that will allow the participant to answer the questionnaire once the block has been ticked. Please complete and submit the questionnaire. Should you have any recommendations as to how the questionnaire can be improved, please inform the researcher.

Risks of the pilot study:

There are no risks associated with the pilot study.

Withdrawal from the pilot study:

Please note that you are able to withdraw from the focus group if you wish to do so.

Benefits of the study:

A thorough description of the current perceptions and practice of patient education by Chiropractic students may lead to improvement of future patient education skills.

Remuneration:

Participants of the pilot study will not be remunerated.

Costs of the focus group:

Participation in the pilot study may incur data costs.

Confidentiality:

Names of participants of the pilot study will not be included in the published study and will remain confidential. Please note that Respondent Anonymity Assurance has been enabled on the questionnaire, as such, the researcher will not be able to identify the participant that has answered any given questionnaire. The data collected during the pilot study will only be accessible by the researcher, supervisor and co-supervisor and statistician.

Results of the study: The final results of this study will be available as a dissertation at the DUT library.

Storage of electronic data of the pilot study:

The pilot study questionnaire data will be downloaded onto a password protected flash drive. The flash drive will be kept safe in the Chiropractic Department for 5 years after which it will be destroyed.

Persons to contact in the Event of Any Problems or Queries: Please contact the researcher Hardus Nieuwenhuis (076 424 1417), my supervisor Dr Pravēena Maharaj (031 262 7490 or 073 256 7399), my co-supervisor Dr Charmaine Korporaal (031 373 2611) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr Linda Langaniso on 031 373 2577 or researchdirector@dut.ac.za.

Your assistance is greatly appreciated.

Hardus Nieuwenhuis

Appendix K: Pilot Study Informed Consent Form



INFORMED CONSENT

Title of the study: Chiropractic students' perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic

Principal investigator/researcher: Hardus Nieuwenhuis B. Tech Chiropractic (DUT)

Co-Investigators/supervisors: Dr Praveena Maharaj M. Tech Chiropractic (DUT) and
Dr Charmaine Korporaal M. Tech Chiropractic (DUT)

Statement of Agreement to Participate in the Research Study

- I hereby confirm that Hardus Nieuwenhuis, the researcher, informed me about the nature, conduct and benefits of the study - Research Ethics Clearance Number: **IREC 047/21**
- I confirm that I have received a Participant Letter of Information regarding the study, which I have read and understood.
- I agree that I had an opportunity to voice any concerns.
- I am aware that my personal details including sex, date of birth, age and initials will be excluded for the published version of the study.
- I agree that I am participating in this study willingly.

Full Name of Participant	Date	Time	Signature /	Right
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Thumbprint

I, _____(name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Full Name of Researcher	Date	Signature
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Full Name of Witness (If applicable)	Date	Signature
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Full Name of Legal Guardian (If applicable)	Date	Signature
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Appendix L: Pilot Study Confidentiality Statement



CONFIDENTIALITY STATEMENT

- I agree to keep the information of the questionnaire private.
- The personal details of participants will be kept confidential and will be processed anonymously.

If you have read the document and agree with above statements, please confirm by providing relevant details below.

Full Name of Participant **Date** **Time** **Signature / Right**
Thumbprint

Full Name of Researcher **Date** **Signature**

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

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

Appendix M: Recruitment Email to Class Representatives

Hi (class representative name)

Could you please forward this email to all the students on your communication list?

Dear Master's student

With this email I would like to invite you participate in my research study. As part of my Master's degree, I am doing a questionnaire study on patient education of Chiropractic students at DUT. The title of the study is: Perceptions and practice of patient education by Chiropractic interns at a teaching clinic at a tertiary institution.

Please click on the link to the Letter of Information before clicking on the link provided below to complete the questionnaire. The questionnaire should take between 5-10 minutes for you to complete. Please note that you will only be able to access and answer the questionnaire once after you have agreed to participate. If you have any questions, please do not hesitate to contact me at 076 424 1417.

If you have any problems completing the questionnaire online, please inform your class rep so that they can inform me.

Link to the Letter of Information: https://www.questionpro.com/qp_userimages/sub-3/3125574/LOI.docx

Link to the questionnaire: <https://dut.questionpro.com/t/ANv85ZmfBo>

Regards

Hardus

Appendix N: Main Study Letter of Information



LETTER OF INFORMATION

Title of research study: Chiropractic students' perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic.

Principal investigator/researcher: Hardus Nieuwenhuis B. Tech Chiropractic (DUT)

Co-Investigators/supervisors: Dr Praveena Maharaj M. Tech Chiropractic (DUT) and
Dr Charmaine Korporaal M. Tech Chiropractic (DUT)

Good day

Thank you for considering participating in my study. This letter serves to provide you with some background of my study as part of my Master's degree in Chiropractic at the Durban University of Technology.

Brief introduction of the study:

Chiropractic students treat patients with musculoskeletal conditions at the Durban University of Technology as part of their clinical practicum. The management plan of these conditions often includes patient education in addition to manual therapy. Patient education is an important aspect of the clinical encounter as it serves to empower patients to take control of their condition and to improve their quality of life. Patient education has not studied in the Chiropractic student population of South Africa. This study will provide insight into the patient education perception and practice of Chiropractic students.

Objective of the study:

The aim of this study is to describe Chiropractic students' perceptions and practice of patient education of musculoskeletal conditions and to identify the strategies used to educate patients and possible barriers that students experience when educating their patients.

Procedure of the study:

Should you decide to participate in the study and click on the link to the questionnaire, the consent form will pop up before the questionnaire starts. Please read over the consent form, and should you wish to proceed, please check the box at the bottom of the consent form. Once the block has been ticked, the questionnaire will appear on the screen. Please answer the questionnaire truthfully, all of the answers in the questionnaire will be anonymous. The questionnaire should take 5-10 minutes for you to complete. Once you have completed the questionnaire, please click on submit.

Risks of the study:

There are no risks associated with the study.

Withdrawal from the study:

Please note that your participation in this study is voluntary and that you are able to withdraw from the study if you wish to do so.

Benefits of the study:

A thorough description of the current perceptions and practice of patient education by Chiropractic students may lead to improvement of future patient education skills.

Remuneration:

Participants of the study will not be remunerated.

Costs of the study:

Participation in the study may incur data costs.

Confidentiality:

No personal information will be published in the final dissertation of this study. All personal information that relates to your participation in this study will be treated confidentially and answers to the questionnaire will be processed anonymously.

Results of the study:

The final results of this study will be available as a dissertation at the DUT library.

Storage of electronic data of the study:

Once data collection has been completed; the questionnaire data will be downloaded onto a password protected flash drive. The flash drive will be kept safe in the Chiropractic Department for 5 years after which it will be destroyed.

Persons to contact in the Event of Any Problems or Queries: Please contact the researcher Hardus Nieuwenhuis (076 424 1417), my supervisor Dr Pravēena Maharaj (031 262 7490 or 073 256 7399), my co-supervisor Dr Charmaine Korporaal (031 373 2611) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr Linda Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

Your assistance is greatly appreciated.

Hardus Nieuwenhuis

Appendix O: Final Questionnaire for Main study

Perception and practice of patient education

Statement of Agreement to Participate in the Research Study

- I hereby confirm that Hardus Nieuwenhuis, the researcher, informed me about the nature, conduct and benefits of the study - Research Ethics Clearance Number: **IREC 047/21**
- I confirm that I have received a Participant Letter of Information regarding the study, which I have read and understood.
- I am aware that my personal details including sex, date of birth, age and initials will be treated confidentially and excluded from the published version of the study.
- I am aware that my answers will be reported anonymously.
- I agree that the data collected during this study may be processed by the researcher.
- I am aware that I am able to withdraw from the study at any point, if I choose to do so.

I agree that I am participating in this study willingly.

I Agree

Demographics

1. What is your gender?

1. Male
2. Female

2. What is your age?

3. What is your year of study?

- 5th year (first Master's registration)
- 6th year (second Master's registration)
- 7th year (third Master's registration)
- 8th year (fourth Master's registration)
- 9th year (fifth Master's registration)

4. Do you have prior qualifications or studied another degree before Chiropractic

- Yes
- No

Patient education

Patient education is defined as “a planned learning experience using a combination of methods such as teaching, counselling and behaviour modification techniques which influence patients’ knowledge and health behaviour.”

Activities related to patient education may include the following:

Providing an explanation of diagnosis, improving the knowledge, beliefs or behaviours of patients or teaching and demonstrating exercises, specific skills, activity or posture modification.

Frequency

5. During the average patient consultation time, how often do you undertake the following activities?

	Never	Rarely	Sometimes	Very often	Always
Advice on social support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on use of assistive devices or equipment (e.g., bracing, strapping, crutches)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or strategies to perform activities of daily living (ADL's)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching activity pacing (e.g., gradually increasing activities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching correct posture and movement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching problem-solving strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching self-management strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asking the patient their concerns and discussing these specifically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Counselling about psychological problems (e.g., stress, depression, emotional distress)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explaining pain neurophysiology / mind-body description of pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploring patient ideas and perceptions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General health promotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pathoanatomical explanations (e.g., bone-out-of-place or “your spine is out of alignment”)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Providing information about the patient's condition or diagnosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing information about the patient's prognosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing demonstration needed to perform a basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing verbal instruction or information needed to perform a basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing written instruction or information needed to perform a basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

Perceived importance

6. Please rate the following patient education activities according to your perceived importance:

	Not important	Slightly important	Moderately important	Important	Very important
Advice on social support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice on use of assistive devices or equipment (e.g., bracing, strapping, crutches)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or strategies to perform activities of daily living (ADL's)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching activity pacing (e.g., gradually increasing activities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching correct posture and movement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching problem-solving strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice or teaching self-management strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asking the patient their concerns and discussing these specifically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Counselling about psychological problems (e.g., stress, depression, emotional distress)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explaining pain neurophysiology / mind-body description of pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploring patient ideas and perceptions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

General health promotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pathoanatomical explanations (e.g., bone-out-of-place or “your spine is out of alignment”)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing information about the patient’s condition or diagnosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing information about the patient’s prognosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing demonstration needed to perform a basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing verbal instruction or information needed to perform a basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing written instruction or information needed to perform a basic exercise program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Strategies of delivery

7. What strategies do you use to deliver patient education?

	Never	Rarely	Sometimes	Very often	Always
Anatomy models	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Handouts / pamphlets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Links to online websites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One-on-one discussion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personalised handouts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photography or video	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical demonstration of exercise, movement, posture or activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of biofeedback equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

8. What is your average time spent on patient education activities throughout the consultation, specifically during the initial visit (in minutes)?

- Less than 1
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- >25

9. What is your average time spent on patient education activities throughout the consultation, specifically during the follow up visit (in minutes)?

- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- >25

Effectiveness of patient education

10. How do you evaluate the effectiveness of your patient education?

	Never	Rarely	Sometimes	Very often	Always
Ask the patient to demonstrate movement, position or activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ask the patient to repeat in their own words what has been discussed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interpret signals from the patient that shows that they understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Objective measures or standards (e.g., questionnaire)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

Barriers to patient education

11. Please indicate to what extent you feel the following factors would be a barrier to your effective use of patient education:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Age of the patient (e.g., paediatric vs elderly)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attitude of the patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cognitive status of the patient (e.g., Down's syndrome or inebriation)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotional status of the patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health knowledge or literacy of the patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of privacy in the clinic environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of time allocated to treatment session	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of trust or rapport between the patient and yourself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Language barrier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My lack of knowledge on the topic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient assuming a passive role in student patient interaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

Development of patient education skills

12. In your perception, what is the relative importance of the following items in contributing to the development of your patient education skills?

	Not important	Slightly important	Moderately important	Important	Very important
Chiropractic studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuing education courses (CPD courses)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaction with colleagues (e.g., clinicians)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaction with colleagues (e.g., peers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Institutional opportunities for professional interpersonal skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited patient interaction (e.g., COVID-19 or absence from clinic)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal experience with patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Post school training and / or experience outside of Chiropractic studies (leave blank if not applicable)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

Appendix P: Plagiarism Report

Chiropractic students' perception and practice of patient education on management of musculoskeletal conditions at a tertiary education teaching clinic

ORIGINALITY REPORT

SIMILARITY INDEX **14%** 13 INTERNET SOURCES% 8 PUBLICATIONS% 5%
STUDENT PAPERS
