SPORTS PHYSIOTHERAPISTS' KNOWLEDGE, ATTITUDES AND BELIEFS OF PAIN: A CROSS-SECTIONAL CORRELATIONAL STUDY

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DECLARATION

I, Nadia-Germira Clenzos, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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LIST OF ABBREVIATIONS

ALS	Advanced Life Support
CBT	Cognitive Behavioural Therapy
CPR	Cardio-Pulmonary Resuscitation
HIV/AIDS	Human Immuno-deficiency Virus/ Acquired Immune Deficiency Syndrome
HREC	Human Research Ethics Committee
HPCSA	Health Professions Council of South Africa
IASP	International Association for the Study of Pain
NRS	Numeric Rating Scale
OMPTG	Orthopaedic Manipulative Physiotherapy Group
OMT 1	Orthopaedic Manipulative Physiotherapy 1
PhD	Doctor of Philosophy
PLWHA	People Living With HIV/AIDS
RPKAQ	Revised Pain Knowledge and Attitudes Questionnaire
SA	South Africa
SASP	South African Society of Physiotherapy
SD	Standard Deviation
SIG	Special Interest Group
SPG	Sports Physiotherapy Group
SPT 1	Sports Physiotherapy 1
UCT	University of Cape Town
UK	United Kingdom

USA	United States of America
VAS	Visual Analogue Scale
VHA	Veterans Health Administration
WCPT	World Confederation for Physical Therapy
WHO	World Health Organisation

LIST OF DEFINITIONS

Pain:	An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [g].
Acute pain:	Pain temporarily related to injury and that resolves during the appropriate healing period [h].
Nociceptive pain:	Pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors [g].
Nociception:	The neural process of encoding noxious stimuli [g].
Nociceptive stimulus:	An actually or potentially tissue-damaging event transduced and encoded by nociceptors [g].
Chronic pain:	Pain that extends beyond the expected period of healing [c].
Neuropathic pain:	Pain caused by a lesion or disease of the somatosensory nervous system [g].
Sensitization:	Increased responsiveness of nociceptive neurons to their normal input, and/or recruitment of a response to normally sub-threshold inputs [g].
Central sensitisation:	Increased responsiveness of nociceptive neurons in the central nervous system to their normal or sub-threshold afferent input [g].
Affect:	Affect refers to the experience of feeling or emotion [a].
Biopsychosocial:	The biopsychosocial model is an approach which acknowledges that biological, psychological (thoughts, emotions, and behaviours), and social factors, all play a significant role in human functioning [b].
Cognitive-behavioural:	Cognitive behavioural therapy (CBT) is a psychotherapeutic approach that addresses dysfunctional emotions, maladaptive behaviours and cognitive processes through a number of goal-oriented, explicit systematic procedures [d].

Culture:	The ideas, customs, and social behaviour of a particular people or society [e].
Ethnicity:	The fact or state of belonging to a social group that has a common national or cultural tradition [f].

Definition References:

a) http://en.wikipedia.org/wiki/Affect_(psychology)
b) http://en.wikipedia.org/wiki/Biopsychosocial_model
c) http://en.wikipedia.org/wiki/Chronic_pain
d) http://en.wikipedia.org/wiki/Cognitive_behavioral_therapy
e) http://oxforddictionaries.com/definition/english/culture
f) http://oxforddictionaries.com/definition/english/ethnicity?q=ethnicity
g) http://www.iasp-pain.org/Content/NavigationMenu/GeneralResourceLinks/PainDefinitions/default.htm
h) http://www.paincommunitycentre.org/article/acute-postoperative-pain-definition-acute-pain

ABSTRACT

Background: Pain is the most common complaint for which patients seek the help of a physiotherapist. Previous studies have found deficits in pain knowledge, attitudes and beliefs among health care providers. Poor knowledge and negative attitudes about pain are recognised to lead to poor assessment ability and subsequent poor pain management.

Aim: The purpose of this study was to investigate the pain knowledge, pain attitudes and pain beliefs of physiotherapists treating athletes and to explore factors which may contribute to knowledge, attitudes and beliefs.

Method: Data was collected by means of a questionnaire that was made available online. The questionnaire included a demographic questionnaire and Unruh's Revised Pain Knowledge and Attitudes Questionnaire (RPKAQ). Participants were members of the Sports Physiotherapy Group and Orthopaedic Manipulative Physiotherapy Group of the South African Society of Physiotherapy. Two hundred and seven physiotherapists completed the questionnaire.

Results: The mean score for the RPKAQ was 65.53%. Only 14.49% (n=30) of the physiotherapists scored 75% or above. Lowest scores were obtained for the 'Assessment and Measurement of Pain' (47.73%) and 'Developmental Changes in Pain Perception' (58.84%) sections of the RPKAQ. The highest mean score was obtained for the 'Physiological Basis of Pain' (76.43%) section of the RPKAQ. Gender, ethnicity (defined by home language), academic training and clinical experience did not significantly contribute to overall pain knowledge and attitudes. The 'Psychology' and 'Cognitive/Behavioural' sub-sections of the RPKAQ were responsible for most of the significant differences. Physiotherapists who studied in their first language scored significantly higher (76.94%) in the 'Physiology' section of the RPKAQ than those who studied in their second language (67.27%) ($U=677.00$; $p=0.04$). A significant difference in knowledge and attitudes about the psychological aspects of pain was identified among physiotherapists who studied at different undergraduate universities ($\chi^2=15.57$; $p=0.049$). Increased time since graduation was positively correlated with better knowledge and attitude scores for psychological ($r=0.20$; $p<0.05$) and cognitive/behavioural ($r=0.17$; $p<0.05$) aspects of pain. Similarly, increased number of years in clinical practice was positively associated with better pain knowledge and attitude scores with regard to psychological ($r=0.19$; $p<0.05$) and cognitive/behavioural ($r=0.17$; $p<0.05$) aspects of pain. Furthermore, physiotherapists who graduated more than 10 years ago scored significantly higher (69.60%) in the 'Cognitive/Behavioural' section than those who graduated within the last 10 years (65.98%) ($U=4157.00$; $p=0.02$).

Conclusion: There is an inadequate level of pain knowledge and attitudes among sports physiotherapists in South Africa, particularly in the areas of assessment and measurement of pain and developmental changes in pain perception.

Clinical relevance: The identification of areas that are lacking would allow the implementation of an evidence-based intervention strategy aimed at improving physiotherapists' awareness, knowledge, attitudes and assessment of pain. Adequate knowledge of pain and ability to assess pain is essential in order to treat appropriately, effectively and optimally.

Keywords: *Pain, Physiotherapist, Sport, Knowledge, Attitudes*

CHAPTER ONE

INTRODUCTION AND SCOPE OF THESIS

Pain is defined by the International Association for the Study of Pain (IASP) as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage , or described in terms of such damage; pain is always subjective" [42, 55]. Physiotherapists are accepted and involved members of the pain management team [10], who are concerned with identifying the possible causes of pain. Pain is recognised as the most common complaint for which individuals seek the help of a manual therapist [57], however, the most commonly cited reasons for mismanagement of pain are health care practitioner's negative attitudes and lack of knowledge about pain [79].

The topic of pain, when applied to an athletic population and the health professionals managing these athletes, becomes that much more interesting. Athletes are able to continue to compete despite sustaining painful injury during competition [85]. Sternberg et al (1998) acknowledge the brain as a powerful modulator of sensory input and the role of the central nervous system in the inhibition of nociceptive afferent fibres when there is a perception of stress or threat. It is important for physiotherapists to be aware that the self-report of pain during athletic competition may not always be indicative of the true nature of injury. Unnecessary tissue damage may result from failure to attend to a potentially painful injury sustained during competition. Jevon and Johnston (2003) identified that practitioners providing health care to elite athletes are best placed to recognise the psychological factors associated with injury and therefore play a vital role in the emotional support provided to injured athletes. It is essential for physiotherapists to be aware of the psychosocial aspects associated with pain in athletes, as these factors play a critical role in the impact, duration and rehabilitation of an injury.

Further, it is important for physiotherapists to conduct assessments within a biopsychosocial framework and to understand that intervention should include management of the patient's pain behaviour as well as the nociceptive component of their pain [57].

Detection of sensitisation mechanisms is of clinical value for sports physicians and sports physiotherapists because the diagnosis of central sensitisation may give new, more appropriate treatment options [95]; as well as allow for early intervention with the goal of minimising and preventing the onset of chronic pain.

A review of the literature reveals a paucity of evidence relating to pain knowledge and assessment ability in health care professionals. The implications for physiotherapy practice are highlighted by the fact that poor knowledge about pain and pain mechanisms is recognised to lead to poor assessment ability and subsequently poor pain management [72]. Adequate knowledge of pain and ability to assess pain is essential in order to treat appropriately, effectively and optimally.

In summary, physiotherapists require adequate knowledge to assess and treat painful conditions. There is a paucity of research on the knowledge of pain of health care professionals in South Africa, particularly in physiotherapists. The principle aim of this study was to provide baseline descriptive information regarding the pain knowledge, pain attitudes and pain beliefs of South African physiotherapists, particularly those treating athletes and to explore factors which may contribute to level of knowledge or influence attitudes and beliefs. These factors include gender, ethnicity/ culture, academic training and clinical experience.

In preparation for the questionnaire-based study of the thesis, a comprehensive review of the literature on pain knowledge, attitudes and beliefs will be presented (Chapter 2, p. 3). This will be followed by a description of the study designed to answer the above-mentioned questions (Chapter 3, p. 25). The summary and conclusion section will complete this thesis (Chapter 4, p. 61).

CHAPTER TWO

LITERATURE REVIEW: PAIN KNOWLEDGE, ATTITUDES AND BELIEFS

2.1. Introduction

Pain is the most common complaint for which individuals seek the help of a physiotherapist [57]. It is a complex phenomenon which, in acute sports injuries, includes the actual noxious sensation as well as all factors associated with the pain experience. Pain is defined by the International Association for the Study of Pain (IASP) as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage , or described in terms of such damage; pain is always subjective" [42, 55]. From this definition, it is clear that there are various aspects that contribute to pain; these include physiological, psychological, cognitive/behavioural, developmental (pain in neonates, infants and children), pharmacological and the emotional/affective aspects of pain. Essentially, the experience of pain is determined by the individual's specific context and meaning of their pain [80].

The importance of pain has escalated in the medical and allied medical field. Loeser and Melzack (1999) stated that pain is the most common symptomatic reason to seek medical attention; and still in 2010, Meyer and Kenny identified pain as being the most common reason patients seek medical attention. Consequently, pain has been identified as the fifth vital sign [72], indicating the attention with which physiotherapists should be assessing pain. Pain as the fifth vital sign was initially promoted by the American Pain Society to elevate awareness of pain treatment among health care professionals. Vital signs are critical; therefore if pain is assessed as seriously as other vital signs, it may lead to an improved chance of adequate and optimal treatment [70].

Physiotherapists are accepted and involved members of the pain management team [10], who are concerned with identifying the possible causes of pain. All physiotherapists registered with the Health Professions Council of South Africa (HPCSA) are considered first line practitioners [83].

This professional status is important as it allows patients to directly consult physiotherapists for care. Furthermore, in a sports team environment, physiotherapists are involved in field side care which leads to direct acute pain and injury management. McKenna, Delaney and Phillips (2002) recognize that the physiotherapist is involved in and plays a major role in the rehabilitation of elite athletes.

This literature review will briefly discuss pain in sport and establish the prevalence of painful sporting injuries, as well as outline pain assessment and measurement. The review will then focus on the influence of knowledge, attitudes and beliefs of pain on pain assessment and management, and explore factors which contribute to knowledge, attitudes and beliefs of pain, namely, clinical experience, academic training, ethnicity/culture and gender.

Data was sourced from health science, sports science, sports medicine and psychology literature utilising searches through PubMed, PEDro and Google Scholar. Keywords used in the search included "pain", "chronic pain", "knowledge, attitudes and beliefs", "physiotherapists' knowledge, attitudes and beliefs of pain", "health care professionals' knowledge, attitudes and beliefs of pain", "pain assessment", "pain in athletes", "pain in sport", "gender and pain", "clinical experience and pain", "academic training and pain", "ethnic differences and pain".

2.2. Pain in Sport

The topic of pain, when applied to an athletic population and the health professionals managing these athletes, is indeed fascinating. Injury has a profound effect on the athlete's pain, function and performance. Injury causes impairment to body structure and function, by means of tissue damage. This may limit the athlete's ability to partake in functional activities related to sport, hinder optimal performance and prevent participation in competition for a period of time. In addition, lack of participation may have financial implications and may impact on the athlete's psychological wellbeing. Although this is a relatively new area of focus in research, there is a substantial amount of literature in the field of psychology and sport, which has a link to pain and injury. However, literature about physiotherapy and elite athletes is almost non-existent [60]. There is also very little evidence in the field of sports physiotherapy with regards to knowledge, attitudes and beliefs about pain. The literature does reveal some interesting concepts which will be expanded on in this review.

2.2.1. Epidemiology of painful sports injuries

There is limited literature on the epidemiology of pain, injuries and physiotherapy, especially in South Africa. Nonetheless, musculoskeletal injuries are a major public health problem globally [63] and the World Health Organisation (WHO) has identified a high prevalence of musculoskeletal conditions across all continents and economies [98].

The prevalence of injury seems to be decreasing in developed countries due to a combination of injury prevention and improved acute care, while injury prevalence in developing countries remains high. Further, there is a notable deficiency in the availability of human resources for rehabilitation, such as physiotherapists, in primary health care facilities in developing countries [63].

Injuries sustained in sport are varied but commonly delineated into two distinct categories, namely acute traumatic injuries and insidious overuse injuries. The proportion of injuries is dependent mainly on the sport in question and although these types of injuries are inherently different, both result in debilitation of an athlete's performance [4]. According to the 1992 National Institute of Health report, there are approximately three million injuries annually in the United States that are directly related to organized sports, with football, ice hockey and gymnastics yielding the highest injury rates [4].

A national study of sport- and exercise-related morbidity identified 29 million incidents of new or recurrent injuries in England and Wales each year [68]. Of these injuries, 9.8 million are potentially serious, result in treatment, or lead to participants being unable to partake in their usual sporting activities. Over one third of sports related morbidity occurred in men aged 16-25 years. Treatment was sought in approximately 25% of exercise-related injuries. The treatment provider most likely to be consulted was a general practitioner; however physiotherapists practising in sports injury clinics were also consulted frequently. Devereaux and Lachmann (1983) identified 1186 sporting injuries treated at a general hospital sports injury clinic in the United Kingdom over a two year period. Seventy-five percent of these patients were aged 16-25 years old, with 80% being male. Grotle, Brox, Veierod, Glosrod, Lonn and Vollestad (2005) conducted a study in Norway where 43% of acute low back pain patients consulted a general practitioner, 25% a chiropractor and 5% a physiotherapist. Physiotherapy services in Europe are directly available to patients without the requirement of a referral [27], thus the low statistics may be due to differences in accessibility, awareness of the physiotherapy profession or the type of health care facility.

These studies show a high prevalence of sports related pain and injury but surprisingly low incidence of patients attending physiotherapy for pain and injury. It is important to note that these statistics are taken from hospital or out-patient samples abroad and may be different in a sports medicine setting where physiotherapists are actively involved in the assessment and management of pain and injury, as well as in the South African context. There is a paucity of information on South African populations indicating that further epidemiological studies in South Africa are warranted to provide more relevant, applicable and useful information.

Below is a summary of the most common sports injuries and most common causes of sports injuries (in the UK and USA):

Table 2-1: Summary of Sports Injuries [3, 16, 17, 18, 49, 54, 58, 67, 81]

Most Common Sports Injuries	Most Common Causes/ Mechanisms of Injury
Sprains and strains	Overuse
Shin splints	Sudden stopping and twisting movements
Tendinopathy	Contact sport (blunt athletic trauma)
Knee pain	Falls
Lower back pain	Inadequate warm-up
Shoulder injuries	Improper equipment
Hamstring injuries	Poor technique or posture
Plantar Fascitits	Fatigue
Dislocations	New or increased activity
Stress fractures	Repetitive unilateral movements

2.2.2 Mechanisms of pain in sports injuries

Elite athletes have an increasingly wide knowledge about injuries and treatment modalities; however these ideas are not always correct or applicable to their current injury [60]. This may arise in conflict between elite athletes and the physiotherapist when treatment appropriateness is questioned. Physiotherapists expect to use their experience and skills to effectively optimise the healing process, to control the athlete and to manage external pressures to achieve full recovery as early as possible [60]. Rehabilitation is often pressured by time, but available time is rarely sufficient for full recovery. For athletes, injury may be regarded as a period of lost opportunities, and returning to competition is as important to the elite athlete as full recovery. In this setting there is much external pressure from management and coaches to return the athlete to play as soon as possible. Results count in elite sport and this often affects treatment; these features are at odds with physiotherapists concerns to offer ethical treatment.

Athletes are often able to continue to compete despite sustaining painful injury during competition [85]. Sternberg et al (1998) examined competition-related stress as a trigger for endogenous analgesia in three sports – fencing, track and basketball, allowing systematic investigation of competition in sports assumed to vary in cognitive and physiological demands. The authors acknowledge the brain as a powerful modulator of sensory input and the role of the central nervous system in inhibition of nociceptive afferent fibres when there is a perception of stress or threat. Athletic competition was found to modulate behavioural responses to noxious stimuli, causing either pain inhibition or pain enhancement depending on the body area tested.

Subsequently, it is important for health care professionals to be aware that the self-report of pain during athletic competition may not always be indicative of the true nature of injury.

According to the American Institute for Research (1988), a survey of college athletes indicated that a substantial number of athletes felt intense pressure to ignore their injuries [19]. Curry (1993) conducted a case study of an amateur wrestler, in which he identifies the pattern of normalisation of injury by both the athlete and medical staff. This may have a huge implication for the onset, development and progression of chronic pain. Although case study designs are recognised as poor quality research, with many limitations and lack of quantitative, statistical data, the findings of this study are consistent with other studies showing evidence for normalisation of pain and injury in sport. A common belief, which may be particularly relevant in sport, is that pain tolerance increases as the period of pain exposure is prolonged [59].

Paparizos, Tripp, Sullivan and Rubenstein (2005) support the hypothesis that dancers of increased skill and experience show significantly higher pain tolerance. Due to the small, selective sample population, it is doubtful whether this information represents athletes in other sporting codes; however, this correlates with research that shows athletes to have a higher pain tolerance than non-athletes. The relevance of this information to physiotherapists and other health care professionals treating athletes should be in identifying a more appropriate approach towards assessment and treatment of pain in athletes.

Scott and Gijsbers (1981) found enhanced pain tolerance in competitive swimmers to be due to systematic exposure to brief periods of intense pain. According to Sternberg et al (1998), it is reasonable to expect that exercise (as a 'stressful' state) acts as a trigger for endogenous analgesia. While it is difficult to dissociate competition-specific effects from exercise-only effects, a lack of consensus about the existence of exercised-induced analgesia leads to the conclusion that the 'stress' of competition is a necessary component of the pain inhibition associated with physical exertion [85]. Moseley (2004) supports the above-mentioned theories by identifying that pain thresholds can be increased during physical tasks.

Van Wilgen and Keizer (2011) acknowledge the involvement of sensitisation as an explanation for pain in chronic sports injuries. There also seems to be an indication that repetitive injury may lead to sensitisation [95]. Detection of sensitisation mechanisms is of clinical value for sports physicians and sports physiotherapists because the diagnosis of central sensitisation and understanding of such neuropathic mechanisms is important for early intervention and effective management of sports injuries, with the goal of minimising and preventing the onset of chronic pain.

There are many factors which may contribute to the pain experience in the athlete. Understanding the multiple mechanisms and factors which contribute to pain in sports injuries is key to adequately assessing and managing such injuries. However, this knowledge alone is insufficient to ensure adequate assessment or care of the athlete. In the following section, appropriate assessment and management strategies for pain in sports injuries will be discussed.

2.2.3. Assessment and management of pain in sports injuries

In recent years, great advances have been made in the field of pain management. However, despite improved knowledge of underlying pain mechanisms and improved treatments, many people with chronic pain receive inadequate care [55]. Pain has been identified as the most under-treated condition and symptom [1]. This is potentially due to patients' pain being underestimated by healthcare professionals [14].

Comprehensive assessment is essential to select the most appropriate treatment strategy [62]. 'Pain as the 5th Vital Sign Toolkit' (2000) identifies the importance of a comprehensive pain assessment, documentation thereof and a plan for improved management. It identifies the value in educating healthcare providers on pain assessment, emphasising that the way a person thinks about pain influences how they will evaluate pain. Assessment of pain is influenced both by the way a person thinks about pain as well as by learned behavioural responses and culture. Pain assessment may therefore be influenced by attitudes of healthcare providers (e.g. concern that attention to pain may encourage further complaints of pain), skills (e.g. inadequate knowledge and experience of pain assessment and management) and practice behaviour (e.g. failure to routinely assess and document).

In a sports physiotherapy environment, accurate pain assessment is an essential part of clinical reasoning. Identifying the type, nature and severity of pain helps to identify the injury, anatomical structure and/or pathology. Additionally, it determines the caution needed as well as guides the overall treatment strategy. Pain patterns are identified by means of a thorough subjective examination and pain intensity should be measured to allow for treatment planning and accurate re-assessment [74]. A discussion on the psychological aspects of pain in sports injuries will now be presented.

2.2.4. Psychological aspects of pain in sports injuries

Pain behaviour has to be understood in terms of its context [57]. In a sports physiotherapy setting, most useful aspects of pain behaviour would seem to be the observation of guarded movements, the identification of psychological aspects of pain, fear-related responses to examination and the communication of distress. It is therefore important for physiotherapists to conduct assessments within a biopsychosocial framework and understand that intervention also manages the patient's pain behaviour rather than just the nociceptive component of their pain in isolation [57].

Johnston and Carroll (2000) evaluated the psychological impact of injury, with regards to the effects of prior sports involvement. Athletes who were more involved in sport and exercise before injury experienced greater negative effect, registered higher levels of confusion and perceived a reduced recovery at the end of rehabilitation. This reflects greater information needs and a greater perceived mismatch between current physical status and that before injury in the athletic sample. It is possible that physiotherapists require training in order to appreciate more fully the information needs of the highly involved athlete.

This suggests an importance in assessing affective reactions and perceived recovery. Injury has a discernible emotional impact, and the negative emotional impact of injury diminished over the course of rehabilitation as self-rated recovery improved. End of rehabilitation correlated with a recovery score of 80% by both physiotherapists and participants. It is interesting to note here that discharge therefore occurs not at 100% recovery but rather at 80%. Although a small sample, a strength of this study is that it is wide-ranging compared to previous studies of injured athletes. It is also the first substantial study to include, as a control, people who were relatively uninvolved in sport and exercise. Gordon et al (1991) investigated sports physiotherapists' perspectives on the psychological aspects of the recovery process from sport injury. Factors identified by the physiotherapists affecting the degree of psychological adjustment to injury included severity of injury, intensity of sport involvement, injury prior to major competition and aspects of personality. External factors such as athlete-therapist relationships and social support systems also affected rehabilitation performance and the importance of providing expert therapeutic skills, diagnosis of injury, and education to athletes on sport injury was emphasised.

Research has demonstrated that injury can have a profound psychological impact on athletes [33, 46]. Jevon and Johnston (2003) identified that practitioners providing health care to elite athletes are best placed to identify these psychological problems and therefore play a vital role in the emotional support provided to injured athletes. It is essential for physiotherapists to be aware of the psychological aspects associated with pain in athletes, as these factors play a critical role in the impact, duration and rehabilitation of an injury. The practical implication of this is to be able to assess when to refer patients for further intervention, facilitating the multi-disciplinary team approach in the management of pain.

The literature highlights the need for improved education in the both the assessment and management of all aspects of pain, including the psychological aspects of pain and injury; and emphasises the importance of a multi-disciplinary team approach for optimal pain management. In addition, it is not simply knowledge of the pathological, social and psychological components of pain in athletes which is important, but recognition that the attitudes and beliefs of the healthcare professional will also influence the care given out to the athlete. In the following section, the impact of health care professionals' pain knowledge, attitudes and beliefs on patient care will be presented.

2.3. Health care professionals' knowledge, attitudes and beliefs about pain

The most commonly cited reasons for the mismanagement of pain are healthcare practitioner's negative attitudes and beliefs, and a lack of knowledge about pain [79]. Inadequate knowledge about a condition, its pathology and management will clearly influence the approach of the health care professional towards patient care. However, it is recognised that negative attitudes and beliefs may override adequate knowledge to result in mismanagement of pain. These factors will now be discussed further.

2.3.1. Pain knowledge

There is a need to improve undergraduate education of pain and chronic pain and bridge the gap between pain research and pain management practices as a deficit in undergraduate training on pain has been recognised by several authors in studies conducted worldwide [13, 72, 90]. A common problem is that pain is usually treated as acute due to a lack of education of healthcare professionals [80].

In a study of final year nursing students in Australia and the Philippines, students had consistently low levels of pain knowledge [13]. Similarly, Ali and Thomson (2009) found that final year physiotherapy and medical students in the United Kingdom (UK) have a lack of understanding of central sensitization and fear-avoidance with regards to chronic pain. Finally, in South Africa, Parker et al (2009) found a deficit in the area of pain knowledge among final year health science students at the University of Cape Town. Further, 70% of therapists in the UK sampled by Brown (2003) had received no dedicated training on pain during their undergraduate training. Scudds et al (2001) showed that there was inadequate information on the cognitive-behavioural approaches to pain management in the physiotherapy curriculum in North America as well as a lack of knowledge in the assessment and treatment of chronic pain. The questionnaire used placed much emphasis on the pathology, anatomy, physiology and biochemistry of pain. However, Scudds et al (2001) suggests that more weight should have been given to the psychological aspects of pain, particularly chronic pain. In a similar study, Strong, Tooth and Unruh (1999) found a gap in newly graduated Australian occupational therapists' knowledge about pain. Using the validated Revised Pain Knowledge and Attitudes Questionnaire, this study identified highest levels of knowledge in the area of physiological aspects of pain; while the two areas of knowledge found to be least understood were pharmacological management and the assessment and measurement of pain.

Lebovits, Florence, Bathina, Hunko, Fox and Bramble (1997) investigated pain knowledge and attitudes of 686 healthcare providers from three hospitals in New York. An overall score of 56% reflected significant knowledge deficiencies regarding currently accepted principles of pain management, as well as beliefs that could affect optimal care. A lack of knowledge has been recognised to be associated with poor clinical ability to assess and manage pain adequately [72]. In Hong Kong, Chuk (2002) conducted a study concerning the accuracy of pain assessment of 198 senior student nurses using a clinical vignette approach. Less than half (40.8%) of the student nurses in this study correctly considered the subjective report of patients as the most reliable indicator of pain. The remaining students (59.2%) tended to ignore the subjective indication of pain and rather incorrectly referred to objective signs for pain assessment. The results indicate that the objective signs of pain serve as a bias for senior student nurses to disregard the subjective report of pain by patients. Although the sample size of senior nursing students in this study was small, the results are consistent with previous research results. This study of nursing students highlights the importance of pain education of the health care professional for accurate pain assessment and improved quality of patient care and pain management.

Common limitations are present in all the above-mentioned studies. These include low response rates to questionnaires, small sample sizes, limited representability of the sample populations and limited generalisability of the results. There may be sampling bias associated with increased responses from health care professionals who are more confident in their knowledge of pain mechanisms, thereby influencing the results favourably. Furthermore, Ali and Thomson (2009) note that survey-based research designs have inherent limitations due to their standardised format. The understanding of questionnaires may not be the same for all the respondents, with possible misinterpretation of the wording of the questions. Despite these limitations, the results of these studies are consistent with each other as well as with previous research.

As mentioned previously, injury can have a profound psychological impact on athletes [33, 47]. Knowledge about the psychological factors associated with pain and pain management will now be discussed.

(i) Knowledge about psychological factors associated with pain and pain management

There is increasing research in the field of sports psychology; information identified in the literature may influence how physiotherapists treat elite athletes [60]. Physiotherapists often have to deal with the injured athletes' associated emotional disturbances [46].

Gordon, Milios and Grove (1991) revealed that 84% of physiotherapists in Australia and New Zealand felt their training in psychological aspects of injury was inadequate, and more relevantly, 87% welcomed more applied information in this area of their training. Due to the small sample size, these results are not representative of the general physiotherapy population; and results may differ in other countries due to differences in undergraduate and postgraduate curricula.

Views of physiotherapists on the psychological content of their practice were explored by Hemmings and Povey (2002). This study was conducted in the United Kingdom, aiming to bridge the paucity of research in this field. Although research into the psychological aspects of sports injury is increasing and psychological interventions have been identified as important in the rehabilitation process, few studies have focused on how sports medicine practitioners deal with psychological problems. Physiotherapists reported that psychological factors were an important aspect of sports injury and 90% of physiotherapists believed that sports injuries have a psychological impact in the athlete.

Physiotherapists noticed a variety of characteristics in athletes who successfully cope with injury: compliance with treatment and rehabilitation (54%), positive attitudes to injury and life (40%), motivation (28%) and determination (24%). Likewise the physiotherapists reported a range of characteristics in athletes who less successfully cope with injury: these being non-compliance with rehabilitation (49%), impatience (29%), poor motivation (22%), and a lack of understanding of an injury (19%). The physiotherapists also reported often using psychological techniques when treating injured athletes. These included creating variety in rehabilitation exercises, using short term goals and encouragement and detailed explanation of the treatment and rehabilitation process. Less than 10% reported having access to a sports psychologist and only half of these reported ever referring an athlete for counselling. This indicates that future physiotherapy education may need more emphasis on the psychological aspect of injury, and seek to increase knowledge on the potential of using psychological interventions within a physiotherapy rehabilitation programme. Further replication of this research, incorporating a larger sample size and possibly physiotherapists from different countries, is needed to represent the views of physiotherapists across a general population.

Although physiotherapists demonstrate knowledge about the need for psychological intervention, it does not always extend to proactive intervention [60]. Furthermore, some form of referral network should be established between physiotherapists and sports psychologists.

In the above studies the focus of the research was on pain knowledge. However, as previously mentioned knowledge and attitudes do not always align, and negative attitudes and beliefs may override knowledge in the clinical setting. It is notable that an increase in knowledge has been found to influence pain attitudes and beliefs in some studies. Jones, Ravey and Steedman (2000) found a statistically significant change in attitudes and beliefs about pain of occupational therapists in the United Kingdom after participation in a pain management program. From a different perspective, Moseley and colleagues (2002) identified that education about the neurophysiology of pain results in significant changes in pain beliefs and attitudes; as well as alterations in pain cognitions and physical performance in patients with chronic lower back pain [64]. This highlights the importance of physiotherapists' knowledge about pain in educating patients, to achieve improved treatment outcomes.

Adequate pain knowledge is therefore essential to ensure effective pain assessment and management. However, pain education and training aimed at increasing knowledge alone is limited. The role of attitudes and beliefs about pain must be acknowledged and the link between the three factors explored further.

2.3.3. Pain attitudes and beliefs

In a study of orthopaedic physiotherapists' knowledge and attitudes about chronic pain, Wolff et al (1991) found insufficient pain knowledge and inappropriate attitudes, which could lead to inadequate treatment of patients with pain. All but 4% of the participants preferred to work with patients who were not likely to have chronic pain, while 72% believed their entry-level education in pain and pain management was inadequate to deal with an orthopaedic patient population. Despite this finding, 77% were satisfied with their current level of pain knowledge. Only 27.7% felt that physiotherapy is beneficial for patients with chronic pain and the majority of the sample (84.9%) indicated that successful rehabilitation requires more than physiotherapy alone. It is encouraging to note that 50% reported continuing education as the most useful source of pain management information. As in the studies discussed earlier, pain knowledge scores for this population were low where 49.6% met the criterion score. Notably, scores on positive attitudes toward treating patients with chronic pain were even lower with only 7.8% meeting the criterion score.

A criterion test score of 80% was set by the authors to demonstrate adequate pain knowledge and appropriate attitudes. Contrary to other studies, no correlation was demonstrated between pain knowledge and attitudes. A significant weakness of this study is the low response rate (36.6%) which should be considered with regard to generalising results to the population. Furthermore, the sample is not representative of all physiotherapists.

Attitudes and belief about pain affect health care practitioner's perceptions of patient's suffering and pain. The International Association for the Study of Pain (IASP) describes pain as being "always subjective", however, Bartfield, Salluzo, Raccio-Robak, Funk and Verdile (1997) found key treatment decisions to be dependent on the physician's perception of their patient's pain; possibly a reflection of underlying beliefs and attitudes rather than knowledge. Although this information is interesting, it may not be applicable to other professional settings as the study only included physicians, was performed at one particular institution and was conducted on one particular patient population. Further studies are needed to clarify the factors which influence health care professionals' assessment and treatment of pain.

Negative biases of physiotherapists towards patients with chronic pain have been shown to potentially influence expectations of treatment outcomes and ultimately, the actual treatment outcome. Simmonds and Kumar (1996) looked at whether knowledge of a patient's workers' compensation status influences clinical judgements.

It was found that knowledge of a patient's compensation status did not influence the physiotherapists' physical assessment but did influence prognostic judgement. There may be some limitations in this study based on the use of videotape methodology. No verbal communication or palpation was possible between the physiotherapist and the patient. While different methodology may have been more realistic clinically, it could have confounded the results due to the variability in communication and palpation skills [82].

Further, it is suggested that in order to maximise the rehabilitation potential of patients with chronic low back pain, physiotherapists need to be aware that their pain beliefs may influence their management of these patients. Daykin and Richardson (2004) evaluated physiotherapists' pain beliefs and their influence on the management of patients with chronic low back pain. Personal pain experience was found to affect physiotherapists' management of their pain patients. The influence of physiotherapists' beliefs regarding 'difficult' patients on the therapeutic outcome was more apparent than the effect of treating 'good' patients.

Patients with acute pain were believed to be 'good' patients with satisfactory treatment outcomes, whereas 'difficult' patients were not expected to have good treatment outcomes, leading to an inequality in treatment and sub-optimal management of these patients. Patient compliance was also found to affect the physiotherapists' perceptions and therefore management. Increased experience and a larger "tool bag" of techniques was seen as desirable, with physiotherapists' having increased self-efficacy and confidence in their patient management. Although improved knowledge was desirable, it did not always lead to a change in practice. Physiotherapists' attributions about pain were reflected in the treatments they provided and were evident throughout their therapeutic encounter with patients [21].

The physiotherapist-patient relationship is a reciprocal one. Physiotherapists' attributions can influence the patients' beliefs and behaviour; and the clinical characteristics physiotherapists believe patients have can affect their own treatment strategies and outcomes. Daykin and Richardson (2004) found that physiotherapists' beliefs about pain and its management influenced the outcomes of therapeutic encounters with patients. This study provides valuable information as it addresses an area that is lacking in the literature, i.e. pain beliefs of physiotherapists within their therapeutic encounter with chronic pain patients. However, the small sample size, data analysis based on a grounded theory approach and lack of valid and/or reliable outcome measures limits the generalisability of this study.

A further attitude or belief about pain which may influence patient care relates to fear-avoidance. Some evidence exists that treatment behaviours are associated with fear-avoidance beliefs in healthcare providers. Houben, Vlaeyen, Peters, Ostelo, Wolters and Stomp-van den Berg (2004), evaluated healthcare providers' attitudes and beliefs towards low back pain. Therapists' included in this study were chiropractors, physiotherapists and manual therapists. Therapists' attitudes and beliefs were found to influence patients' attitudes and beliefs, therefore impacting on patients' behaviour and impairments. Houben, Gijsen, Peterson, de Jong and Vlaeyen (2005) identified that healthcare providers' treatment attitudes and beliefs were found to influence the actual treatment provided. Therefore, the attitudes and beliefs of healthcare providers may also play an important role in the persistence of pain. The study sample consisted of final year physiotherapy students from one school; therefore the question remains whether the results of this study would be similar to those with more experienced physiotherapists and the generalisability of the results should be treated with caution.

Green and colleagues (2002) investigated whether differences in pain management are related to physicians' attitudes. It was identified that physicians with a goal of high pain relief were more likely to provide high quality care; therefore, physicians' low pain relief goals and neutral attitudes towards satisfaction with the management of pain suggest the potential for its under-treatment [34].

From the patient perspective, Seers and Friedli (1996) investigated patients' experiences of their chronic pain. Patients' perceptions of disbelief by physicians were found to have negative consequences. Having their pain acknowledged as real was crucial to many patients, and it was identified that the most important factor for patients was that their pain was believed; thereby leading to improved patient care. This study highlights how pain affects many dimensions of a patient's life, emphasising the complex and multidimensional nature of pain, as well as the importance of healthcare professionals' attitudes toward and beliefs about pain.

The literature highlights the importance of adequate knowledge as well as appropriate beliefs and attitudes of health care professionals in the management of pain, and the role of education in achieving this. Thus, knowledge, attitudes and beliefs about pain may be influenced through effective education strategies, thereby addressing some of the issues that have been identified in literature. The specific factors which may influence the knowledge, attitudes and beliefs of the health care professionals managing pain in athletes will now be discussed.

2.3.4. Factors Contributing to Pain Knowledge, Attitudes and Beliefs of Pain

Gender, ethnicity/culture, academic training and clinical experience are factors that have been found to contribute to a person's knowledge, attitudes and beliefs of pain. Each of these factors will be discussed in the following section.

(i) Gender

The literature largely focuses on gender differences in patients. Pain perception and pain responses have been recognised to differ between men and women. It is acknowledged that men and women respond differently to nociceptive input due to physiological differences in functioning [2, 35, 76]. Fillingim and Maxiner (1995) reviewed a representative sample of experimental pain studies and concluded that women exhibit lower pain threshold and tolerance than men.

It is considered that the various systems (e.g. neural, hormonal) involved in the transmission and modulation of nociceptive information may contribute to gender associated pain differences in pain sensitivity. Fillingim, King, Ribeiro-DaSilva, Rahim-Williams and Riley (2009) confirm these gender differences in a comprehensive review of recent clinical and experimental literature. This review attempted to select studies from a range of geographical regions as well as, where possible, rely on studies drawn from general population-based samples, thus improving generalisability.

Possible theories explaining male and female differences in the pattern of reporting pain are explored by Holdcraft and Power (2003) in a clinical review of recent developments in the management of pain. These include a greater biological sensitivity to painful stimuli in women; a cognitive psychological difference such that women label stimuli as painful at different thresholds from men; and social and cultural factors that influence reporting of pain differently in men and women. These underlying biological mechanisms of pain and the contribution of psychological and social factors as they contribute to the meaning of pain for women and men warrant greater attention in pain research [90].

Sullivan, Tripp and Santor (2000) examined gender differences in catastrophising and pain in healthy students in Canada. Results showed that women reported more intense pain and engaged in pain behaviour for a longer period of time than men. Women also scored higher on a measure of catastrophic thinking than men. The emerging literature suggests that, in order to maximise the impact of interventions for pain control, it is necessary to devote more attention to understanding the goals of coping with pain and clarify the contextual factors that impact on these goals.

If men and women have different goals when faced with painful situations, they will likely also differ in the thoughts and behaviours that are initiated to attain those goals. This study signifies that gender could be a factor which influences healthcare professionals' thoughts and behaviours towards their patients.

However, differences in pain response may equally be affected by cultural gender differences, that is, differences in culturally accepted or expected behaviour by men or women [5, 12, 35]. In a review of research examining gender variations in clinical pain experiences, Unruh (1996) recognises social differences in the upbringing of boys and girls as a factor which contributes to differences in pain perception, making it more acceptable for women to report the experience of pain.

Results identified by Robinson, Riley, Myers, Papas, Wise, Waxenberg and Fillingim (2000) are consistent with the gender-stereotyped pain expectations and lend support to the gender role theories that suggest that men and women are socialized to respond differently and have different expectations relative to pain perception. Men are expected by both sexes to have higher pain endurance and lower pain sensitivity than women. Attitudes and beliefs about the acceptability of different aspects of pain behaviour for women and men may be an influencing factor and gender may have an impact on management practices within pain clinics [90].

In an epidemiological perspective of gender differences in pain, LeResche (1995) identifies most studies to sample young adults, largely conducted in North America or Western Europe. These limitations become salient if social development and culture are considered important in influencing tendencies to experience and report pain. Although the selective nature of study samples does not invalidate the results of individual studies and may not invalidate the authors' conclusions regarding the higher pain sensitivities of women, it does lead to the question of whether the findings can be generalised to the overall population.

Despite the evidence that women have lower pain thresholds, less pain tolerance and greater pain behaviours than men in most societies, there is evidence that women and men receive differential care for their pain, with the disadvantage being greatest for women. Healthcare professionals tend to associate pain experienced by women with emotional and psychosocial factors.

Literature focuses on gender-related prejudices which impact on the quality of pain care [90]. These studies centre on biases towards patient gender. Despite studies identifying differences in gender expectations with regard to pain tolerance, there are no studies which explore the possibility of healthcare professionals' gender as a factor which may influence attitudes and beliefs about pain towards their patients, thereby affecting the outcome of pain management.

Unruh (1996) identifies several limitations that must be considered in any review of gender and pain experience. Gender is rarely the primary focus of pain research; instead, gender is typically included as a socio-demographic variable. As a result, there may be some bias towards reporting only statistically significant gender differences giving an overall inflated appearance of gender variation in pain experience. Uneven gender distribution within samples may obscure or exaggerate gender outcomes. Sample size, age distributions, statistical significance and reliability/validity of measures in epidemiological surveys have considerable variability, thereby limiting credibility of the results.

As discussed in the previous sections, culture and ethnicity may influence attitudes and beliefs about pain limiting comparison of studies exploring knowledge in different contexts. The influence of ethnicity and culture on pain knowledge, attitudes and beliefs will now be discussed.

(ii) Ethnicity/Culture

Ethnicity describes groups of people with shared culture, heritage and beliefs. Culture refers to shared language, behaviour, customs and knowledge. Pain is recognised as a subjective experience that is influenced by ethnicity and culture, shared attitudes, and values about behaviour and words [89]. Ethnic factors may have a major influence on how pain is appraised and responded to emotionally and behaviourally. The meaning of pain can be influenced by socio-cultural factors related to ethnic background [23].

There is considerable evidence which demonstrates ethnic differences in pain beliefs, pain perception, pain tolerance and experience of pain [9, 11, 15, 24, 89]. Although the literature focuses on persons experiencing pain, this information provides rationale to explore whether ethnicity may influence physiotherapists' attitudes and beliefs about pain.

Ethnic differences in pain beliefs, pain prevalence and pain coping strategies have been reported in experimentally induced pain and in both acute and chronic pain [11, 36, 89]. Similar results have been recorded in people living with HIV/AIDS (PLWHA) [11, 36, 89]. Non-Caucasian PLWHA reported significantly higher pain intensity than Caucasian patients in a study exploring pain in PLWHA conducted in New York [9].

This is of particular relevance as Southern Africa is the most severely affected region in the world, with 5.6 million PLWHA in South Africa alone [94]. There are several limitations to the above-mentioned studies: it is important to note that all the studies focus on investigating ethnic differences in pain beliefs among patients rather than health care professionals. Campbell et al (2005) conducted their study on healthy college students from a homogenous urban university population; while Hastie et al (2005) used a community-based sample, therefore the degree to which results can be applied to other populations is unknown.

Tan et al (2005) identified that unequal sampling between black and white populations may possibly render the comparisons less sensitive to detecting actual differences between the groups. What is interesting, however, is that ethnic differences in pain-reducing behaviours are present even within a young, college-educated, healthy sample.

This suggests that ethnic differences in behaviour responses to pain are present before the development of a clinical pain condition and may reflect behaviour patterns acquired relatively early in life based on cultural or environmental influences [36].

While no similar studies could be found relating to South African ethnic groups it is possible that similar differences may be found. These differences in pain prevalence and coping strategies are theorised to be as much a reflection of differences in physiological functioning as of the psychosocial influence of culture [23]. Given the large number of ethnic groups which make up South African society and the possible differences between ethnic groups in pain beliefs, pain reporting and pain coping strategies, it is pertinent to explore ethnicity as a variable which may influence pain knowledge, attitudes and beliefs.

As identified earlier, education may play a role in changing attitudes and beliefs about pain. The influence of academic training on pain knowledge, attitudes and beliefs will now be discussed.

(iii) Academic Training

Jones et al (2000) focused on the attitudes and beliefs of occupational therapists following a pain education course. Results showed an improvement in scores after education, indicating a positive change in beliefs and attitudes. It is noted that the sample consisted of occupational therapists that chose to attend the course and different results may have been obtained with a cohort group who had no choice about attendance.

Enskar, Ljusegren, Berglund, Eaton, Harding, Mokoena, Chauke and Moleki (2007) compared the perspectives on pain and pain management of nurses from the UK, South Africa and Sweden. It was found that Swedish nurses have higher levels of knowledge and a more positive attitude to pain management than nurses from the UK or South Africa. While there may be benefit in comparing different countries, results may be a reflection of differences in education, responsibilities and working conditions or a reflection of culture and beliefs [25].

In the Netherlands, Zwakhalen, Hamers, Peijnenburg and Burger (2007) found that educational level seems to influence beliefs and knowledge about pain. Furthermore, in Australia, an integrated pain course developed according to the IASP pain curriculum guidelines resulted in increased allied health students' knowledge about pain [86].

This information is important as it highlights that physiotherapists' knowledge and attitudes of pain may differ depending on the academic institution and level of undergraduate or postgraduate education.

An opposing study found no correlations between test scores, entry-level pain education and pain knowledge satisfaction of orthopaedic physiotherapists in the USA [97]. Furthermore, Fanslow (1985) investigated nurses' attitudes towards pain, showing that a sufficient knowledge base may not be directly associated with appropriate attitudes or effective use of the knowledge. These studies are dated and therefore the level, type of education and curricula may differ significantly in more recent times, thereby rendering the results of these studies irrelevant.

Although the literature largely supports academic training as a factor that may influence knowledge, attitudes and beliefs about pain, there is a paucity of research on the pain curriculum content in health care courses in a South African context. This is important as there are eight academic institutions which offer Physiotherapy, each with slightly differing curricula.

Having considered the role of undergraduate training and education, the role of postgraduate clinical experience on pain knowledge attitudes and beliefs will now be discussed further.

(iv) Clinical Experience

Wilson (2007) identified that clinical experience influences nurses' knowledge of pain and that the working environment has an influence on the development and use of this knowledge. This study included a small group of nurses who were self-selecting (specialist oncology hospice nurses and general district nurses). These findings are supported by another recent study which found that nurses with more working experience had more positive attitudes to pain management and a higher level of knowledge [25]. Enskar et al (2007) noted that comparing the results from different countries may affect results due to differences in education, responsibilities and working conditions. Similar results were identified in a study of physiotherapists in Sweden, where beliefs are found to change during the first 18 months of qualifying, with a possibility of continued change with further experience [20].

In contrast to the results discussed above, correlations between test scores, years of experience and pain knowledge satisfaction of orthopaedic physiotherapists in the USA were not found to be significant [97]. Lebovits et al (1997) also found no significant differences based on post-graduate years of experience of healthcare providers in New York.

The results of both these studies may be limited due to sampling bias, as respondents who chose to complete the questionnaires may have had confidence in their knowledge, thus scoring higher than those who chose not to return the questionnaire. Further, both studies were conducted over 10 years ago and there may have been changes in the clinical environment in various health professions, therefore the results may no longer be representative of the current situation. While no similar studies have been conducted in South Africa, it is possible that clinical experience, particularly in a sports physiotherapy setting, may play a role in knowledge, attitudes and beliefs of pain.

It is apparent from the inconclusive literature that further research is required to explore the influence of clinical experience on pain knowledge, attitudes and beliefs.

Several factors may therefore influence healthcare professionals' knowledge, attitudes and beliefs about pain. These include gender, ethnic or cultural differences, undergraduate training, postgraduate experience and training. Methods of evaluating pain knowledge, attitudes and beliefs in health care professionals will now be discussed.

2.3.5. Assessing pain knowledge, attitudes and beliefs in health care professionals

Few tools have been developed to measure the knowledge, attitudes and beliefs in health care professionals. These include the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT) [66], The Health Care Providers' Pain and Impairment Relationships Scale (HC-PAIRS) [8] and the Revised Pain Knowledge and Attitudes Questionnaire (RPKAQ) [87].

The PABS-PT and HC-PAIRS were identified by Bishop et al (2007), in a systematic search and critical review, to currently be the most thoroughly tested tools available for the measurement of attitudes and beliefs of health care professionals towards spinal pain.

The PABS-PT is a measure designed to assess the strength of two treatment orientations, namely biomedical and behavioural, towards the management of patients with chronic lower back pain [7]. Findings suggest that the PABS-PT is a valid tool that discriminates between physiotherapists with a 'behavioural' orientation and those with a 'biomedical' orientation; however internal consistency is questionable [69].

The HC-PAIRS assesses the attitudes and beliefs practitioners hold about functional expectations for patients with chronic lower back pain [7]. The HC-PAIRS shows good validity and satisfactory internal consistency, with moderate test-retest reliability [7].

A limitation of the PABS-PT and HC-PAIRS is that the questions are specific to chronic lower back pain and thus cannot be used to assess health care professionals' general knowledge, attitudes and beliefs about pain; furthermore, the questionnaires focus on attitudes and beliefs about pain, rather than knowledge.

The RPKAQ covers a wide base of knowledge that is appropriate for health care professionals [72]. The sub-sections in the original questionnaire included physiological, psychological, developmental, assessment/measurement, pharmacological and cognitive/behavioural aspects of pain knowledge. Content validity of the RPKAQ was established by consultation with five internationally recognised experts in pain research; however the internal consistency was unsatisfactory and the questionnaire was developed over 10 years ago [93]. Based on the variety of pain aspects included in the RPKAQ, it was selected as the most appropriate tool to assess pain knowledge, attitudes and beliefs in the current study. It is, however, noted that there is scope for development of a more valid and reliable outcome measure for the assessment of pain knowledge, attitudes and beliefs in health care professionals.

2.4. Summary

There is a need for therapists to be aware of the levels of evidence that exist for pain treatments [92]. A review of the literature reveals a paucity of evidence relating to pain knowledge and assessment ability in healthcare professionals. The implications for physiotherapy practice are highlighted by the fact that poor knowledge about pain and pain mechanisms is recognised to lead to poor assessment ability and subsequently poor pain management [72].

Adequate knowledge of pain and the ability to assess pain is essential in order to treat appropriately, effectively and optimally. This is of particular relevance in the field of sports physiotherapy where the majority of patients will experience pain associated with injuries which needs appropriate evidence-based assessment and management using a biopsychosocial framework.

Further, there is a paucity of research on the knowledge of pain in health care professionals in South Africa, particularly in physiotherapists. Research in this field could provide insight into the levels of pain knowledge, the pain attitudes and pain beliefs of physiotherapists treating athletes and explore the factors which may contribute to level of knowledge or influence attitudes and beliefs. In addition such research could be used to facilitate an improvement in pain education aimed at increasing health professionals' knowledge and changing attitudes and beliefs about pain. This may then result in an improvement in health professionals' assessment and identification of central changes that contribute to chronic pain in athletes. Additionally, this may allow for implementation of more appropriate and effective intervention strategies in the acute stages of injury, including referral to relevant members of the multidisciplinary team.

CHAPTER THREE

SPORTS PHYSIOTHERAPISTS' KNOWLEDGE, ATTITUDES AND BELIEFS OF PAIN: A CROSS-SECTIONAL CORRELATIONAL STUDY

INTRODUCTION

Pain is the most common complaint for which individuals seek the help of a health care professional [55, 57, 62], and many studies present a high incidence of sports-related pain and injury [22, 68]. Pain has been identified as the 5th vital sign [72], indicating the attention with which health care professionals should be assessing pain. The most commonly cited reasons for mismanagement of pain are health care professionals' negative attitudes and lack of knowledge about pain [79]. The implications for physiotherapy practice are highlighted by the fact that poor knowledge about pain and pain mechanisms is recognised to lead to poor assessment ability and subsequently poor pain management [72]. Adequate knowledge of pain and ability to assess pain, as well as appropriate attitudes about pain are essential in order to treat appropriately, effectively and optimally.

Moseley (2002) discovered that education about the neurophysiology of pain will result in significant changes in pain beliefs and attitudes as well as alter pain cognitions and physical performance [64]. Thus, knowledge, attitudes and beliefs about pain may be influenced through effective education strategies, thereby addressing some of the issues that have been identified in the literature.

The physiotherapist has a central role in all aspects of pain assessment and subsequent management. McKenna, Delaney and Phillips (2002) recognize that the physiotherapist is involved in and plays a major role in the rehabilitation of elite athletes. However, there is a paucity of research on South African health care professionals' knowledge, attitudes and beliefs of pain, particularly in the field of physiotherapy.

This study will aim to provide baseline descriptive information regarding the pain knowledge, pain attitudes and pain beliefs of physiotherapists in South Africa, particularly those treating athletes; and to explore factors (including gender, ethnicity/culture, clinical experience and academic training) which may contribute to knowledge, attitudes and beliefs.

3.1. AIMS & OBJECTIVES

3.1.1. Aim

The aim of this study was to determine the pain knowledge, pain attitudes and pain beliefs of physiotherapists treating athletes and to explore factors which may contribute to knowledge, attitudes and beliefs.

3.1.2. Objectives

1) To determine the pain knowledge and attitudes of South African physiotherapists treating athletes as measured by the Revised Pain Knowledge and Attitudes Questionnaire [91].

2) To determine whether gender, ethnicity, academic training or clinical experience is associated with pain knowledge and attitudes.

3.2. METHODS

3.2.1. Participants and Study Design

The study was a descriptive cross-sectional correlational design. The study was submitted and approved by the Faculty of Health Sciences Human Research Ethics Committee, University of Cape Town (HREC REF: 312/ 2011) (Appendix I). One thousand five hundred and sixty-two HPCSA registered physiotherapists were requested to participate in the study through electronic correspondence. All participants were required to give informed consent before completing the questionnaire (Appendix II). The informed consent form explained the purpose of the study, voluntary participation with no risk to reputation, how confidentiality and anonymity would be ensured and the right to withdraw from the study without prejudice.

3.2.2. Sample Size Calculation

The study sample included the whole population of physiotherapists who are members of the Sports Physiotherapy Group (n=639) and the Orthopaedic Manipulative Physiotherapy Group (n=1339) of the South African Society of Physiotherapy. Some physiotherapists were members of both the above-mentioned groups (n=416). Thus, the informed consent forms & questionnaires were distributed to a total of 1562 physiotherapists.

Sample size in surveys needs to be carefully considered as response rates have been reported to be as low as 35% [73] or even 20% [8, 50]. Sample size was calculated using Epi-Info Version 7 [26] based on a population of 1562 physiotherapists. Using the pain knowledge scores obtained by the physiotherapy students (68.87%) in the study conducted by Parker et al (2009), with a 4% precision interval (score range of 63.87 – 73.87%), and a 95% confidence interval, a sample size of 272 was required, a 17.4% response rate.

3.2.3. Inclusion Criteria

HPCSA registered physiotherapists who are members of the Sports Physiotherapy Group (SPG) of the South African Society of Physiotherapy and/ or the Orthopaedic Manipulative Physiotherapy Group (OMPTG) of the South African Society of Physiotherapy were included in this study.

3.2.4. Exclusion Criteria

Participants who had failed to complete all five sections of the Revised Pain Knowledge and Attitudes Questionnaire were considered to be drop-outs and were excluded from the study.

3.2.5. Recruitment

Participants were selected using the South African Society of Physiotherapy Special Interest Group Database and were recruited through electronic correspondence informing them of the study and requesting voluntary participation (Appendix II). No randomisation of subjects was necessary, as this cross-sectional study made use of a whole population.

3.2.6. Revised Pain Knowledge and Attitudes Questionnaire

A demographic questionnaire was included to obtain the characteristics of the sample (Appendix III).The Revised Pain Knowledge and Attitudes Questionnaire [91] (Appendix III) covers a wide base of knowledge that is appropriate for health care professionals. The sub-sections in the original questionnaire included physiological, psychological, developmental, assessment/measurement, pharmacological and cognitive/behavioural aspects of pain knowledge. The questionnaire was adapted for the present study by excluding the section on pharmacological management of pain. Although pharmacology is presently a part of the curriculum for BSc (Physiotherapy) in South African universities, the content of the courses is variable.

In addition, the pharmacology course is a recent addition to the physiotherapy curriculum in South Africa and physiotherapists who graduated more than 10 years ago may have had limited pharmacological training.

Further, physiotherapists in South Africa do not have prescription rights. The adapted Revised Pain Knowledge and Attitudes Questionnaire used in this study therefore included physiological, psychological, developmental, assessment/measurement, and cognitive/behavioural aspects of pain knowledge.

Scoring for the Revised Pain Knowledge and Attitudes Questionnaire was performed, according to the instructions of the instrument's author, as follows:

Responses on the Likert Scale were modified to a true/false/unsure format.

- One mark was awarded for each answer on the correct end of the Likert Scale
- Zero marks were awarded for each answer on the incorrect end of the Likert Scale
- Zero marks were awarded for each question not answered/ indicated as 'uncertain'

Correct answers in each sub-section of the Revised Pain Knowledge and Attitudes Questionnaire were scored as a percentage and the total correct answers for the entire Revised Pain Knowledge and Attitudes Questionnaire were scored as a percentage.

The informed consent forms and questionnaires were kept in the original English format as all correspondence from the Health Professions Council of South Africa and the South African Society of Physiotherapy to health care professionals is in English. Perhaps in future, the questionnaire should be available in the languages used for academic training in South Africa.

(i) Validity of the Revised Pain Knowledge and Attitudes Questionnaire

The content validity of the original Pain Knowledge and Attitudes Questionnaire was established by consultation with five internationally recognised experts in pain research [93], as discussed in the literature review. A disadvantage is that the validity was established internationally over 10 years ago, therefore content and face validity should be ascertained by a panel of South African physiotherapists in the field of sports physiotherapy and/or pain to improve the strength of the questionnaire and generalisability of results. Furthermore, cross-cultural adaptation of the questionnaire for the South African population may enhance applicability of the findings.

(ii) Internal Consistency of the Revised Pain Knowledge and Attitudes Questionnaire (Adapted Version)

Unruh (1995) reported a Cronbach alpha of 0.65 for the original Pain Knowledge and Attitudes Questionnaire. Internal consistency of the adapted version of the Revised Pain Knowledge and Attitudes Questionnaire used in this study was established post-hoc by calculating reliability. A reliability coefficient of 0.7 for the Cronbach alpha is regarded as acceptable internal consistency for an instrument as a whole. The RPKAQ had a Cronbach alpha of 0.62 (questionable internal consistency). It is noted that test-retest reliability could have been included in the pilot study to strengthen the dependability of the questionnaire.

Alpha values for each question was determined and recalculated with individual items deleted in order to explore the contribution each item made to the underlying construct of the subscale. It is expected that the alpha value will decrease with the removal of an item from the questionnaire; a rise in the alpha value with the removal of an item indicates that the item compromises the underlying construct of the questionnaire and should be removed. Omission of items did not significantly affect the underlying construct of the questionnaire (Table 3-2). Four questions in the RPKAQ showed a slight increase in alpha value when removed. These included "Nociception is experienced at the site of tissue damage"; "Children can have severe headaches or migraines"; "Relaxation is an effective method of pain relief for mild to moderate levels of pain"; and "Cognitive/behavioural methods have more effect on reducing mild pain than pain which is moderate or severe". The slight increase in alpha value suggests that there may be an interpretation issue with these questions. Possible ambiguity may lie in the term 'nociception'; the difference between headaches versus migraines; and the subtleties of 'mild/moderate/severe' pain. As the increase in the alpha value of the instrument with removal of these items was <0.1, the items were retained.

Table 3-2: Internal Consistency of the RPKAQ

Summary for scale: Cronbach alpha = 0.62	
	Alpha - if deleted
There is a predictable relationship between the extent of an injury and the person's perception of pain.	0.61
Pain is a physiological sensation.	0.62
The sensation of pain varies from individual to individual.	0.62
Nociception is experienced at the site of tissue damage.	0.64
The physiological basis of pain is well understood.	0.62
The intensity of pain is its most important quality.	0.62
Two people with exactly the same physical condition or trauma will have similar experiences of pain.	0.62
Pain is a subjective experience.	0.62
The duration of pain is similar for individuals with the same pain condition.	0.61
Unrelieved pain contributes to the onset of chronic pain.	0.62
Chronic pain always has an underlying psychological cause.	0.62
A person's statement about pain should always be accepted at face value.	0.62
If there is no organic basis to the pain, then the pain is psychological.	0.60
Psychologically caused pain can hurt as much as organically caused pain.	0.62
A person receiving compensation is less likely to recover from pain.	0.62
Chronic pain frequently leads to depression.	0.62
It is common for someone with chronic pain to feel little control over the pain.	0.62
Improving an individual's coping skills is more important than determining the extent to which there may be a psychological cause of the pain.	0.62
Pain due to a physiological cause and pain due to a psychological cause can occur simultaneously.	0.62
People with chronic pain can continue to live productive lives.	0.62
A person may have severe pain but appear calm and rational at the same time.	0.62
Learning to tolerate pain builds character.	0.61
Relief of pain is often more important to the person than treatment of the underlying condition.	0.62
Deliberate faking of pain is rare among people with pain.	0.62
A child, who is playing after surgery, may have pain.	0.62
Children experience less pain than adults.	0.59
Due to the immaturity of the nervous system, newborns have little sensitivity to pain.	0.58
Children have a higher tolerance for pain than adults.	0.59
Children can have severe headaches or migraines.	0.63
If children are given medication for pain, they are more likely to think that drugs will solve their problems later in life.	0.61
A premature infant is able to feel pain.	0.60
Children, who have recurrent abdominal pain, are probably seeking attention or trying to escape responsibilities.	0.61
Elderly people tolerate more pain.	0.62
It is impossible to measure pain in an individual who is unable to communicate about pain.	0.61
Behavioural measures of pain are reliable measures of short sharp pain.	0.62
Self-report is the most meaningful measure of pain.	0.62

Children remember pain.	0.61
A person, who is sleeping, may have significant pain.	0.62
Blood pressure, heart rate, respiration, and sweating are good measures of postoperative pain.	0.62
Increasing levels of endogenous opioids can help to determine if chronic pain is due to a cause (NB: endogenous opioids are produced by the body).	0.62
Pain can be reliably measured on a variety of numeric scales.	0.62
Behavioural measures of pain are reliable indicators of chronic pain.	0.61
Asking the person "how do you feel?" is usually the best way to measure pain.	0.62
Frequent measurement of acute pain may make the pain worse.	0.61
Being engaged in meaningful activity may reduce a person's perception of pain.	0.62
Cognitive/ behavioural methods of pain relief are more effective than pharmacological methods.	0.61
Relaxation is an effective method of pain relief for mild to moderate levels of pain.	0.63
Reinforcement of coping with pain is an important treatment intervention.	0.62
A spouse, parents, or other family members may exacerbate non-coping behaviours.	0.62
Cognitive/ behavioural methods have more effect on reducing mild pain than pain which is moderate or severe.	0.63
Progressive relaxation (tension with relaxation) may cause more pain.	0.62
It is preferable to use cognitive/ behavioural methods rather than pharmacological treatments for pain relief.	0.62
Changing a person's patterns of thought regarding pain may improve coping skills.	0.62
Cognitive/ behavioural methods may have more impact on improving coping than on reducing the intensity of pain.	0.61

(iii) Feasibility of the Revised Pain Knowledge and Attitudes Questionnaire

Feasibility was established with a pilot study consisting of 10 HPSCA registered physiotherapists who were members of the Sports Physiotherapy Group and/or Orthopaedic Manipulative Physiotherapy Group of the South African Society of Physiotherapy. The participants completed the questionnaire successfully, appropriately indicating selected answers. Feedback from the physiotherapists was obtained regarding time taken to complete the questionnaire, comprehension of the questionnaire, as well as ease and efficiency of completion of the questionnaire. No significant changes were made to the questionnaire following the pilot study. A progress bar feature was added to the online questionnaire indicating the percentage of completion of the questionnaire, as suggested in the feedback responses.

(iv) 'Adequate Pain Knowledge'

The score selected to represent an appropriate level of knowledge for the Revised Pain Knowledge and Attitudes Questionnaire was 75%, as this is a first class pass at the University of Cape Town. A score of 75% has been suggested as an appropriate score for the assessment of a vital sign, as reflected by the Resuscitation Council (UK) using 75% as a standard pass mark for examination in the Advanced Life Support (ALS) Course [76]. The 75% score was also used in a previous study by Parker et al (2009) using the RPKAQ in final year health sciences student Therefore 75% was regarded as a necessary score of adequate knowledge if pain is to be respected as the fifth vital sign.

3.2.7. Procedure

Once the pilot study was completed, all members of the Sports Physiotherapy Group and Orthopaedic Manipulative Physiotherapy Group were contacted through electronic correspondence by the South African Society of Physiotherapy informing them of the purpose of the study and requesting their participation (Appendix II). Therefore, the identity and contact details of the participants were kept blinded from the investigator. The e-mail included a link to the questionnaire on Survey Monkey (www.surveymonkey.com). The informed consent form was presented to the participant on Survey Monkey (Appendix II); participants were required to indicate informed consent electronically in order for the questionnaire to become available. Participants who did not indicate consent were not granted access to the questionnaire.

All responses were anonymous, no contact details were included in the questionnaires and each response was allocated a code on Survey Monkey to ensure anonymity and confidentiality. One follow-up e-mail was sent to members of the Sports Physiotherapy Group at four weeks following initial contact. Participants were encouraged to complete the questionnaires to obtain the highest possible response rate. Questionnaires were marked electronically, which controlled for bias in marking. All returned questionnaire responses were stored electronically in password-protected files. On completion of the study, the correct answers to the questionnaire, as well as an explanation of the answers, were supplied to all Sports Physiotherapy Group and Orthopaedic Manipulative Physiotherapy Group members of the South African Society of Physiotherapy via e-mail to assist in increasing pain knowledge (Appendix IV).

3.2.8. Statistical Analyses

Statistical analyses were performed using Statistica Software [84]. The demographic data are presented using descriptive statistics in the form of means and standard deviations [X ± SD (range)]. The knowledge of the whole sample group is presented as percentage scores and described by means and standard deviations [X ± SD (range)]. As a consequence of differences in groups sizes, differences in levels of knowledge between two independent groups was analysed using the Mann-Whitney U test and differences in levels of knowledge between more than two independent groups was analysed using the Kruskal-Wallis & test. Differences in pain knowledge, attitudes and beliefs were tested between groups with gender, ethnicity, academic training or clinical experience as grouping variables. Relationships between levels of knowledge and factors which may influence knowledge are illustrated using Spearman's correlation coefficients. Significance was accepted at the $p < 0.05$ level.

3.2.9. Ethical Considerations

The study was performed in accordance with the principles of the Declaration of Helsinki (Seoul version, 2008). The study was submitted and approved by the Faculty of Health Sciences Human Research Ethics Committee, University of Cape Town (HREC: 312/ 2011) (Appendix I). All participants were required to complete an informed consent form prior to completing the questionnaire (Appendix II). The informed consent form explained the purpose of the study, voluntary participation with no risk to reputation, how confidentiality and anonymity would be ensured and the right to withdraw from the study without prejudice. All data was kept confidential and anonymous.

(i) Risk to Participants

There was no risk to the participants, anonymity ensured no threat to the participants' clinical practice or reputation, and there were no consequences for non-participating physiotherapists.

(ii) Benefits to Participants

On completion of the study, the correct answers to the questionnaire, as well as an explanation of the answers, were supplied to all Sports Physiotherapy Group and Orthopaedic Manipulative Physiotherapy Group members of the South African Society of Physiotherapy via e-mail to assist in increasing pain knowledge (Appendix IV).

3.3. RESULTS

The Revised Pain Knowledge and Attitudes Questionnaire was sent to 639 members of the Sports Physiotherapy Group and 1339 members of the Orthopaedic Manipulative Physiotherapy Group of the South African Society of Physiotherapy. Four hundred and sixteen physiotherapists were members of both SPG and OMPTG groups, thus the questionnaire was distributed to a total population of 1562 physiotherapists. Sampling and responses are presented in Figure 3-1. Responses were received from 253 physiotherapists, a response rate of 16%. Of these 253 responses, 18 respondents gave informed consent but did not complete any part of the questionnaire, rendering the responses invalid; 235 physiotherapists completed the demographic part of the questionnaire, a response rate of 15%, however 28 of these respondents did not complete the RPKAQ to varying degrees. A total of 207 respondents completed the entire questionnaire, a response rate of 13%. Therefore, 235 questionnaires were used for demographic information and 207 completed questionnaires were used for data analysis.

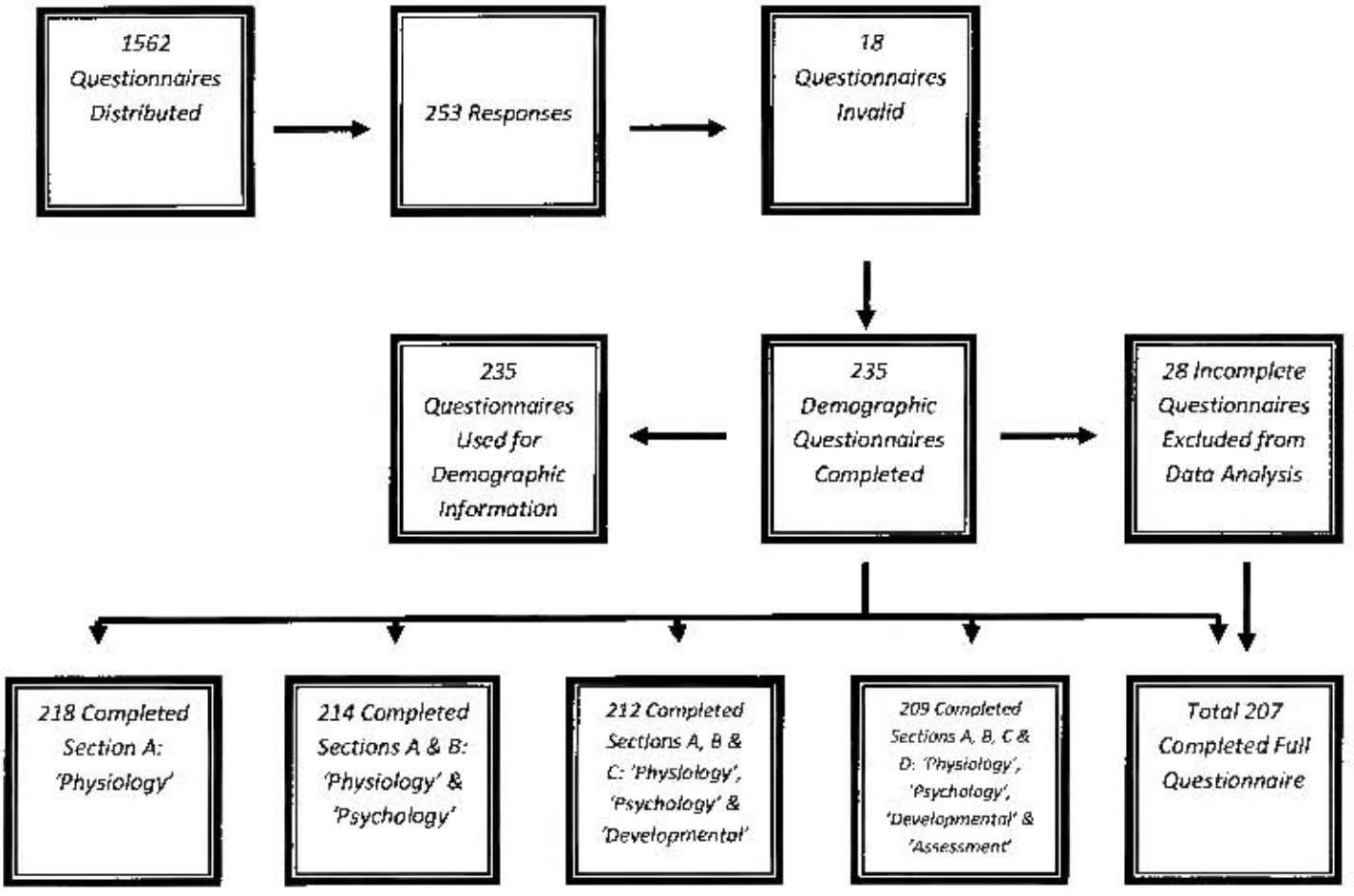


Figure 3-1: Summary of Responses

3.3.1. Descriptive Characteristics

(i) Demographics

Socio-demographic characteristics are presented in Table 3-3. The majority of participants were female (89%) physiotherapists from the provinces of Gauteng (36.17%) and the Western Cape (32.34%). The prevalent home languages of physiotherapists who responded were English (53.62%) and Afrikaans (37.87%), while African (2.13%) and European (2.98%) languages were in the minority.

Table 3-3: Socio-demographic characteristics of the sample (n = 235)

	Frequency (%)	Mean ± SD (Range)
Age (Years)		**(n = 234)**
		37.44 ± 9.78 (23-68)
Gender	**(n = 235)**	
Female	209 (89)	
Male	26 (11)	
Home Language	**(n = 235)**	
English	126 (53.62)	
Afrikaans	89 (37.87)	
English/ Afrikaans	8 (3.40)	
Ndebele	1 (0.43)	
Sesotho	2 (0.85)	
SiSwati	1 (0.43)	
Xitsonga	1 (0.43)	
Dutch	1 (0.43)	
German	4 (1.70)	
English/ Italian	1 (0.43)	
English/ Portuguese	1 (0.43)	
Province	**(n = 235)**	
Gauteng	85 (36.17)	
Eastern Cape	13 (5.53)	
Free State	13 (5.53)	
KwaZulu Natal	25 (10.64)	
North West	9 (3.83)	
Western Cape	76 (32.34)	
Eastern Cape/ Western Cape	1 (0.43)	
Mpumalanga	9 (3.83)	
Limpopo	3 (1.28)	
Northern Cape	1 (0.43)	

(ii) Academic Training and Clinical Experience

All universities which train physiotherapists in South Africa were represented in this study, with the greatest number of physiotherapists having completed their undergraduate physiotherapy qualification at the University of Cape Town (20.85%), University of Pretoria (19.15%), University of Stellenbosch (18.72%) and University of the Witwatersrand (15.75%). A small number of participants completed their undergraduate studies outside of South Africa (3.40%). Sixty percent of physiotherapists in this study graduated over 10 years ago, with the remaining 40% having graduated within the last 10 years; 91.92% are currently in clinical practice as a physiotherapist and 18.72% are involved in lecturing at various levels. A wide variety of postgraduate qualifications were represented in the sample, including the OMT1, SPT1, CPR, Principles of Pain and Women's Health postgraduate certificates offered by special interest groups (SIGs) of the SASP, Masters and PhD degrees (Table 3-4 & Table 3-5).

Table 3-4: Academic training & clinical experience of the sample (n = 235)

	Frequency (%)	Mean ± SD (Range)
Undergraduate University	**(n = 235)**	
University of Pretoria	45 (19.15)	
University of Cape Town	49 (20.85)	
University of the Witwatersrand	37 (15.75)	
University of the Free State	28 (11.92)	
University of Stellenbosch	44 (18.72)	
University of Limpopo	9 (3.83)	
University of KwaZulu Natal	9 (3.83)	
University of the Western Cape	6 (2.55)	
Not in South Africa	8 (3.40)	
Year of Graduation		**(n = 235)**
		1996 ± 9.96 (1968 - 2011)
Graduation Timeline	**(n = 235)**	
Last 10 years (2011-2002)	95 (40.43)	
>10 years ago (2001-1968)	140 (59.57)	
Currently in Clinical Practice	**(n = 235)**	
Yes	216 (91.92)	
No	19 (8.09)	
Clinical Experience		**(n = 235)**
Years		14.53 ± 9.73 (1-44)
Community Service (Currently Completing)	**(n = 235)**	
Yes	1 (0.43)	
No	234 (99.57)	
Postgraduate Qualifications (Completed)	**(n = 235)**	
OMT 1	130	
SPT 1	29	
CPR	43	
Principles of Pain	18	
Women's Health	7	
Masters	39	
PhD	2	
Postgraduate Qualifications (Currently completing)	**(n = 235)**	
OMT 1	7	
SPT 1	6	
CPR	0	
Principles of Pain	7	
Women's Health	3	
Masters	22	
PhD	6	

**Note: Participants were able to select more than one postgraduate qualification; therefore results are not represented as a percentage.*

Table 3-5: Lecturing experience of the sample (n = 235)

	Frequency (%)
Involved in Lecturing	**(n = 235)**
Yes	44 (18.72)
No	191 (81.28)
Type of Lecturing	**(n = 235)**
Courses offered by SIGs	10 (4.26)
Undergraduate	8 (3.40)
Postgraduate	5 (2.13)
Under and postgraduate	5 (2.13)
Undergraduate and Courses	5 (2.13)
Postgraduate and Courses	7 (2.98)
Under and postgraduate and Courses	4 (1.70)
None	191 (81.28)

(iii) Sports Physiotherapy Experience

Ninety three percent of physiotherapists in this study had experience treating athletes. Of the sample, 57.87% work in a sports physiotherapy practice setting, while 25.53% were also involved with a sports team. Sporting codes were widely represented, with most physiotherapists being involved in a variety of sports. The majority of physiotherapists (55.32%) were involved in treating athletes over the age of 12 years, with 17.02% of physiotherapists treating athletes of all age groups and 17.45% of physiotherapists only treating athletes over the age of 25 years. A minority of physiotherapists (18.72%) were involved in treating children under the age of 12 years (Table 3-6).

Table 3-6: Sports physiotherapy experience of the sample (n = 235)

	Frequency (%)	Mean ± SD (Range)
Experience Treating Athletes	**(n = 235)**	
Yes	218 (92.77)	
No	17 (7.23)	
Number of Years		11.50 ± 8.30 (0-40)
Experience in Sports Physiotherapy	**(n = 235)**	
Sports Practice	136 (57.87)	
Team Physiotherapist	8 (3.40)	
Sports Practice AND Team Physiotherapist	60 (25.53)	
None	31 (13.19)	
Sports	**(n = 235)**	
Athletics	108	
Ballet/ Dancing	42	
Cricket	68	
Cycling	99	
Golf	69	
Gymnastics	24	
Hockey	65	
Mountain Biking	76	
Netball	51	
Rowing	27	
Rugby	121	
Running	137	
Soccer	67	
Swimming	83	
Water Polo	21	
Other	32	
Age Groups of Athletes Seen	**(n = 235)**	
All ages	40 (17.02)	
< 12 years	4 (1.70)	
>12 years	130 (55.32)	
> 25 years	41 (17.45)	

**Note: Participants were able to select more than one sporting code; therefore results are not represented as a percentage.*

3.3.2. Pain Knowledge and Attitudes Questionnaire Results (n = 207)

(i) Overall Pain Knowledge and Attitudes Scores

The mean score for the RPKAQ was 65.53% ± 8.64%. No significant differences were found in the total RPKAQ scores when analysed according to the variables in question (i.e. gender, home language, academic training or clinical experience).

(ii) RPKAQ Sub-Section Scores

The Pain Knowledge and Attitudes score was comprised of five sections: 'Physiology', 'Psychology', 'Developmental', 'Assessment and Measurement', and 'Cognitive/Behavioural'. The lowest scores were obtained for the 'Assessment and Measurement' (47.61% ± 15.55%) and 'Developmental' (58.68% ± 20.75%) sections of the RPKAQ. The highest scores were obtained for the 'Physiology' (76.79% ± 14.57%) and 'Psychology' (72.79% ± 10.83%) sections of the RPKAQ. The average score for the 'Cognitive/Behavioural' section of the RPKAQ was 68.16% ± 12.68% (Figure 3-2). There were significant differences in the various sub-sections of the Pain Knowledge and Attitudes Questionnaire with regard to some of the objective variables. These will be discussed in the next section.

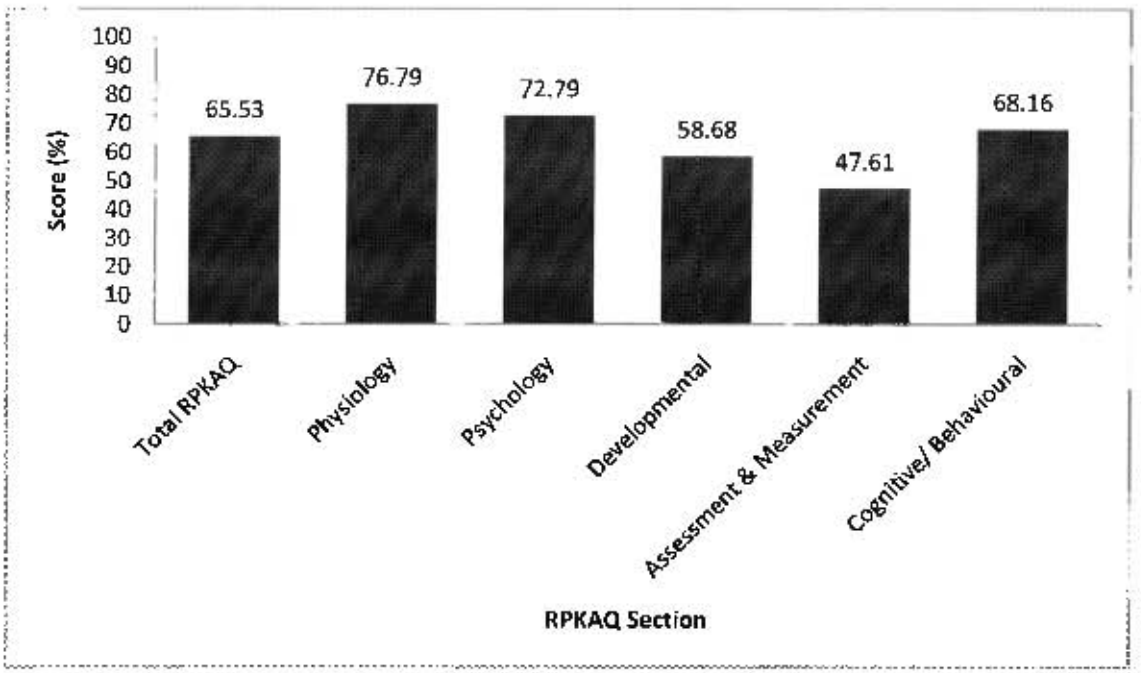


Figure 3-2: Summary of Pain Knowledge and Attitudes Scores for the Sample

(iii) Adequate Pain Knowledge and Attitudes Scores

Only 14.49% (n=30) of the physiotherapists had adequate pain knowledge and appropriate attitudes (RPKAQ score of ≥ 75%, Methodology Section 3.2.6 (iv) 'Adequate Pain Knowledge' p.32), while 85.51% (n=177) of the physiotherapists had inadequate pain knowledge and attitudes (RPKAQ score of < 75%) (Figure 3 3).

Furthermore, in the various sub-sections of the RPKAQ, 57% of physiotherapists had adequate knowledge and attitudes about the physiology of pain; 42.03% of physiotherapists had adequate knowledge and attitudes about the psychological aspects of pain; 24.15% of physiotherapists had adequate developmental pain knowledge and attitudes, and 3.86% of physiotherapists had adequate knowledge and attitudes about the assessment and measurement of pain; and 26.57% of physiotherapists had adequate knowledge and attitudes about the cognitive/ behavioural aspects of pain (Figure 3-3).

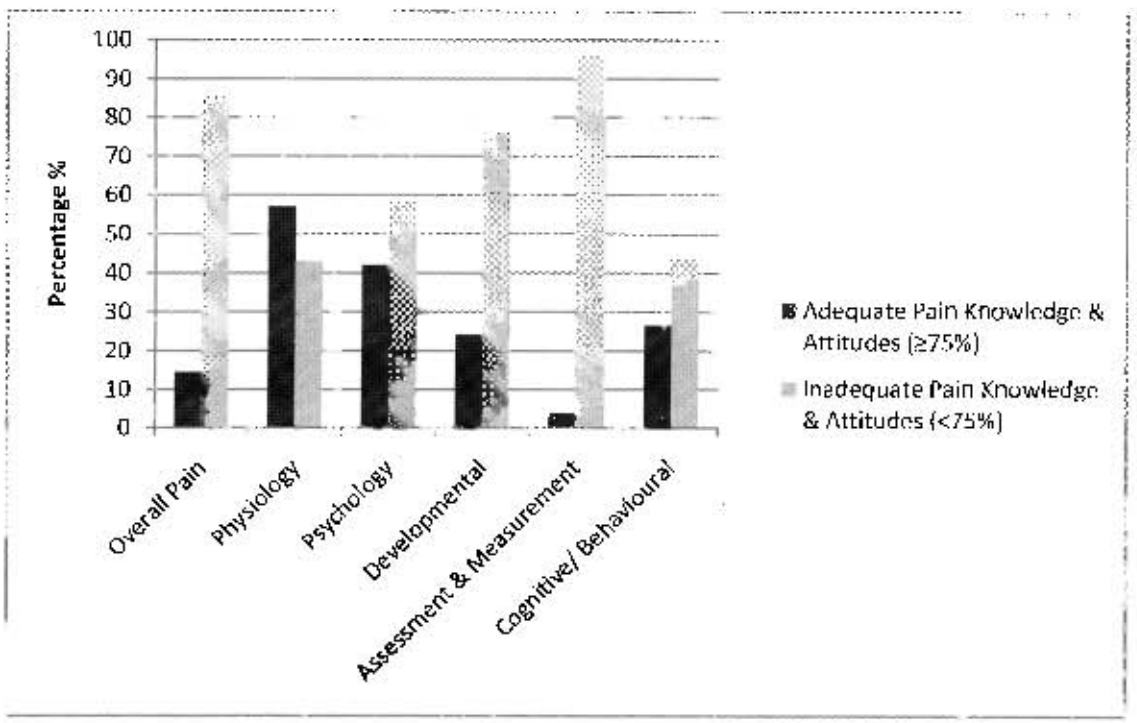


Figure 3-3: Comparison of SPG/OMPTG Physiotherapists in South Africa with Adequate & Inadequate Pain Knowledge and Attitudes Based on RPKAQ Scores

(iv) Factors Contributing to Pain Knowledge and Attitudes

a) Gender

Overall Pain Knowledge and Attitudes Scores

There was no significant difference between males and females with regard to pain knowledge and attitudes in this study (Average male score 63.28% ±10.51% vs. average female score 65.82% ± 8.37%).

RPKAQ Sub-Section Scores

No significant differences were found in any of the sub-sections with regard to gender.

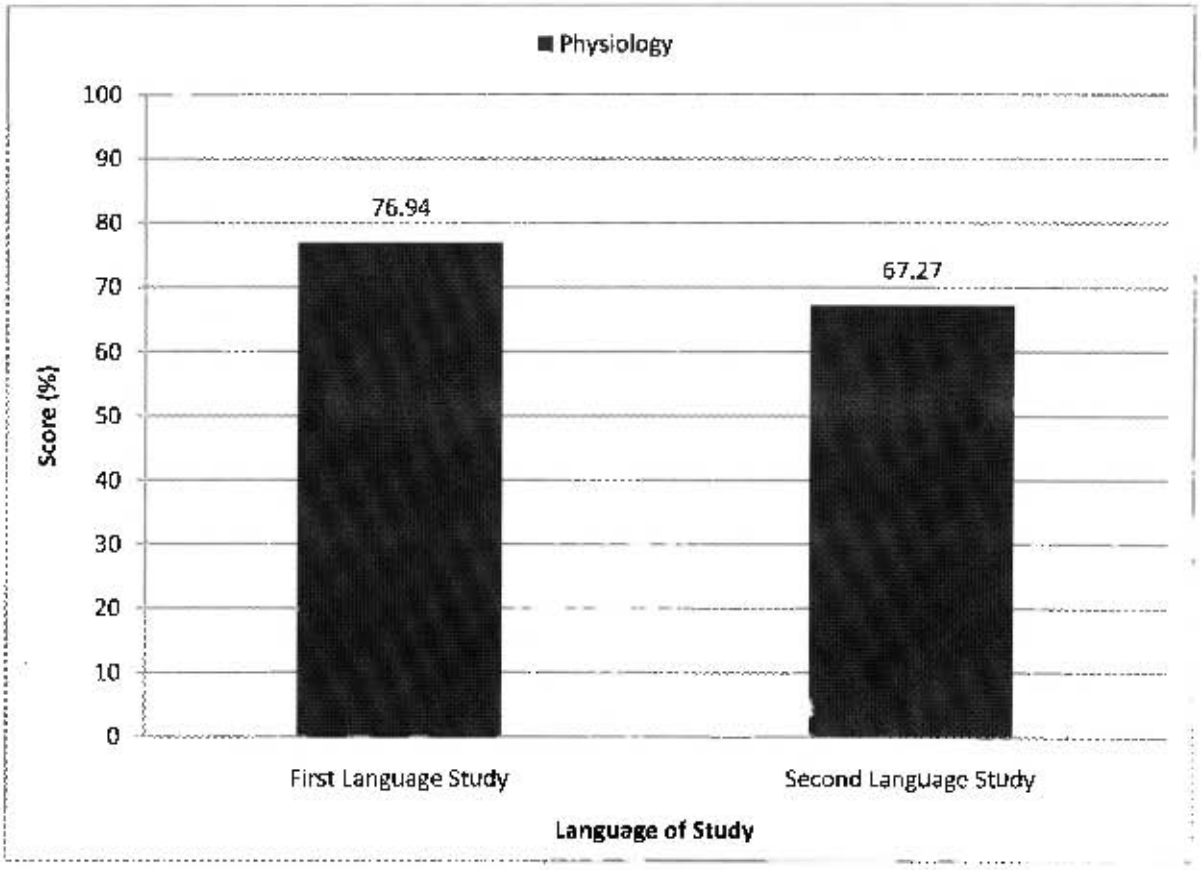
b) Home *Language*

Overall Pain Knowledge and Attitudes Scores

There were no significant differences in pain knowledge and attitude scores when analysed by home language. In addition there was no difference in pain knowledge and attitude scores in those who completed their undergraduate degree in their home language compared with those who completed their undergraduate degree in a second language.

RPKAQ Sub-Section Scores

Those who studied in their first or home language scored significantly higher (76.94% ± 14.42%) in the 'Physiology' section of the RPKAQ than those who studied in their second language (67.27% ± 14.89%) (U=677.00; p=0.04) (Figure 3-4). No other significant differences were noted.



U = 677.00; p = 0.04

Figure 3-4: Physiology Pain Knowledge and Attitude Score Related to Language of Study

c) Academic Training

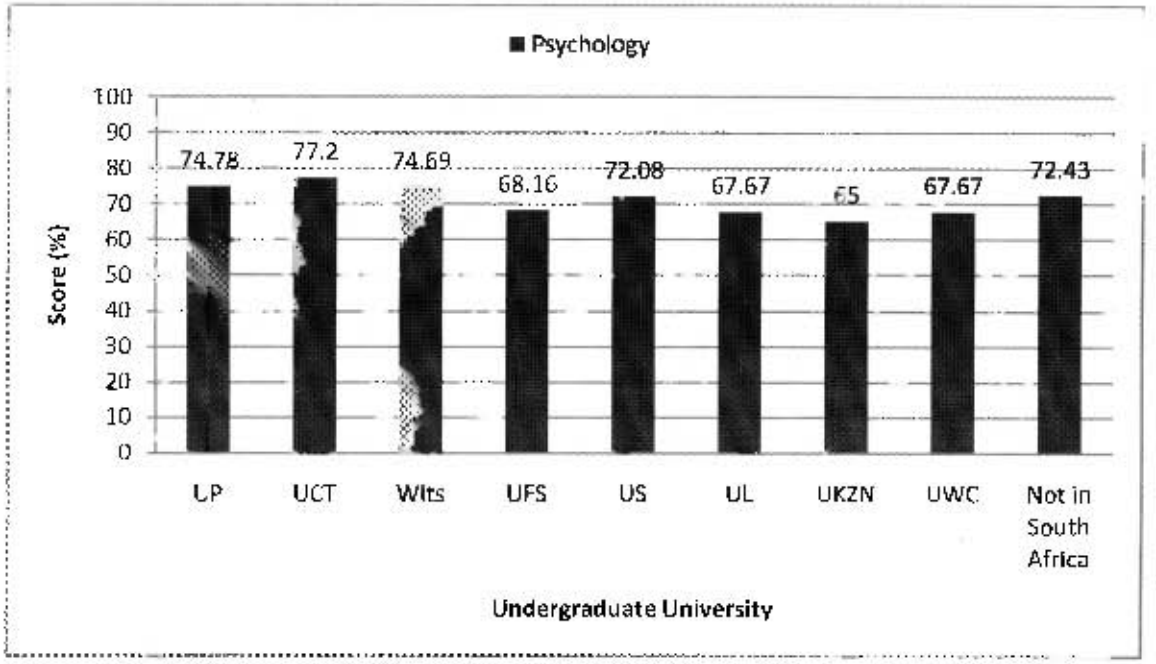
Overall Pain Knowledge and Attitudes Scores

Chi-squared analysis revealed that overall pain knowledge and attitudes did not differ significantly between physiotherapists from various undergraduate universities. No significant differences were found between pain knowledge and attitude scores and the various postgraduate qualifications of the physiotherapists in this study. Furthermore, no significant difference was found between those who had postgraduate qualifications and those who did not.

RPKAQ Sub-Section Scores

Despite no significant differences overall between the undergraduate universities, the 'Psychology' section of the RPKAQ showed a significant difference between knowledge and attitudes about the psychological aspects of pain and undergraduate university (χ^2=15.57; p–0.049) (Figure 3-5). The top three scoring Universities in the 'Psychology' section were the University of Cape Town (77.20% ± 11.31%), University of Pretoria (74.78% + 9.96%) and University of the Witwatersrand (74.69% ± 10.67%).

No other significant differences were noted.



χ^2 = 15.57; p=0.05

Figure 3-5: Psychology Pain Knowledge and Attitudes Score Related to Undergraduate University

d) *Clinical* Experience

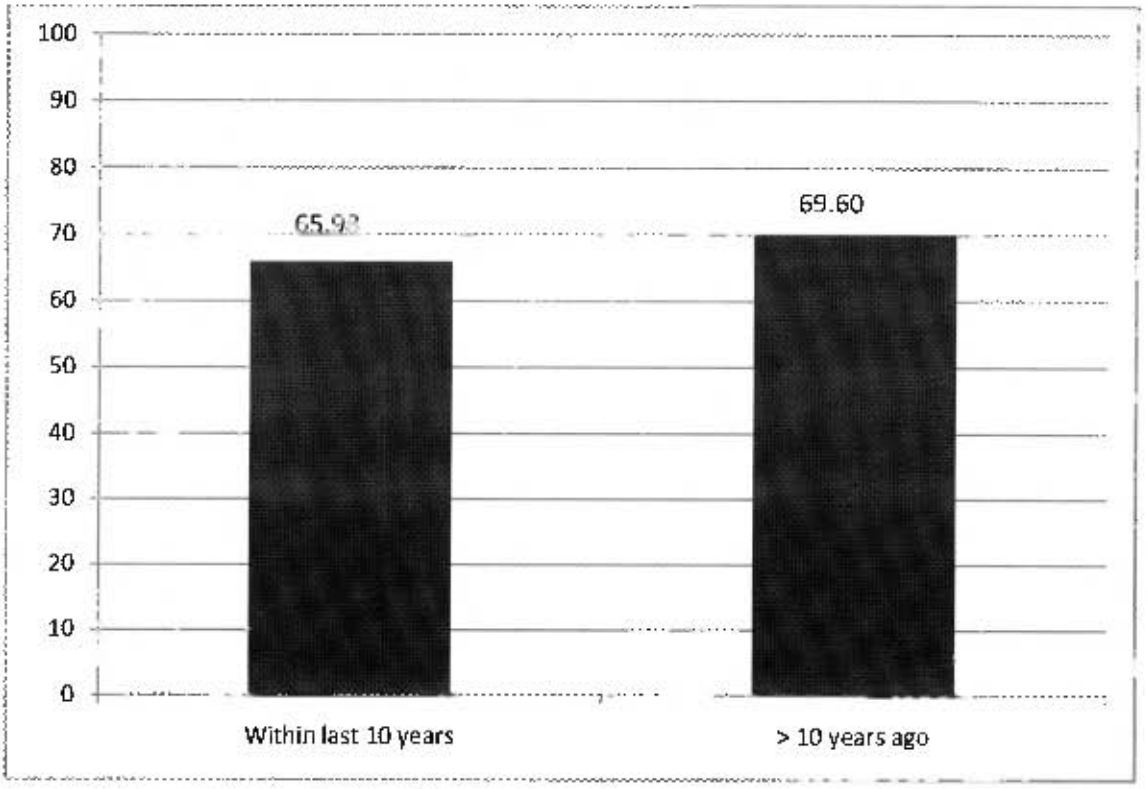
Overall Pain Knowledge and Attitudes Scores

There were no significant differences in overall pain knowledge and attitude scores when analysed by clinical experience (i.e. number of years since graduation, number of years in clinical practice, involvement in lecturing, type of lecturing, and sports physiotherapy experience).

RPKAQ Sub-Section Scores

Physiotherapists with more than 10 years of clinical experience had significantly higher cognitive/behavioural pain knowledge and attitude scores (69.60% ± 12.34%) than those with less than 10 years of experience (65.98% ± 12.94%) (U=4157.00; p=0.02) (Figure 3-6).

There was a weak but significantly positive correlation between the number of years since graduation and the 'Psychology' section of the RPKAQ (r=0.20; p<0.05) as well as the 'Cognitive/Behavioural' section of the RPKAQ (r= 0.17; p<0.05). This correlation shows that increased time since graduation corresponds with better knowledge and attitude scores for psychological and cognitive/behavioural aspects of pain.

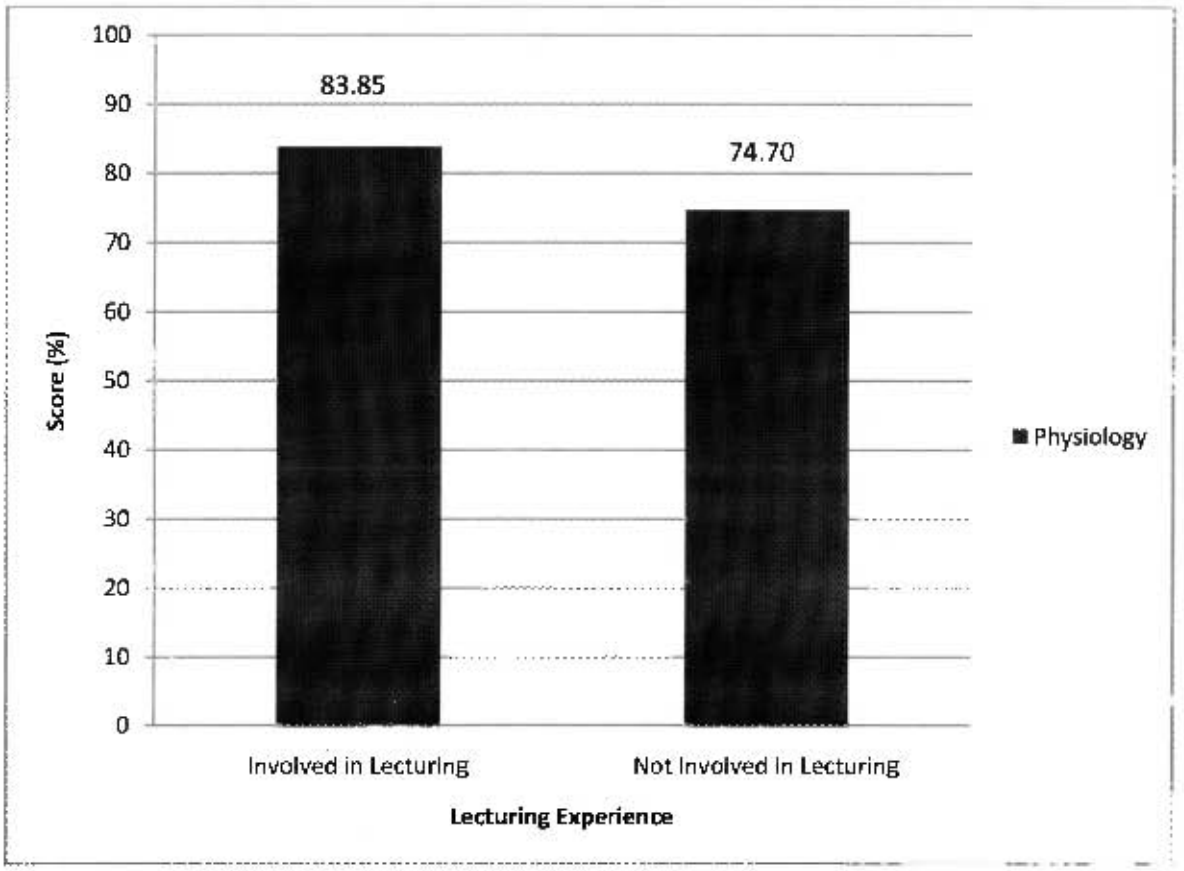


U=4157.00; p = 0.02

Figure 3-6: Cognitive/ Behavioural Pain Knowledge and Attitudes Score Related to Graduation

Similarly, there was a weak positive correlation between number of years in clinical practice and pain knowledge and attitude scores in the psychological ($r=0.19$; $p<0.05$) and cognitive/behavioural aspects of pain ($r=0.17$; $p<0.05$).

Furthermore, physiotherapists who were involved in lecturing scored significantly higher in the 'Physiology' section than those who were not involved in lecturing [83.85% ± 11.38% vs. 74.70% ± 14.72% respectively ($U=2093.50$; $p=0.0005$)] (Figure 3-7). The type of lecturing (undergraduate, postgraduate and/or courses), however, was not significant ($\chi^2=9.91$; $p=0.13$).



U=2093.50; p = 0.0005

Figure 3-7: Physiology Pain Knowledge and Attitudes Score Related to Lecturing Experience

3.3.3. Summary of Results

In summary, the main findings of this study were that 85.51% (n=177) of the physiotherapists who responded had inadequate pain knowledge and attitudes (RPKAQ score of < 75%); thus suggesting a poor level of pain knowledge and attitudes amongst sports physiotherapists in South Africa. The mean score for the RPKAQ was 65.53% ± 8.64%. The lowest scores were obtained for the 'Assessment and Measurement' (47.73%) and 'Developmental' (58.84%) sections of the RPKAQ. The highest scores were obtained for the 'Physiology' (76.43%) and 'Psychology' (73.04%) sections of the RPKAQ.

Gender, ethnicity, academic training and clinical experience did not significantly contribute to overall pain knowledge and attitudes.

The 'Psychology' and 'Cognitive/Behavioural' sub-sections of the RPKAQ were responsible for most of the significant differences. It was found that those who studied in their first language scored significantly higher (76.94% ± 14.42%) in the 'Physiology' section of the RPKAQ than those who studied in their second language (67.27% ± 14.89%; U=677.00, p=0.04). There was a significant difference in knowledge and attitudes about psychological aspects of pain among undergraduate universities (χ^2=15.57; p=0.049).

Correlation analyses showed weak but positive relationships between the number of years since graduation and the 'Psychology' and 'Cognitive/Behavioural' sections of the RPKAQ (r= 0.20, p<0.05 and r= 0.17, p<0.05 respectively); identifying that increased time since graduation corresponded with better knowledge and attitude scores for psychological and cognitive/behavioural aspects of pain. Similarly, increased number of years in clinical practice was positively associated with better pain knowledge and attitude scores with regard to psychological and cognitive/behavioural aspects of pain (r=0.19, p <0.05 and r=0.17, p <0.05 respectively). Furthermore, physiotherapists who graduated more than 10 years ago scored significantly higher (69.60% ± 12.34%) in the 'Cognitive/Behavioural' section than those who graduated within the last 10 years (65.98% ± 12.94%; U=4157.00; p=0.02). Finally, physiotherapists who were involved in lecturing scored significantly higher in the 'Physiology' section than those who were not involved in lecturing [83.85% ± 11.38% vs. 74.70% ± 14.72% respectively (U=2093.50; p=0.0005)]; the type of lecturing, however, was not significant (χ^2=9.91; p=0.13).

3.4. DISCUSSION

Although it is recognised that physiotherapists have a central role in all aspects of pain assessment and subsequent management, there is a paucity of evidence regarding the pain knowledge and attitudes status of physiotherapists in South Africa. The participants in the present study were all physiotherapists who have a special interest in sports and/or orthopaedic physiotherapy, many of whom were actively involved in treating athletes and/or working with a sports team. This is one of many areas of practice in physiotherapy; other areas of practice include neurology, cardiopulmonary, paediatrics and public health. Thus it is important to note that pain knowledge may differ in other areas of physiotherapy practice and results may not be generalised to the whole physiotherapy population.

Despite the low response rate (13.25%), this study had a relatively large sample size (n=207) compared to previous health care professional survey studies by Ali and Thomson, 2009, (n=188); Brown, 2003, (n=84); Chuk, 2002, (n=198); Enskar et al., 2007, (n=106); Parker et al., 2009, (n=114); Scudds et al., 2001, (n=107); Strong et al., 1999, (n=35); and Wilson, 2007, (n=86). Although this sample size was smaller than the objective of 272 required for 95% confidence levels, a sample of 207 gives a 90% confidence level which is regarded as acceptable in surveys of this type [61].

The present study included physiotherapists in South Africa who are involved in a sports physiotherapy environment, whereas previous pain knowledge and attitudes studies focused on health care professionals from a variety of disciplines. The health care professionals surveyed in previous studies included nurses [14, 25, 96], occupational therapists [48, 87], physiotherapists [21, 32, 82, 97], physicians [34], as well as final year physiotherapy, occupational therapy and medical students [1, 72]. Furthermore, the majority of previous pain knowledge studies were conducted in countries outside of South Africa [1, 10, 14, 25, 48, 79, 87, 96, 97], limiting comparison regarding pain knowledge and attitudes of sports-involved physiotherapists in South Africa.

3.4.1. Descriptive characteristics of the sample

(i) Demographics

The average age of physiotherapists in the present study was 37 ± 9.78 (23-68) years, representing an older population of physiotherapists. This age group differs significantly from previous studies representing younger final year students [1, 72].

The majority of participants were female physiotherapists from Gauteng and the Western Cape. The prevalent home languages of physiotherapists who responded were English and Afrikaans, while African and European cultures were in the minority. Many studies have identified that gender [5, 29, 88, 90] and ethnicity [11, 23, 36, 89,] play a role in an individual's perception of pain, influencing attitudes and beliefs of the pain experience; however no studies emphasise the influence of health care professionals' gender or culture on pain knowledge, attitudes and beliefs. Due to the predominance of female physiotherapists from the Gauteng and Western Cape provinces with English or Afrikaans as their home language, the results of the survey should not be extrapolated to apply to all physiotherapists involved in sport in South Africa.

(ii) Academic Training and Clinical Experience

All universities which train physiotherapists in South Africa were represented in the present study, with the greatest number of physiotherapists having completed their undergraduate physiotherapy qualification at the University of Cape Town (UCT). Perhaps this reflects an alumnus loyalty, with UCT physiotherapists being more inclined to respond to a study by a fellow UCT student.

Sixty percent of physiotherapists in the present study graduated over 10 years ago, with an average of 15 ± 9.73 (1-44) years in clinical practice, representing a more experienced physiotherapy population compared to the students and newly graduated health care professionals identified in other studies [1, 72, 87]. Ali and Thomson (2009) and Parker et al (2009) assessed pain knowledge in undergraduate final year health science students, while Strong et al (1999) assessed pain knowledge in newly graduated occupational therapists. The design of the present study was aimed at assessing pain knowledge in qualified physiotherapists treating athletes. It was notable that the majority of respondents in the present study were more experienced.

Perhaps the demographic profile of the SPG and OMPTG special interest groups of the SASP targeted consisted of an older physiotherapy population. Alternatively, this finding may be due to a selection bias, as experienced physiotherapists may feel more confident in their knowledge and therefore more likely to respond.

(iii) Sports Physiotherapy Experience

Ninety three percent of physiotherapists in the present study have had experience treating athletes. Of the sample, 57.87% work in a sports physiotherapy practice setting, while 25.53% were also involved with a sports team. Previous studies have included orthopaedic physiotherapists [97], general physiotherapists [21, 79] and physiotherapy students [1, 72]. It appears that the present study is the first to explore pain knowledge in sports physiotherapists in particular.

3.4.2. Pain Knowledge and Attitudes

The mean score for the RPKAQ was 65.56% (Section 3.3.2, p. 40). These results are concurrent with a previous South African study by Parker et al (2009) which also identified poor pain knowledge and attitude scores. Scores for each section were varied. The lowest scores were obtained for the 'Assessment and Measurement' (47.73%) and 'Developmental' (58.84%) sections of the RPKAQ. The highest scores were obtained for the 'Physiology' (76.43%) and 'Psychology' (73.04%) sections of the RPKAQ. The average score for the 'Cognitive/Behavioural' section of the RPKAQ was 68.16%. This spread of scores across the different knowledge areas reiterates the scores reported by both Parker et al (2009) and Strong et al (1999) who identified areas of most knowledge to be in the physiological aspects of pain, while assessment and measurement knowledge was found to be least understood.

As mentioned above, comparison of the present study with two previous studies [72, 87] using the RPKAQ indicates that these results are largely in concordance. The 'Physiological Basis of Pain' was found to be the area of most knowledge and most appropriate attitudes in all three studies. The scores for 'Psychological Factors of Pain Perception' and 'Cognitive/Behavioural Methods of Pain Relief' were higher in the more recent studies (Parker et al, 2009 and the present study), suggesting an improvement in the biopsychosocial aspect of pain education over the past decade.

The score for the 'Developmental Changes in Pain Perception' in the present study was 59%. This result may be a reflection of the fact that the majority of physiotherapists in the sample were involved in treating athletes over the age of 12 years, indicating limited experience with pain in children. This result is in contrast to that reported in final year health science students who showed adequate developmental pain knowledge and attitudes [72]. This may be due to the fact that 'Paediatrics' is included in the undergraduate curriculum or that the population in the study by Parker et al (2009) included a range of health care professionals including occupational therapists, speech therapists and audiologists who may have greater knowledge in developmental aspects.

Despite improvements in the pain education curricula over the years, the scores for 'Assessment and Measurement of Pain' represented the lowest results among all three studies comparatively, indicating a gap in education about pain assessment. Poor knowledge is recognised to lead to poor assessment ability and subsequent poor pain management [87]. The notably poor results for the section on assessment and measurement of pain leads us to question the accuracy with which sports physiotherapists in South Africa are assessing pain and subsequently managing pain.

The 'Pharmacological Management of Pain' section was excluded from the RPKAQ for the present study. Although pharmacology is presently a part of the curriculum for BSc (Physiotherapy) in South African universities, the content of the courses is variable. In addition, the pharmacology course is a recent addition to the physiotherapy curriculum in South Africa and physiotherapists who graduated more than 10 years ago may have had limited pharmacological training. It is interesting to note that Strong et al (1999) and Parker et al (2009) identified poor knowledge about the pharmacological management of pain, with significantly low scores of 24% and 47% in the respective studies.

Interestingly, the final year health science students sampled in the study by Parker et al (2009) had the highest RPKAQ scores. The second highest scores were found in the present study, while the lowest scores were yielded by the newly graduated occupational therapists assessed by Strong et al (1999). This pattern may be due to recent improvements in pain education as defined by the IASP [41]. Concurrently, the majority of physiotherapists in the present study graduated more than 10 years ago, accounting for the lower RPKAQ scores. In addition, the study by Parker et al (2009) included other medical disciplines (medicine, occupational therapy, physiotherapy, dietetics and communication sciences/audiology) which may have influenced the overall outcome.

The results of the present study are difficult to interpret comparatively due to the lack of literature on South African physiotherapists. There is however a fair amount of supportive literature identifying a lack of pain knowledge among health care professionals all over the world. Ali and Thomson (2009) found that final year physiotherapy and medical students had a lack of understanding of central sensitisation with regards to chronic pain; Parker et al (2009) found a deficit in pain knowledge among final year health science students; Lebovits et al (1997) found significant knowledge deficiencies regarding currently accepted principles of pain management; Wolff et al (1991) identified inadequate knowledge related to entry-level pain education in orthopaedic physiotherapists.

The results of the present study concur with the above findings indicating the need for improved education in pain with particular focus on the 'Assessment and Measurement' and 'Developmental' aspects of pain. It is still unclear whether the deficit in pain education lies at an undergraduate or postgraduate level.

(i) Adequate and Inadequate Pain Knowledge and Attitudes

This is one of few studies that have attempted to quantify adequate pain knowledge and attitudes. Once again, there is a paucity of literature regarding the minimum scores for an appropriate level of pain knowledge among health care professionals. In the present study, adequate pain knowledge and attitudes was classified as a minimum RPKAQ score of 75% as this is a first class pass at the University of Cape Town. The 75% score was used in a previous study by Parker et al (2009); furthermore, the Resuscitation Council (UK) uses 75% as a standard pass mark for examination in the Advanced Life Support (ALS) Course [76]. Therefore 75% is regarded as a necessary score of adequate knowledge if pain is to be respected as the fifth vital sign.

It is a concern that 85.51% (n=177) of the physiotherapists had inadequate pain knowledge and attitudes (Section 3.3.2, p. 41); thus indicating a poor level of pain knowledge and attitudes amongst sports and orthopaedic physiotherapists in South Africa. This is supported by Parker et al (2009), identifying inadequate pain knowledge and attitudes at an undergraduate level. One needs to question whether this deficit lies in the physiotherapy curriculum, or rather due to complacency of qualified physiotherapists. Despite IASP guidelines aiming to improve and standardise pain education, there is a paucity of research on the pain curriculum content in health care courses in a South African context. This is important as there are eight academic institutions which offer Physiotherapy, each with slightly differing curricula.

In addition, these curricula are guided by the HPCSA minimum standards guidelines which in their present form do not specify pain education or training in any form.

This document is presently under review and pain has been included in the proposed new guidelines (Parker, personal communication). Alternatively, there may be a sufficient knowledge base but this may not be directly associated with appropriate attitudes or effective use of the knowledge [28]. It could be argued that beliefs and attitudes about pain override knowledge. To gain further insight into these elements, factors that contribute to pain knowledge, attitudes and beliefs will now be discussed further.

3.4.3. Factors that Contribute to Pain Knowledge, Attitudes and Beliefs

(i) Gender

Previous studies have identified differences in pain perception between men and women, identifying that women exhibit a lower pain threshold and tolerance than men [30, 35]. In addition studies have recognised the role of socio-cultural upbringing on gender differences in pain perception with healthcare professionals associating pain experienced by women with emotional and psychosocial factors [90]. However, these studies have focused on biases toward patient gender. No studies were identified which explore the contribution of the healthcare professionals' gender as a factor which may influence their own knowledge, attitudes and beliefs about pain.

In the present study, gender did not appear to contribute to pain knowledge and attitudes (Section 3.3.2, p. 42). This may simply be a reflection of the uneven sample distribution, as male physiotherapists represented a smaller sample (n=11) compared to female physiotherapists (n=209). In addition, given the small sample size, the results may not be a true representation of the whole sports physiotherapy population.

However, perhaps the differences are negligible in a South African context. Gender is closely related to cultural beliefs [90], and it is difficult to make comparisons with previous studies which investigate gender and cultural differences in western populations. Furthermore, perhaps formal academic training has the effect of eliminating socio-cultural influences [43]. The contribution of ethnicity and culture to pain knowledge, attitudes and beliefs will now be discussed.

(ii) Ethnicity/Culture

Ethnic differences in pain beliefs, pain prevalence and pain coping strategies have been reported in experimentally induced pain and in both acute and chronic pain [11]. Similar results have been reported in people living with HIV/AIDS (PLWHA) [11, 36, 89]. Furthermore, Hastie et al (2005) suggest that ethnic differences in behaviour responses to pain are present before the development of a clinical pain condition and may reflect behaviour patterns acquired early in life based on cultural or environmental influences.

Despite the trends in literature, the present study did not identify any significant differences in pain knowledge and attitudes related to home language (Section 3.3.2, p. 42). It should be noted that the sample was unevenly distributed among home languages, with an under-representation of African cultures (n=5), thereby possibly introducing a potential for bias.

Although not statistically significant, those respondents of African culture scored lowest overall, as well as in four of the five sub-sections. It cannot be said whether this is due to cultural beliefs or rather due to a 'second language phenomenon'. This relates to language anxiety, which is defined as the feeling of apprehension specifically associated with second language contexts [56]. Research has shown language anxiety to be associated with reduced performance, difficulty demonstrating knowledge and poor global assessments of proficiency, such as course grades [56]. Those who studied in their second language (including Afrikaans, European and African respondents) also had lower pain scores overall, but this was not statistically significant. Furthermore, the present study identified that those who studied in their first language scored significantly higher in the 'Physiology' section than those who studied in their second language. This may be due to the specificity of physiology terminology compared to other aspects of pain which may be described more liberally.

As identified earlier, education may play a role in changing attitudes and beliefs about pain. The role of academic training on pain knowledge, attitudes and beliefs will now be discussed.

(iii) Academic Training

The literature highlights the importance of pain education for accurate pain assessment and management; as well as the correlation between pain education and improved knowledge, attitudes and beliefs [14, 64, 65].

Jones et al (2000) found an improvement in pain knowledge scores after an education intervention, including a positive change in attitudes and beliefs. Similarly, an integrated pain course developed according to the IASP pain curriculum guidelines resulted in increased knowledge about pain [86].

It should however be noted that knowledge was tested immediately before and after the pain course, which may have affected the results favourably due to the short time frame in which knowledge was assessed. Since the majority of physiotherapists in the present study graduated over 10 years ago, the contribution of academic training to pain knowledge and attitudes may be minimal with attitudes and beliefs about pain possibly overriding pain knowledge.

It should also be noted that, despite having adequate pain knowledge, attitudes and beliefs may change over time and may influence treatment decisions. Attitudes and beliefs may be influenced by context, learning environment, responsibilities and working conditions [25], and often do not correspond with knowledge [28, 97]. Several authors have identified that experienced and inexperienced clinicians hold attitudes and beliefs about pain that are inconsistent with evidence [10, 31, 51]. Further, beliefs influence the clinicians' frame of reference and thus affect assessment and treatment of any painful condition [73].

Differences in pain knowledge scores between nurses in different countries have also been documented by Enskar et al (2007), indicating that pain knowledge may differ depending on academic institution. In the present study, academic training (defined by undergraduate university and postgraduate qualifications) had no significant contribution to overall pain knowledge and attitudes (Section 3.3.2. p. 43).

From an undergraduate training perspective, it could be assumed that the South African universities represented in the present study have similar pain education curricula; thereby yielding similar pain knowledge and attitude scores overall. Furthermore, there were no significant differences in pain knowledge and attitude scores amongst participants from any one South African university and participants who studied abroad.

Interestingly, the 'Psychology' section of the RPKAQ showed a significant difference between pain knowledge and undergraduate university (Section 3.3.2, p.44); this may suggest that the degree of psychological aspects of pain education included in the physiotherapy curricula among South Africa universities may vary.

In addition, there was no difference in pain knowledge and attitudes between those physiotherapists who had completed postgraduate qualifications and those who had not. Only 15.13% of physiotherapists with postgraduate qualifications had adequate pain knowledge and attitudes. It should be noted that postgraduate courses may not have included pain education. This result is similar to that reported by Wolff et al (1991), identifying no correlation between test scores, entry-level pain education and pain knowledge satisfaction. Perhaps adequate education may not be directly associated with appropriate attitudes or effective use of the knowledge; which leads one to question the influence of health care professionals' attitudes and beliefs in their pain management strategies.

Although no statistical significance was found in the present study between those who had completed postgraduate courses, it is worth mentioning that the physiotherapists who had completed the 'Principles of Pain' postgraduate course obtained higher pain knowledge and attitude scores overall, as well as in each sub-section, than any other physiotherapist. However, it should also be acknowledged that the average age of the physiotherapists who had completed the "Principles of Pain" postgraduate course (and scored higher) was 48 (27-68) years old; thus corresponding with an older group of physiotherapists. Therefore, the higher pain knowledge and attitude scores may be due to the clinical experience of the older physiotherapists (who also scored higher, discussed below on page 57) rather than the postgraduate qualification.

The topic of pain has become more salient over the past decade, with the introduction of the IASP pain curriculum guidelines [86]. It may be suggested that although undergraduate curricula and postgraduate qualifications aim to improve knowledge in various areas of physiotherapy, there may be a deficit in pain education, thereby failing to fulfil the necessary requirements to ensure South Africa physiotherapists have adequate pain knowledge. Perhaps the content of pain education curricula as well as type of education interventions should be further assessed to identify gaps in the system. It should also be noted that, despite the implementation of 'Continued Professional Development' (CPD) by the HPCSA, there are potential challenges to education in the South African context, such as language, cost and accessibility.

As mentioned previously, perhaps the introduction of pain in the new HPCSA minimum standards document will bring about a change in pain education and lead to improvements in pain knowledge and attitudes amongst health care professionals in South Africa.

Having considered the role of undergraduate training and education, the role of postgraduate clinical experience on pain knowledge attitudes and beliefs will now be discussed further.

(iv) Clinical Experience

Previous studies have found that clinical experience influences knowledge of pain [20, 25, 96], however, in the present study there was no significant relationship between overall pain knowledge and clinical experience (Section 3.3.2, p.44). Clinical experience was defined as number of years since graduation, number of years in clinical practice, involvement in lecturing and sports physiotherapy experience. Studies by Lebovits et al (1997) and Wolff et al (1991) concurrently show no significant correlation between postgraduate years of experience and pain knowledge.

Interestingly, in the present study, there was a weak but significantly positive correlation between the number of years since graduation and pain knowledge and attitudes related to psychological and cognitive behavioural aspects of pain (Section 3.3.2, p.45). This correlation showed that increased time since graduation was positively associated with better knowledge and attitude scores.

Considering that the pain education curriculum has become more salient in the past decade, one may expect to find the opposite result i.e. for physiotherapists who trained more recently to have higher scores; therefore, clinical experience has been associated with improved knowledge and attitudes in the fields of psychology and cognitive/behavioural aspect of pain. This could be due to increased exposure to the psychosocial elements involved in treating athletes and/or patients with chronic pain. Furthermore, perhaps with maturity and clinical experience, physiotherapists acknowledge the relevance of the psychosocial aspects of pain management; in addition, there may be better multi-disciplinary interaction between older physiotherapists and psychologists. One could argue that younger physiotherapists tend to stick to their beliefs, while older physiotherapists may be more flexible in accepting a biopsychosocial framework.

Lastly, physiotherapists who were involved in lecturing scored significantly higher in the 'Physiology' section of the RPKAQ compared to those who were not involved in lecturing; the type of lecturing (e.g. undergraduate, postgraduate and/or courses), however, was not significant (Section 3.3.2, p. 45). Physiology forms the foundation of our understanding of pain and is a vital element of pain education. Moseley (2002) discovered that education about the neurophysiology of pain will result in significant changes in pain beliefs and attitudes. However, only 20.51% of physiotherapists who assist in lecturing at various levels had adequate pain knowledge; it may be suggested that a system be implemented whereby physiotherapists become accredited to lecture in this field, including having completed relevant postgraduate qualifications (i.e. SPT 1, OMT 1, Principles of Pain, Masters or PhD) and having adequate clinical experience (i.e. specified number of years since graduation).

3.4.4. Limitations of the Study

It is recognised that the sample size was insufficient to ensure the 95% confidence levels targeted. A larger sample size may have allowed for better representation of gender, ethnicity, academic training and clinical experience characteristics of the South African physiotherapy population and influenced results differently. In addition, uneven distribution of characteristics within the sample may obscure outcomes. Thus, due to the limited representability of the sample, generalisability cannot be inferred.

Furthermore, the sample should be revised to reflect a true 'Sports Physiotherapy' population, identifying physiotherapists in South Africa who are currently actively involved in treating athletes, including physiotherapists from other special interest groups which may also be involved in the treatment of the sporting population.

Further limitations of the present study are found by virtue of the study design, a self-administered questionnaire. Self-administered questionnaires are common measurement tools used to assess descriptive characteristics and obtain information from large populations [50]. However, questionnaires are also associated with low response rates [50, 73].

A pilot study was conducted on the online demographic questionnaire and RPKAQ used in the present study in order to assess the feasibility, accessibility, comprehension and ease of completion of the questionnaire. However, the present study was unable to control for the disadvantages associated with self-administered questionnaires, including accuracy of mailing lists; literacy and language issues (such as dyslexia and translation); interpretation of the questions; and technical problems (possible online faults or limited access to the internet). It is also not possible to control the period of time taken to complete the questionnaire or whether respondents gain assistance by referring to colleagues or literature when completing the questionnaire [8]. Eighteen of the respondents who gave informed consent did not answer any part of the demographic questionnaire or RPKAQ; this leads to question the possibility of an online fault with the questionnaire, or perhaps a disinterest after being able to access the questionnaire. The questionnaire being in English should not have posed a problem as correspondence from the Health Professions Council of South Africa and the South African Society of Physiotherapy to health care professionals is in English. However, as mentioned earlier it may have negatively affected the scores of those responding in their second language.

There may be sample bias in the results due to the differences in motivation between those individuals who choose to respond and those who do not respond. Respondents may not be motivated to give accurate answers, but rather to give answers that present themselves in a favourable light; furthermore, it is identified that people who feel more confident in their knowledge and/or attitudes are more likely to respond to questionnaires than those who feel they have insufficient knowledge or poor attitudes [72]. If this is the case and physiotherapists with poor knowledge and/or attitudes about pain were not motivated to respond, the results in the present study are effectively inflated by a selection bias.

Further, the internal consistency of the adapted version of the RPKAQ used in the present study showed a Cronbach alpha value of 0.62, which indicates questionable reliability, rendering interpretation difficult. Although this is not markedly lower than the alpha value of 0.65 obtained in the original instrument, it raises concern about the data. In particular, it is important to note that the internal consistency of the 'Assessment and Measurement' section of the RPKAQ was low, with a Cronbach alpha of 0.24. This could pose bias with accuracy of the results. Despite this limitation, the clinical significance of the poor 'Assessment and Measurement' result should not be disregarded.

In addition, the content validity of the original Pain Knowledge and Attitudes Questionnaire was established by consultation with five internationally recognised experts in pain research [93]; and although it was originally conducted over 10 years ago, the questions still hold true today. There is however room for revision and improvement, aiming to develop a more recent and reliable outcome measure for pain knowledge, attitudes and beliefs.

3.4.5. Clinical Implications

The findings of this study are very interesting and have some implications for clinical practice.

There is a paucity of research on the pain curriculum content in health care courses in a South African context. This is important as there are eight academic institutions which offer Physiotherapy, each with slightly differing curricula. Future research is suggested to assess the content of Physiotherapy curricula in South Africa, with the overall outcome of improving and standardising pain education.

A mark of 75% is considered to be adequate for pain knowledge and attitudes. Alignment of learning activities and assessment is an important curricular consideration, and one needs to identify whether the deficit lies in the physiotherapy curriculum. It is essential that pain education is taught at a '75%' level if physiotherapists' are to obtain a 75% level of knowledge and attitudes.

Few physiotherapists with postgraduate qualifications had adequate pain knowledge and attitudes. It should be noted that postgraduate courses may not have included pain education; therefore, a pain education intervention should be applied to those postgraduate courses which are clinically relevant.

As mentioned previously, few physiotherapists who assist in lecturing at various levels had adequate pain knowledge; it may be suggested that a system be implemented whereby physiotherapists become accredited to lecture in this field, including having completed relevant postgraduate qualifications (i.e. SPT 1, OMT 1, Principles of Pain, Masters or PhD) and having adequate clinical experience (i.e. specified number of years since graduation).

Despite the implementation of 'Continued Professional Development' (CPD) by the HPCSA, there are potential challenges to education in the South African context, such as language, cost and accessibility.

Based on the language findings, the questionnaire should be available in other South African academic languages for future use.

3.5. CONCLUSION

Despite its limitations, the present study demonstrated that sports physiotherapists in South Africa have inadequate pain knowledge and attitudes; and based on a minimum score of 75% indicating adequate knowledge to assess and treat a vital sign, insufficient knowledge to ensure optimal pain assessment and management. There was a particular lack of knowledge and inappropriate attitudes in the assessment and measurement of pain as well as the developmental aspects of pain. There was no significant contribution of gender, ethnicity, academic training or clinical experience to overall pain knowledge, attitudes and beliefs. Psychological and cognitive/ behavioural aspects of pain knowledge showed significant differences with regard to academic training and clinical experience.

Further studies are indicated using a larger sample size for better representation of the physiotherapy population. In addition, it is recommended that the content of pain education in various undergraduate and postgraduate curricula be explored to identify the specific areas of pain education that are lacking and maximise the efficacy of pain education to physiotherapists in South Africa.

CHAPTER FOUR

SUMMARY AND CONCLUSION

The incidence of pain as well as the importance of identifying pain in a clinical and/or sporting environment has been well documented [4, 55, 57, 62, 70, 85]. Adequate knowledge about pain and pain mechanisms is essential for effective assessment of pain and subsequently optimal pain management [72]. Previous studies have identified a lack of adequate knowledge amongst health care professionals' worldwide [14, 60, 72, 87, 97]. Furthermore, it has been found that education plays a role in improving knowledge and attitudes about pain [48, 65].

There is, however, a paucity of literature on health care professionals' knowledge, attitudes and beliefs about pain, particularly in South Africa. Furthermore, no study has been conducted on sports physiotherapists in South Africa.

The overall aim of the present study was to determine the pain knowledge, attitudes and beliefs of South African physiotherapists, particularly those treating athletes; and to explore factors which may contribute to knowledge, attitudes and beliefs. Based on the evidence provided in this thesis, the study objectives, as described in Chapter 3.1.2, p. 26, may be answered as follows:

Objective 1:

> *To determine the pain knowledge and attitudes of South African physiotherapists treating athletes as measured by the Revised Pain Knowledge and Attitudes Questionnaire [91].*

In the present study, 85.51% of the physiotherapists had inadequate pain knowledge and attitudes (RPKAQ score <75%); thus suggesting a poor level of pain knowledge and attitudes amongst sports physiotherapists in South Africa. The mean score for the RPKAQ was 65.53%. The lowest scores were obtained for the 'Assessment and Measurement' (47.73%) and 'Developmental' (58.84%) sections of the RPKAQ. The highest scores were obtained for the 'Physiology' (76.43%) and 'Psychology' (73.04%) sections of the RPKAQ.

Objective 2:

> *To determine whether gender, ethnicity, academic training or clinical experience is associated with pain knowledge and attitudes.*

Gender, ethnicity, academic training and clinical experience did not significantly contribute to overall pain knowledge and attitudes.

Interestingly, it was found that those who studied in their first language scored significantly higher (76.94%) in the 'Physiology' section of the RPKAQ than those who studied in their second language (67.27%).

With regard to academic training, there was a significant difference in knowledge and attitudes about psychological aspects of pain between undergraduate universities.

From a clinical experience perspective, the results of the present study identified that increased time since graduation corresponded with better knowledge and attitude scores for psychological and cognitive/behavioural aspects of pain. Similarly, increased number of years in clinical practice was positively associated with better pain knowledge and attitude scores with regard to psychological and cognitive/behavioural aspects of pain. Furthermore, physiotherapists who graduated more than 10 years ago also scored significantly higher (69.60%) in the 'Cognitive/Behavioural' section than those who graduated within the last 10 years (65.98%). In addition, physiotherapists who were involved in lecturing scored significantly higher in the 'Physiology' section than those who are not involved in lecturing (83.85% vs. 74.70%).

Based on the findings of the present study, implementation of an evidence-based intervention strategy aimed at improving physiotherapists' awareness, knowledge, attitudes and assessment of pain is recommended. This strategy should include review of the undergraduate curriculum for pain and postgraduate CPD activities with a pain focus. It is important to convey this information to the relevant professional bodies e.g. HPCSA and higher education institutions to assist with future curriculum development.

REFERENCES

1. Ali N, Thomson D. (2009). A comparison of the knowledge of chronic pain and its management between final year physiotherapy and medical students. European Journal of Pain **13**: 38-50
2. Aloisi AM, Bachiocco V, Constantino A, Stefani R, Ceccarelli I, Bertaccini A, Meriggiola MC. (2007). Cross-sex hormone administration changes pain in transsexual women and men. Pain **132**(Supplement 1): S60-S67.
3. Amitrano C. (17 June 2010). "Livestrong.Com. Most Prevalent Sport Injuries". http://www.livestrong.com/article/151917-most-prevalent-sport-injuries/
4. Armsey TD, Hosey RG. (2004). Medical aspects of sports: epidemiology of injuries, pre-participation physical examination, and drugs in sports. Clinical Sports Medicine **23**: 255–279
5. Aslaksen PM, Myrbakk IN, Hoifodt RS, Flaten MA. (2007). The effect of experimenter gender on autonomic and subjective responses to pain stimuli. Pain **129:** 260-268.
6. Bartfield JM, Salluzzo RF, Raccio-Robak N, Funk DL, Verdile VP. (1997). Physician and patient factors influencing the treatment of low back pain. Pain **73**: 209-211
7. Bishop A, Thomas E, Foster NE. (2007). Health care practitioners' attitudes and beliefs about low back pain: A systematic search and critical review of available measurement tools. Pain **132** (1): 91-101
8. Bourque L, Fielder E. *The Survey Kit: How to conduct self-administered and mail surveys*. 2nd edition ed: Sage Publications 2003.
9. Breitbart W, McDonald MV, Rosenfeld B, Passik SD, Hewitt D, Thaler H, Portenoy RK. (1996). Pain in ambulatory AIDS patients. I: Pain characteristics and medical correlates. Pain **68** (2-3): 315-21.
10. Brown CA. (2003). Treatments for patients with chronic pain: therapists' beliefs. British Journal of Therapy and Rehabilitation **10**(2): 46-51
11. Campbell CM, Edwards RR, Fillingim RB. (2005). Ethnic differences in responses to multiple experimental pain stimuli. Pain **113** (1-2): 20-6.
12. Carr TD, Lemanek KL, Armstrong FD. (1998). Pain and fear ratings: clinical implications of age and gender differences. Journal of Pain Symptom Management **15**(5): 305-13.
13. Chiu LH, Trinca J, Lim LM, Tuazon JA. (2003). A study to evaluate the pain knowledge of two sub-populations of final year nursing students: Australia and Philippines. Journal of Advanced Nursing **41**(1): 99-108.

14. Chuk P. (2002). Determining the accuracy of pain assessment of senior student nurses: a clinical vignette approach. Nursing Education Today **22**: 393-400.
15. Cleland JA, Palmer JA, Venzke JW. (2005). Ethnic Differences in Pain Perception. Physical Therapy Reviews **10**: 113-122
16. Common Sports Injuries.Com (2011). http://www.commonsportsinjuries.com/causes/ [15/10/2012]
17. Common Sports Injuries.Com (2011). http://www.commonsportsinjuries.com/top10injuries/ [15/10/2012]
18. Common Sports Injuries.Com (2011). http://www.commonsportsinjuries.com/most-common-sporting-injuries/ [15/10/2012]
19. Curry TJ. (1993). A Little Pain Never Hurt Anyone: Athletic Career Socialization and the Normalization of Sports Injury. Symbolic Interaction **16**(3): 273-290
20. Dahlgren MA. (1998). Learning physiotherapy: students' ways of experiencing patient encounter. Physiotherapy Research International **3**: 257-273.
21. Daykin A, Richardson B. (2004). Physiotherapists' pain beliefs and their influence on the management of patients with chronic low back pain. Spine **29**(7): 783-795.
22. Devereaux MD, Lachmann SM. (1983). Athletes attending a sports injury clinic – a review. British Journal of Sports Medicine **17** (4): 137-142.
23. Edwards CL, Fillingim RB, Keefe F. (2001). Race, ethnicity and pain. Pain **94**(2): 133-137.
24. Edwards RR, Doleys DM, Fillingim RB, Lowery D. (2001). Ethnic Differences in Pain Tolerance: Clinical Implications in a Chronic Pain Population. Psychosomatic Medicine **63**: 316-323
25. Enskar K, Ljusegren G, Berglund G, Eaton N, Harding R, Mokoena J, Chauke M, Moleki M. (2007). Attitudes to and knowledge anout pain and pain management of nurses working with children with cancer: a comparative study between UK, South Africa and Sweden. Journal of Research in Nursing **12**(5): 501-515
26. Epi-Info (09 August 2012). Version 7.1.0.6.
27. European Region World Confederation for Physical Therapy (September 2011). "Direct Access – Patient Self referral within the ER-WCPT". http://www.physio-europe.org/index.php?action=159 [8 July 2012]
28. Fanslow J. (1985). Attitudes of nurses toward cancer and cancer therapies. Oncology Nursing Forum **12**: 43-47.
29. Fillingim RB, King CD, Ribeiro-DaSilva MC, Rahim-Williams B, Riley JL. (2009). Sex, gender and pain: A review of recent clinical and experimental findings. The Journal of Pain **10**(5): 447-485.

30. Fillingim RB, Maxiner W. (1995). Gender differences in the responses to noxious stimuli. Pain Forum **4**(4): 209-221.
31. Gordon J. (2003). Fostering students' personal and professional development in medicine: A new framework for PPD. Medical Education **37**(4):341-349
32. Gordon S, Milios D, Grove JR. (1991). Psychological aspects of the recovery process from sport injury: the perspective of sports physiotherapists. Australian Journal of Science and Medicine in Sport **23**(2):53-60.
33. Gould D, Udry E, Bridges D, Beck L. (1997). Stress sources encounterd when rehabilitating from season-ending ski injuries. The Sport Psychologist **11**: 361-378.
34. Green CR, Wheeler J, LaPorte F, Marchant B, Guerrero E. (2002). How well is chronic pain managed? Who does it well? Pain Medicine **3**(1): 56-65.
35. Greenspan JD, Craft RM, LeResche L, Arendt-Nielsen L, Berkley KJ, Fillingim RB, Gold MS, Holdcraft A, Lautenbacher S, Mayer EA, Mogil JS, Murphey AZ, Traub RJ. (2007). Studying sex and gender differences in pain and analgesia: a consensus report. Pain **132 Suppl 1**: S26-45.
36. Hastie BA, Riley JL, Fillingham RB. (2005). Ethnic Differences and Responses to Pain in Healthy Young Adults. Pain Medicine **6**(1): 61-71.
37. Hemmings B, Povey L. (2002). Views of chartered physiotherapists on the pscyhological content of their practice: a preliminary study in the United Kingdom. British Journal of Sports Medicine **36**: 61-64.
38. Holdcraft A, Power I. (2003). Management of pain. British Journal of Sports Medicine **326**: 635-639.
39. Houben RMA, Gijsen A, Peterson J, de Jong PJ, Vlaeyen JWS. (2005). Do health care providers' attitudes towards back pain predict their treatment recommendations? Differential predictive validity of implicit and explicit attitude measures. Pain **114**: 491-498.
40. Houben RMA, Vlaeyen JWS, peters M, Ostelo RWJG, Wolters PMJC, Stomp-van den Berg SGM. (2004). Health care providers' attitudes and beliefs towards common lower back pain. Factor structure and psychometric properties of the HC-PAIRS. Clinical Journal of Pain **20**(1): 37-44.
41. IASP Curriculum Outline on Pain for Physical Therapy (2010). http://www.iasp-pain.org/Content/NavigationMenu/GeneralResourceLinks/Curricula/Therapy/default.htm [11 August 2012]
42. IASP Taxonomy – Pain Terms (22 May 2012). http://www.iasp-pain.org/AM/Template.cfm?Section=Pain_Definitions [4 July 2012]

43. Jelsma J, K. Hansen K, de Weerdt W, de Cock P, Kind P. (2003). "How do Zimbabweans value health states?" Population Health Metric **1**(1): 11.
44. Jevon SM, Johnston LH. (2003). The perceived knowledge and attitudes of governing body chartered physiotherapists towards the psychological aspects of rehabilitation. Physical Therapy in Sport **4**: 74-81
45. Jevon SM. Psychological impact of injury in elite athletes: An exploration of the knowledge of the governing body chartered physiotherapist. Cheltenham, UK, Cheltenham and Gloucester College. Unpublished MSc dissertation.
46. Johnston LH, Carroll D. (1998). The context of emotional responses to athletic injury: A qualitative analysis. Journal of Sport Rehabilitation **7**: 206-220.
47. Johnston LH, Carroll D. (2000). The psychological impact of injury: effects of prior sport and exercise involvement. British Journal of Sports Medicine **34**: 436-439.
48. Jones D, Ravey J, Steedman W. (2000). Developing a measure of beliefs and attitudes about chronic non-malignant pain: A pilot study of occupational therapists. Occupational Therapy International **7**(4): 232-245.
49. Kaminsky A. (15 March 2011). "Livestrong.Com. Sport & exercise Related Injuries". http://www.livestrong.com/article/403313-sport-exercise-related-injuries/ [15/10/2012]
50. Kelley K, Clark B, Brown V, Sitza J. (2003). Methodology Matters. Good practice in the conduct and reporting of survey research International Journal for Quality in Health Care **15**(3):261-266.
51. Latimer J, Maher C, Refshauge K. (2004). The Attitudes and Beliefs of Physiotherapy Students to Chronic Back Pain. Clinical Journal of Pain **20**(1):45-50
52. Lebovits AH, Florence I, Bathina R, Hunko V, Fox M, Bramble C. (1997). Pain knowledge and attitudes of healthcare providers: Practice charactersitic differences. The Clinical Journal of Pain **1393**: 237-243.
53. LeResche L. (1995). Gender differences in pain. Epidemiological perspectives. Pain Forum **4**(4): 228-230.
54. Levy AM, Fuerst ML. (2002-2004) Sports Injury Handbooks http://www.sportsinjuryhandbook.com/injuries/index.html [15/10/2012]
55. Loeser JD, Melzack R. Pain: an overview. (1999). The Lancet **353**: 1607-1609.
56. MacIntyre PD, Gardner RC. (1994). The Subtle Effects of Language Anxiety on Cognitive Processing in the Second Language. Language Learning **44**(2): 238-305
57. Main CJ, Watson PJ. (1999).Psychological aspects of pain. Manual Therapy **4**(4): 203-215

58. Mair K. (25 August 2011). "Livestrong.Com Top Ten Causes of Sport Injuries". http://www.livestrong.com/article/526375-top-ten-causes-of-sport-injuries/ [15/10/2012]
59. McCaffery RN, Beebe A. (1989). Pain Clinical Manual for Nursing Practice. Missouri: The C.V. Mosby Company
60. McKenna J, Delaney H, Phillips S. (2002). Physiotherapists' lived experience of rehabilitating elite athletes. Physical Therapy in Sport **3**: 66-78
61. Meier GM, Rauch JE. (2005). Leading Issues in Economic Development. 8th ed. New York, Oxford: Oxford University Press
62. Meyer HP, Kenny PT. (2010). Assessment of patients with chronic pain. SA Family Practice **52** (4): 288-294
63. Mock C, Cherian MN. (2008). The Global Burden of Musculoskeletal Injuries: Challenges and Solutions. Clinics of Orthopaedics and Related Research **466**:2306-2316
64. Moseley GL, Hodges PW, Nicholas MK. (2004). A randomized controlled trial of intense neurophysiology education in chronic low back pain. Clinical Journal of Pain **20**: 324-330
65. Moseley GL. (2002). Combined Physiotherapy and Education is Effective for Chronic Low Back Pain: A Randomized Controlled Trial. Australian Journal of Physiotherapy **48**: 297-302
66. Moseley GL. (2004). Evidence for a direct relationship between cognitive and physical change during an education intervention in people with chronic low back pain. European Journal of Pain **8**: 39-45
67. NHS (13 July 2011). "Sports Injuries – Causes". http://www.nhs.uk/Conditions/Sports-injuries/Pages/Causes.aspx [15/10/2012]
68. Nicoll JP, Coleman P, Williams BT. (1995). The epidemiology of sports and exercise related injury in the United Kingdom. British Journal of Sports Medicine **29**(4): 232-238.
69. Ostelo RWJG, Stomp-van den Berg SGM, Vlaeyen JWS, Wolters PMJC, de Vet HCW. (2003). Health care providers' attitudes and beliefs towards chronic lo back pain: the developmetn of a questionnaire. Manual Therapy **8**(4): 214-222
70. Pain as the 5th Vital Sign Toolkit (2000). http://www.va.gov/painmanagement/docs/TOOLKIT.pdf. [2011, July 7].
71. Paparizos AL, Tripp DA, Sullivan MJ, Rubenstein ML. (2005). Catastrophizing and pain perception in recreational ballet dancers. Journal of Sport Behaviour **28**(1): 35-50.
72. Parker R, Gush S, Vale M, Birchall L, Joffe J, Ross N. (2009). Pain Knowledge and Attitudes in Final Year Health Science Students at the University of Cape Town. Pain SA **4**(2): 5-10
73. Parker R. (2007). Physiotherapy Students' Assessment of Psychosocial Yellow Flags in Low Back Pain. South African Journal of Physiotherapy **63**:2-7.

74. Petty NJ, Moore AP. (2003). Neuromusculoskeletal Examination adn Assessment: A Handbook for Therapists (2nd ed). London: Churchill Livingstone
75. Quiton RL, Greenspan JD. (2007). Sex differences in endogenous pain modulation by distracting and painful conditioning stimulation. Pain **132: Suppl 1,** S134-149.
76. Resuscitation Council (UK). (Revised 2012). Advancerd Life Support Provider Course Regulations. http://www.resus.org.uk/pages/alsregs.pdf. [July 2011].
77. Robinson ME, Riley JL, Myers CD, Papas RK, Wise EA, Waxenberg LB, Fillingim RB. (2001). Gender role expectations of pain: Relationship to sex differences in pain. The Journal of Pain **2**(5): 251-257.
78. Scott V, Gijsbers K. (1981). Pain perception in competitive swimmers. British Medical Journal **283**; 91-93.
79. Scudds RJ, Scudds RA, Simmonds MJ. (2001). Pain in the physical therapy (pt) curriculum: A faculty survey. Physiotherapy Theory and Practice **17**: 239-256
80. Seers K, Friedli K. (1996). The patients' experiences of their chronic non-malignant pain. Journal of Advanced Nursing **24**: 1160-1168.
81. Sherwood C. (26 May 2011). "Livestrong.Com. Reasons We Get Sport Injuries". http://www.livestrong.com/article/367453-reasons-we-get-sport-injuries/ [15/10/2012]
82. Simmonds M, Kumar S. (1996). Does knowledge of a patient's workers' compensation status influence clinical judgements? Journal of Occupational Rehabilitation **6**(2): 93-107
83. South African Society of Physiotherapy. Position Paper: The First Line Practitioner Status of Physiotherapists (2009). http://www.physiosa.org.za/?q=node/506. [27 July 2011].
84. StatSoft, Inc 1984-2011. STATISTICA, Version 10.
85. Sternberg WF, Bailin D, Grant M, Gracely RH. (1998). Competition alters the perception of noxious stimuli in male and female athletes. Pain **76**: 231-238
86. Strong J, Meredith P, Darnell R, Chong M, Roche P. (2003). Does participation in a pain course based on the International Association for the Study of Pain's curricula guidelines change student knowledge about pain? Pain Research Management **8**(3): 137-142
87. Strong J, Tooth L, Unruh A. (1999). Knowledge about pain among newly graduated occupational therapists: relevance for curriculum development. Canadian Journal of Occupational Therapy **66** (5): 221-228
88. Sullivan MJL, Tripp DA, Santor D. (2000). Gender differences in pain and pain behaviour: The role of catastrophising. Cognitive Therapy and Research **24**(1): 121-134.
89. Tan G, Jensen MP, Thornby J, Anderson KO. (2005). Ethnicity, Control Appraisal, Coping, and Adjustment to Chronic Pain Among Black and White Americans. Pain Medicine **6**(1): 18-28.

90. Unruh A. (1996). Gender variation in clinical pain experience. Pain **65**: 123-167
91. Unruh A. (1996). Revised Pain Knowledge and Attitudes Questionnaire. Dalhousie University, Halifax, NS. Unpublished document.
92. Unruh A. Managing pain: general principles of practice. In: Strong J, Unruh A, Wright A, Baxter D, eds. (2002). Pain: a Textbook for Therapists. London: Churchill Livingstone
93. Unruh AM. (1995). Teaching student occupational therapists about pain: A course evaluation. Canadian Journal of Occupational Therapy **62**: 30-36
94. USAID: HIV/AIDS Health Profile – Sub-Saharan Africa (March, 2011). http://www.usaid.gov/our_work/global_health/aids/Countries/africa/hiv_summary_africa.pdf [31 July 2011].
95. van Wilgen CP, Keizer D. (2011). Neuropathic Pain Mechanisms in Patients with Chronic Sports Injuries: A Diagnostic Model Useful in Sports Medicine? Pain Medicine **12**: 110–117
96. Wilson B. (2007). Nurses' knowledge of pain. Journal of Clinical Nursing **16**: 1012-1020
97. Wolff MS, Michel TH, Krebs DE, Watts NT. (1991). Chronic pain – assessment of orthopaedic physical therapists' knowledge and atitudes. Physical Therapy **71**(3): 207-214.
98. Woolf AD, Pfleger B (2003). Burden of major musculoskeletal conditions. Bulletin of the World Health Organization **81**: 646-656.
99. Zwakhalen S, Hamers J, Peijnenburg R, Burger M. (2007). Nursing staff knowledge and beliefs about pain in elderly nursing home residents with dementia. Pain Research Management **12**(3): 177-184

Appendix I: Ethics Approval Letter

UNIVERSITY OF CAPE TOWN

Health Sciences Faculty
Human Research Ethics Committee
Room 1152-24 Groote Schuur Hospital Old Main Building
Observatory 7925
Telephone [021] 406 6338 • Facsimile [021] 406 6411
e-mail: shuretta.thomas@uct.ac.za

21 July 2011

HREC REF: 312/2011

Ms N Clenzos
c/o Ms R Parker & Ms N Naidoo
Physiotherapy
Health & Rehab
F-Floor
Old Main Building

Dear Ms Clenzos

PROJECT TITLE: SPORTS PHYSIOTHERAPISTS' KNOWLEDGE, ATTITUDES AND BELIEFS OF PAIN: A CROSS-SECTIONAL CORRELATION STUDY.

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee for review.

It is a pleasure to inform you that the HREC has **formally approved** the above mentioned study.

Approval is granted for one year till the 30 July 2012.

Please submit a progress form, using the standardised Annual Report Form (FM8016), if the study continues beyond the approval period. Please submit a Standard Closure form (FM8016) if the study is completed within the approval period.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the HREC REF in all your correspondence.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, HSF HUMAN ETHICS
Federal Wide Assurance Number: FWA00001637.

s.thomas

Appendix II: Letter to Physiotherapists and Informed Consent

Dear Physiotherapist

Your assistance in this study will be much appreciated!

I am currently doing my postgraduate MPhil (Sports Physiotherapy) at the University of Cape Town. My research study will investigate sports physiotherapists' pain knowledge, attitudes and beliefs.

You have been selected for this study as a participant who is a physiotherapist, identified by membership of the Sports Physiotherapy Group and/ or the Orthopaedic Manipulative Physiotherapy Group of the South African Society of Physiotherapy.

Participation in this study involves completing an online consent form and questionnaire which will take no longer than 20 minutes.

There are no risks involved in participating in this study, and there are no negative implications for your clinical practice or reputation. Answers to the questionnaire will be supplied via e-mail after the data collection is complete to assist in increasing the overall knowledge of pain amongst sports physiotherapists in South Africa. Your demographic information and responses will remain anonymous and confidential.

Thank you for your time and assistance.

Please click on the following link to access the online consent form and questionnaire: https://www.surveymonkey.com/s/6K3W7WT

You may contact me or any of the listed supervisors if you have questions regarding this study.

Contact details:

Faculty of Health Sciences Human Research Ethics Committee - Tel 021 406 6492

Researcher:

Nadia Clenzos - nadiaclenzos@yahoo.com - Tel 072 351 0718

Supervisors:

Romy Parker - Romy.Parker@uct.ac.za - Tel 021 406 6431

Niri Naidoo - Niri.Naidoo@uct.ac.za - Tel 021 406 6431

Kind regards,

Nadia Clenzos

Sports Physiotherapists' Knowledge, Attitudes and Beliefs of Pain
Informed Consent

Dear Physiotherapist

I, Nadia Clenzos, am currently doing my postgraduate MPhil (Sports Physiotherapy) at the University of Cape Town. My research study will investigate physiotherapists' pain knowledge, attitudes and beliefs.

Title: Sports Physiotherapists' Knowledge, Attitudes and Beliefs of Pain: A Cross-Sectional Correlational Study.

There is insufficient research regarding sports physiotherapists' pain knowledge. This raises the question of whether or not there are implications regarding appropriate treatment of athletes. This study aims to determine sports physiotherapists' knowledge, attitudes and beliefs of pain in athletes, identifying areas of inadequacy, with the ultimate goal of optimising patient management.

You have been selected for this study as a participant who is a physiotherapist, identified by membership of the Sports Physiotherapy Group and/ or the Orthopaedic Manipulative Physiotherapy Group of the South African Society of Physiotherapy.

The information obtained in this study will remain confidential and anonymous and will be used for the completion of a mini-dissertation as required for the partial fulfilment of the MPhil (Sports Physiotherapy) at the University of Cape Town. This study has been granted ethical approval by the University Of Cape Town Faculty Of Health Sciences Human Research Ethics Committee (HREC Ref: 312/2011).

Participation in this study is voluntary and involves completing this consent form and filling out the online questionnaire which will take approximately 15 minutes. You may contact me or any of the listed supervisors if you have questions regarding this study. There are no risks involved in participating in this study, and there are no negative implications for your clinical practice or reputation. Answers to the questionnaire will be supplied via e-mail after the data collection is complete to assist in increasing the overall knowledge of pain amongst sports physiotherapists in South Africa. Your demographic information and responses will remain anonymous as the consent form does not include personal identification and your e-mail contact information is not linked to the online questionnaire data collection, thereby ensuring confidentiality and anonymity.

Thank you for your time and assistance.

Kind regards,
Nadia Clenzos

Contact details:
Faculty of Health Sciences Human Research Ethics Committee - Tel 021 406 6492

Researcher:
Nadia Clenzos - nadiaclenzos@yahoo.com - Tel 072 351 0718

Supervisors:
Romy Parker - Romy.Parker@uct.ac.za - Tel 021 406 6431
Niri Naidoo - Niri.Naidoo@uct.ac.za - Tel 021 406 6431

Sports Physiotherapists' Knowledge, Attitudes and Beliefs of Pain
Informed Consent

Please complete the consent form below if you wish to participate in this study:

I hereby consent to take part in this study. I have read the information provided and I understand what is required of me. My participation is voluntary; I understand that my e-mail contact, demographic information and responses will remain confidential and anonymous; I know that I can withdraw at any point and that this will have no negative implications for my clinical practice or reputation. All my questions have been answered by the researcher.

- ○ **Yes**
- ○ **No**

Date: _____

Appendix III: Questionnaire (Demographic & RPKAQ)

Sports Physiotherapists' Knowledge, Attitudes and Beliefs of Pain
Demographic Questionnaire

Please complete the following demographic questionnaire before proceeding to the Pain Knowledge and Attitudes Questionnaire.

1. Age

_____

2. Gender

☐ Male

☐ Female

3. Home language

☐ English

☐ Afrikaans

☐ Zulu

☐ Xhosa

☐ Ndebele

☐ Sesotho

☐ Setswana

☐ SiSwati

☐ Xitsonga

☐ Tshivenda

☐ Other (please specify)

_____

4. Are you currently doing community service?

☐ Yes

☐ No

5. Are you currently practicing as a physiotherapist in clinical practice?

- ☐ Yes
- ☐ No

6. At which University did you complete your undergraduate BSc Physiotherapy degree?

- ☐ University of Cape Town
- ☐ University of the Free State
- ☐ University of KwaZulu Natal
- ☐ University of Limpopo
- ☐ University of Pretoria
- ☐ University of Stellenbosch
- ☐ University of the Western Cape
- ☐ University of the Witwatersrand
- ☐ Not in South Africa/ Other (please specify) _____

7. Year of graduation

_____

8. Please indicate which postgraduate qualifications or courses you have completed:

- ☐ OMT 1
- ☐ SPT 1
- ☐ CPR
- ☐ Principles of Pain
- ☐ Women's Health
- ☐ Masters
- ☐ PhD

Please specify Masters/ PhD qualification and/or any other qualifications not mentioned above.

_____

9. Please indicate which postgraduate qualifications or courses you are currently doing:

- ☐ OMT 1
- ☐ SPT 1
- ☐ CPR
- ☐ Principles of Pain
- ☐ Women's Health
- ☐ Masters
- ☐ PhD

Please specify Masters/ PhD qualification and/or any other qualifications not mentioned above.

10. Are you involved in lecturing?

- ☐ Yes
- ☐ No

11. If you answered yes to question 10, please indicate:

- ☐ Undergraduate physiotherapy students
- ☐ Postgraduate physiotherapy students
- ☐ Courses

12. Are you a member of?

- ☐ Orthopaedic Manipulative Physiotherapy Group (OMPTG)
- ☐ Sports Physiotherapy Group (SPG)
- ☐ Both

13. Which Province do you work in?

- ☐ Eastern Cape
- ☐ Free State
- ☐ Gauteng
- ☐ KwaZulu Natal
- ☐ Limpopo
- ☐ Mpumalanga
- ☐ Northern Cape
- ☐ North West
- ☐ Western Cape

14. Number of years working as a physiotherapist:

☐

15. Have you ever or do you currently treat athletes (sportsmen & sportswomen)?

- ☐ Yes
- ☐ No

Number of years: ☐

16. What is your experience with sports physiotherapy?

- ☐ Work in sports practice/ treatment of athletes
- ☐ Team physiotherapist (Individual athletes or team sports)
- ☐ Work in sports practice/ treatment of athletes AND a team physiotherapist

17. Which sports are you involved in?

- ☐ Athletics
- ☐ Ballet/ Dancing
- ☐ Cricket
- ☐ Cycling
- ☐ Golf
- ☐ Gymnastics
- ☐ Hockey
- ☐ Mountain Biking
- ☐ Netball
- ☐ Rowing
- ☐ Rugby
- ☐ Running
- ☐ Soccer
- ☐ Swimming
- ☐ Water Polo

Other (please specify) _____

☐

18. What age group of athletes do you work with?

- ☐ <12 years
- ☐ 12-18 years
- ☐ 19-25 years
- ☐ >25 years

Sports Physiotherapists' Knowledge, Attitudes and Beliefs of Pain

Pain Knowledge and Attitudes Questionnaire

Please read each of the following statements and select an appropriate answer based on whether you agree or disagree with the statement or whether you are uncertain.

Please note: Questions left unanswered will be considered as 'Uncertain'.

There are five categories:

A. Physiological Basis of Pain

B. Psychological Factors of Pain Perception

C. Developmental Changes in Pain Perception

D. Assessment and Measurement of Pain

E. Cognitive/ Behavioural Methods of Pain Relief

1 Strongly disagree	2 Moderately disagree	3 Slightly disagree	4 Uncertain	5 Slightly agree	6 Moderately agree	7 Strongly agree

*Represents the preferred direction of the responses

Physiological Basis of Pain	
1. There is a predictable relationship between the extent of an injury and the person's perception of pain	1* 2 3 4 5 6 7
2. Pain is a physiological sensation	1* 2 3 4 5 6 7
3. The sensation of pain varies from individual to individual	1 2 3 4 5 6 7*
4. Nociception is experienced at the site of tissue damage	1 2 3 4 5 6 7*
5. The physiological basis of pain is well understood	1* 2 3 4 5 6 7
6. The intensity of pain is its most important quality	1* 2 3 4 5 6 7
7. Two people with exactly the same physical condition or trauma will have similar experiences of pain	1* 2 3 4 5 6 7
8. Pain is a subjective experience	1 2 3 4 5 6 7*
9. The duration of pain is similar for individuals with the same pain condition	1* 2 3 4 5 6 7
10. Unrelieved pain contributes to the onset of chronic pain	1 2 3 4 5 6 7*

Psychological Factors of Pain Perception	
1. Chronic pain always has an underlying psychological cause	1* 2 3 4 5 6 7
2. A person's statement about pain should always be accepted at face value	1 2 3 4 5 6 7*
3. If there is no organic basis to the pain, then the pain is psychological	1* 2 3 4 5 6 7
4. Psychologically caused pain can hurt as much as organically caused pain	1 2 3 4 5 6 7*
5. A person receiving compensation is less likely to recover from pain	1* 2 3 4 5 6 7
6. Chronic pain frequently leads to depression	1 2 3 4 5 6 7*
7. It is common for someone with chronic pain to feel little control over the pain	1 2 3 4 5 6 7*
8. Improving an individual's coping skills is more important than determining the extent to which there may be a psychological cause of the pain	1 2 3 4 5 6 7*
9. Pain due to a physiological cause and pain due to a psychological cause can occur simultaneously	1 2 3 4 5 6 7*
10. People with chronic pain can continue to live productive lives	1 2 3 4 5 6 7*
11. A person may have severe pain but appear calm and rational at the same time	1 2 3 4 5 6 7*
12. Learning to tolerate pain builds character	1* 2 3 4 5 6 7
13. Relief of pain is often more important to the person than treatment of the underlying condition	1 2 3 4 5 6 7*
14. Deliberate faking of pain is rare among people with pain	1 2 3 4 5 6 7*

Developmental Changes in Pain Perception	
1. A child, who is playing after surgery, may have pain	1 2 3 4 5 6 7*
2. Children experience less pain than adults	1* 2 3 4 5 6 7
3. Due to the immaturity of the nervous system, newborns have little sensitivity to pain	1* 2 3 4 5 6 7
4. Children have a higher tolerance for pain than adults	1* 2 3 4 5 6 7
5. Children can have severe headaches or migraines	1* 2 3 4 5 6 7
6. If children are given medication for pain, they are more likely to think that drugs will solve their problems later in life	1* 2 3 4 5 6 7
7. A premature infant is able to feel pain	1 2 3 4 5 6 7*
8. Children, who have recurrent abdominal pain, are probably seeking attention or trying to escape responsibilities	1* 2 3 4 5 6 7
9. Elderly people tolerate more pain	1* 2 3 4 5 6 7
10. Children remember pain	1 2 3 4 5 6 7*

Assessment and Measurement of Pain	
1. It is impossible to measure pain in an individual who is unable to communicate about pain	1* 2 3 4 5 6 7
2. Behavioural measures of pain are reliable measures of short sharp pain	1 2 3 4 5 6 7*
3. Self-report is the most meaningful measure of pain	1 2 3 4 5 6 7*
4. A person, who is sleeping, may have significant pain	1 2 3 4 5 6 7*
5. Blood pressure, heart rate, respiration, and sweating are good measures of postoperative pain	1* 2 3 4 5 6 7
6. Increasing levels of endogenous opioids can help to determine if chronic pain is due to a cause (NB: endogenous opioids are produced by the body)	1* 2 3 4 5 6 7
7. Pain can be reliably measured on a variety of numeric scales	1 2 3 4 5 6 7*
8. Behavioural measures of pain are reliable indicators of chronic pain	1* 2 3 4 5 6 7
9. Asking the person "how do you feel?" is usually the best way to measure pain	1* 2 3 4 5 6 7
10. Frequent measurement of acute pain may make the pain worse	1* 2 3 4 5 6 7

Cognitive/Behavioural Methods of Pain Relief	
1. Being engaged in meaningful activity may reduce a person's perception of pain	1 2 3 4 5 6 7*
2. Cognitive/ behavioural methods of pain relief are more effective than pharmacological methods	1* 2 3 4 5 6 7
3. Relaxation is an effective method of pain relief for mild to moderate levels of pain	1 2 3 4 5 6 7*
4. Reinforcement of coping with pain is an important treatment intervention	1 2 3 4 5 6 7*
5. A spouse, parents, or other family members may exacerbate non-coping behaviours	1 2 3 4 5 6 7*
6. Cognitive/ behavioural methods have more effect on reducing mild pain than pain which is moderate or severe	1 2 3 4 5 6 7*
7. Progressive relaxation (tension with relaxation) may cause more pain	1 2 3 4 5 6 7*
8. It is preferable to use cognitive/ behavioural methods rather than pharmacological treatments for pain relief	1* 2 3 4 5 6 7
9. Changing a person's patterns of thought regarding pain may improve coping skills	1 2 3 4 5 6 7*
10. Cognitive/ behavioural methods may have more impact on improving coping than on reducing the intensity of pain	1 2 3 4 5 6 7*

Appendix IV: Pain Information Document

Department of Health and Rehabilitation Sciences Faculty of Health Sciences

Divisions of Communications Sciences and Disorders, Nursing and Midwifery, Occupational Therapy, Physiotherapy

H45 Old Main Building, Groote Schuur Hospital, Observatory 7925

Tel: +27 (0) 21 406 6401 Fax: +27 (0) 21 406 6323

Internet: 0Hwww.uct.ac.za

Sports Physiotherapists' Knowledge, Attitudes and Beliefs of Pain: A Cross-sectional Correlational Study

Dear Physiotherapist

Thank you for your participation in my MPhil Sports Physiotherapy study to investigate South African sports physiotherapists' knowledge, attitudes and beliefs of pain. I sincerely appreciate the time and effort it took for you to complete the questionnaire.

Pain is recognised as the most common complaint for which individuals seek the help of a manual therapist (Main and Watson, 1999), however, the most commonly cited reasons for mismanagement of pain are health care practitioner's negative attitudes and lack of knowledge about pain (Scudds, Scudds and Simmonds, 2001). The Pain Society identifies physiotherapists as accepted and involved members of the pain management team (Brown, 2003), who are involved in identifying the possible causes of pain. Therefore, it is important that physiotherapists have a good understanding of pain and pain mechanisms.

The information gained from this study helped to establish the current levels of pain knowledge among sports and orthopaedic manipulative physiotherapists in South Africa. This study will serve as platform from which we may begin to address any gaps in physiotherapists' current knowledge of pain. The appropriate and effective management of pain, through education, may become a key factor for progress in this field.

Thank you once again for your contribution to this research project, as well as your contribution to the growing body of sports research.

Please find attached a pain information document as well as the answers to the Revised Pain Knowledge and Attitudes Questionnaire (Unruh, 1996).

Please do not hesitate to contact me should you have any further questions about the study. All enquiries will remain confidential.

Kind regards,

Nadia Clenzos

BSc Physiotherapy (Wits)

Currently registered for MPhil Sports Physiotherapy (UCT)

Tel: 072 351 0718

E-mail: nadiaclenzos@yahoo.com

Physiological Basis of Pain

- The IASP defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage... pain is always subjective".

- Pain is an individual and subjective phenomenon. Pain responses vary amongst gender and culture; individual differences in pain responses have been identified, possibly related to genetics, temperament.

- The type of pain is its most important quality.

- Nociception is a physiological sensation which involves the neural process of encoding noxious stimuli; nociception is neither sufficient nor necessary for pain.

- Nociceptors are high-threshold sensory receptors of the peripheral somato-sensory nervous system that are capable of conducting and encoding noxious stimuli.

- Nociception is the most common, but not the only, precursor of pain. Neurons in tissue respond to various stimuli, if the stimuli are sufficient to cause actual or potential tissue damage. Activation of these nociceptors sends an alarm to signal to the spinal cord and brain. The message is processed throughout the central nervous system, and the brain gives an appropriate output (this output may include the PNS/SNS, motor system, endocrine system, immune system and/or pain production system).

- Pain occurs when sensory information is processed by the central nervous system. This involves complex memory, reasoning and emotional processes. Therefore, nociception is merely sensory excitation; pain is the subjective perception of that sensation.

- Tissue damage initiates the release of local mediators such as bradykinin, substance P, prostaglandins and potassium. These mediators heighten nociception and facilitate the communication of painful sensations to the spinal cord and brain. Tissue injury also leads to histamine and serotonin release, which results in increased pain sensitivity in the areas surrounding the site of initial injury.

- The inflammatory soup directly activates alarm bells and this increased sensitivity is designed to protect the injured tissue.

- Sensitisation (peripheral/ central) is the increased responsiveness of nociceptive neurons to their normal input, and/or recruitment of a response to normally sub-threshold inputs.

- Pain is usually considered as a warning signal of actual or perceived tissue damage, nevertheless pain can occur in the absence of tissue damage.

- Pain is often experience d at the site of tissue damage but pain may radiate beyond this site and cause sensitisation to noxious stimuli beyond this site. The extent of the tissue damage is frequently not a reliable indicator of the severity of the pain that will be experienced.

- Patients who have similar underlying tissue damage may report very different pains.

- Acute pain has an inherent biological function; a warning of actual or potential physiological harm. Acute pain usually stops before healing is completed, a process that may take a few days or a few weeks.

- Chronic pain – changes in the central nervous system due to injury may prolong and maintain pain long after the expected period of healing. The IASP considers chronic pain as a persistent pain that is not amenable, as a rule, to treatments based upon specific remedies, or to the routine methods of pain control such as non-narcotic analgesics.

- Loeser and Melzack (1999) concluded that it is not the duration of pain that distinguishes acute from chronic pain, but more importantly, the inability of the body to restore its physiological functions to normal homeostatic levels.

- Melzack and Wall (1988) suggested that, in certain circumstances, areas of the brain that are essential for pain experience and response may be engaged on other matters and become inaccessible to receiving painful input, even if the person is aware of the injury. E.g. in times of great crisis or when one is engaged in meaningful occupation.

- The social, cultural and physical context in which pain occurs is also an important influence on pain sensation and on behaviour in response to pain.

- Unrelieved pain has a number of undesirable physical and psychological consequences and may contribute to the onset of chronic pain.

Developmental Changes in Pain Perception

- Even premature and newborn babies feel pain; noxious stimuli have been shown to produce a cortical pain response in premature babies.

- Sensory nerve fibres involved in nociception are present during the prenatal period. Large diameter A fibres of the pain network develop first, followed by development of the C fibres; the descending mechanisms that modulate pain are the last element to appear.

- Pain pathways, although immature, are present at birth and pain impulses are able to travel to and from the pain centres in the brain. Complete myelination is not necessary for pain to be felt; painful stimuli are transmitted by both myelinated and unmyelinated fibres. Incomplete myelination implies only a slower conduction speed in the nerves, which is offset by the shorter distances the impulse has to travel.

- Immature synapses within the spinal cord may cause activation of nerve impulses below the normal threshold increasing the pain response. Immature gating mechanisms in the neonate result in an inability to distinguish between some types of stimuli, which may result in an exaggerated pain response.

- Neonates exhibit behavioural, physiological and hormonal responses to pain.

- Newborns are capable of emotional processing of pain and other experiences but emotions are relatively undifferentiated early in life and appear in the form of negative and positive states.

- Emotional processing and cognitive abilities develop over time, which may influence pain coping mechanisms. Infants and young children have not yet developed these coping strategies and therefore may express pain differently.

- Growing up with recurrent or chronic pain appears to sensitize children to subsequent pain experiences; lower pain thresholds are observed in children who have had exposure to painful experiences.

- Untreated pain suffered early in life can have profound and long-lasting effects on social and physical development, and can cause permanent changes in the nervous system that will affect future pain experience and development.

- Children remember pain, and may avoid future medical care because of painful experiences in a hospital or clinic.

- Increased activity is often a sign of pain. Children are particularly gifted in the use of distraction and use play as a diversion and as a coping mechanism.

Assessment and Measurement of Pain

- The patient's history is the most important initial source of information and self-reporting of pain remains the most reliable indication of pain.

- Because pain is primarily a subjective experience, self-report is recommended as the primary source for pain measures whenever possible. These include numerical scales, visual analogue scales and faces scales).

- When self-report measures are considered to be unreliable, then observational measures can be used (facial expression, physical movement, social responsiveness).

- Regularly measuring pain improves pain management. Routinely recording pain scores as "The Fifth Vital Sign" has been advocate by the American Pain Society.

- All that can be determined about the intensity of a person's pain is based on what the patient verbally or nonverbally communicates about their subjective experience. Intensity of pain is the most salient dimension of pain. However, pain is a complex, multi-dimensional, subjective experience. The report of pain is related to numerous variables, such as cultural background, past experience, the meaning of the situation, personality, attention, arousal level, emotions, and reinforcement contingencies. Pain intensity alone is inadequate to assess pain conditions.

- It is important to distinguish between nociception, pain, suffering, and pain behaviour.

- Physiological changes in heart rate and respiratory rate are not well correlated with painful events and may occur in response to many other states such as exertion or fever.

- Sleep may be the result of exhaustion because of persistent pain.

Psychological Factors Associated with Pain Perception and Cognitive/Behavioural Methods of Pain Relief

- Thoughts and beliefs are nerve impulses too; thought processes are powerful enough to maintain a pain state.

- Multidisciplinary treatments for chronic pain are superior to no treatment, waiting list, as well as single-discipline treatments such as medical treatment or physiotherapy.

- Cognitive- behavioural therapy (CBT) techniques are effective in terms of a reduction of the pain experience, an improvement in the ability to cope with pain, a reduction of pain behaviour, and an increase in functionality; most effects can be maintained over time.

- The hallmark of the cognitive-behavioural model of pain is the notion that pain is a complex experience that is not only influenced by its underlying pathophysiology, but also by an individual's cognitions, affect and behaviour.

- CBT for pain management has 3 basic components:

    - The first is a treatment rationale that helps patients understand that cognitions and behaviour can affect the pain experience and emphasises the role that patients can play in controlling their own pain.

    - The second component of CBT is coping skills training. Progressive relaxation and cue-controlled brief relaxation exercises are used to decrease muscle tension, reduce emotional distress, and divert attention away from pain. Activity pacing and pleasant activity scheduling are used to help patients increase the level and range of their activities. Training in distraction techniques such as pleasant imagery, counting methods, and use of a focal point helps patients learn to divert attention away from severe pain episodes. Cognitive restructuring is used to help patients identify and challenge overly negative pain-related thoughts and to replace these thoughts with more adaptive, coping thoughts.

    - The third component of CBT involves the application and maintenance of learned coping skills. During this phase of treatment patients are encouraged to apply their coping skills to a progressively wider range of daily situations. Patients are taught problem solving methods that enable them to analyse and develop plans for dealing with pain flares and other challenging situations. Self-monitoring and behavioural contracting methods are also used to prompt and reinforce frequent coping skills.

Selected References

- Butler D, Moseley L. (2006). Explain Pain. Adelaide, Australia. NoiGroup Publications.
- Flor H, Fydrich T, Turk D. (1992). Efficacy of multidisciplinary pain treatment centres: a meta-analytic review. Pain **49**(2): 221-230
- IASP Special Interest Group on Pain in Childhood. (12 June 2012). 1Hhttp://childpain.org/ [July 2012].
- IASP Taxonomy. (22 May 2012). 2Hhttp://www.iasp-pain.org/AM/Template.cfm?Section=Pain_Definitions. [July 2012].
- Keefe FJ. (1996). Cognitive behavioural therapy for managing pain. The Clinical Psychologist **49**(3)4-5.
- McCaffery RN and Beebe A. (1989). Pain Clinical Manual for Nursing Practice. Missouri: The C.V. Mosby Company
- Meyer HP, Kenny PT. (2010). Assessment of patients with chronic pain. SA Family Practice **52** (4): 288-294
- Strong J, Unruh AM, Wright A, Baxter D. (2002). Pain – A Textbook for Therapists. UK. Churchill Livingstone.
- Traue HC, Jerg-Bretzke L, Pfingsten M, Hrabal V. (2010). IASP Guide to Pain Management in Low-Resource Settings. Chapter 4. Psychological Factors in Chronic Pain. 3Hhttp://www.iasp-pain.org/AM/Template.cfm?Section=Home&Template=/CM/ContentDisplay.cfm&ContentID=12163. [July 2012].
- Turk, D & Melzack R. 3rd ed. (2011). Handbook of Pain Assessment. New York. Guilford Press.
- Twycross A, Dowden S, Bruce E. (2009). Managing Pain in Children: A Clinical Guide. Oxford, UK. Blackwell Publishing Ltd.
- Von Baeyer CL, Spagrud LJ. (2007). Systematic review of observational (behavioural) measures of pain for children and adolescents aged 3 to 18 years. Pain **127**: 140-150.
- Walco GA, Goldschneider R. (2008). Pain in Children: A Practical Guide for Primary Care. USA. Humana Press.
- Wittbrodt E & Tietze K. (1999). Pain in the intensive care unit. http://cmbi.bjmu.edu.cn/uptodate/criticalcare/other/Paincontrolintheintensivecareunit.htm. [July 2012].

PAIN KNOWLEDGE, ATTITUDES AND BELIEFS

REVISED PAIN KNOWLEDGE AND ATTITUDES QUESTIONNAIRE (Unruh, 1996)

Physiological Basis of Pain	
1. There is a predictable relationship between the extent of an injury and the person's perception of pain	Disagree
2. Pain is a physiological sensation	Disagree
3. The sensation of pain varies from individual to individual	Agree
4. Nociception is experienced at the site of tissue damage	Agree
5. The physiological basis of pain is well understood	Disagree
6. The intensity of pain is its most important quality	Disagree
7. Two people with exactly the same physical condition or trauma will have similar experiences of pain	Disagree
8. Pain is a subjective experience	Agree
9. The duration of pain is similar for individuals with the same pain condition	Disagree
10. Unrelieved pain contributes to the onset of chronic pain	Agree

Psychological Factors of Pain Perception	
1. Chronic pain always has an underlying psychological cause	Disagree
2. A person's statement about pain should always be accepted at face value	Agree
3. If there is no organic basis to the pain, then the pain is psychological	Disagree
4. Psychologically caused pain can hurt as much as organically caused pain	Agree
5. A person receiving compensation is less likely to recover from pain	Disagree
6. Chronic pain frequently leads to depression	Agree
7. It is common for someone with chronic pain to feel little control over the pain	Agree
8. Improving an individual's coping skills is more important than determining the extent to which there may be a psychological cause of the pain	Agree
9. Pain due to a physiological cause and pain due to a psychological cause can occur simultaneously	Agree
10. People with chronic pain can continue to live productive lives	Agree
11. A person may have severe pain but appear calm and rational at the same time	Agree
12. Learning to tolerate pain builds character	Disagree
13. Relief of pain is often more important to the person than treatment of the underlying condition	Agree
14. Deliberate faking of pain is rare among people with pain	Agree

Developmental Changes in Pain Perception	
1. A child, who is playing after surgery, may have pain	Agree
2. Children experience less pain than adults	Disagree
3. Due to the immaturity of the nervous system, newborns have little sensitivity to pain	Disagree
4. Children have a higher tolerance for pain than adults	Disagree
5. Children can have severe headaches or migraines	Disagree
6. If children are given medication for pain, they are more likely to think that drugs will solve their problems later in life	Disagree
7. A premature infant is able to feel pain	Agree
8. Children, who have recurrent abdominal pain, are probably seeking attention or trying to escape responsibilities	Disagree
9. Elderly people tolerate more pain	Disagree
10. Children remember pain	Agree

Assessment and Measurement of Pain	
1. It is impossible to measure pain in an individual who is unable to communicate about pain	Disagree
2. Behavioural measures of pain are reliable measures of short sharp pain	Agree
3. Self-report is the most meaningful measure of pain	Agree
4. A person, who is sleeping, may have significant pain	Agree
5. Blood pressure, heart rate, respiration, and sweating are good measures of postoperative pain	Disagree
6. Increasing levels of endogenous opioids can help to determine if chronic pain is due to a cause (NB: endogenous opioids are produced by the body)	Disagree
7. Pain can be reliably measured on a variety of numeric scales	Agree
8. Behavioural measures of pain are reliable indicators of chronic pain	Disagree
9. Asking the person "how do you feel?" is usually the best way to measure pain	Disagree
10. Frequent measurement of acute pain may make the pain worse	Disagree

Cognitive/Behavioural Methods of Pain Relief	
1. Being engaged in meaningful activity may reduce a person's perception of pain	Agree
2. Cognitive/behavioural methods of pain relief are more effective than pharmacological methods	Disagree
3. Relaxation is an effective method of pain relief for mild to moderate levels of pain	Agree
4. Reinforcement of coping with pain is an important treatment intervention	Agree
5. A spouse, parents, or other family members may exacerbate non-coping behaviours	Agree
6. Cognitive/behavioural methods have more effect on reducing mild pain than pain which is moderate or severe	Agree
7. Progressive relaxation (tension with relaxation) may cause more pain	Agree
8. It is preferable to use cognitive/behavioural methods rather than pharmacological treatments for pain relief	Disagree
9. Changing a person's patterns of thought regarding pain may improve coping skills	Agree
10. Cognitive/behavioural methods may have more impact on improving coping than on reducing the intensity of pain	Agree