The role of psychosocial risk factors on the prevalence of low back pain amongst Grade 12 learners in public schools in the Greater Durban area.

By

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I, Verusha J. Seethal, do declare that this dissertation is representative of my own work in both conception and execution (except where acknowledgements indicate to the contrary).

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In loving memory of my grandfather, Mr. Ramraj Luckna

(1930-2008)

Nana, I miss you so much and I will never forget all that you have taught me.

I am a better person because of you…

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ABSTRACT

Background: Low back pain (LBP) is the most prevalent musculoskeletal condition experienced by human beings and the most common cause of disability in developed nations. Psychosocial factors, involving aspects of social and psychological behaviour, have previously been documented as potential risk factors in the development of adult LBP. However, more research is required to fully understand the role of psychosocial risk factors on the prevalence of LBP amongst adolescents.

Objective: To determine the prevalence of LBP and to identify selected psychosocial risk factors associated with LBP amongst Grade 12 learners in the Greater Durban area.

Methods: A population-based study was conducted amongst a stratified random sample of 20 public secondary schools in all three educational districts in the Greater Durban area. Data was collected by means of a structured questionnaire administered to the sample population consisting of Grade 12 learners. Using an exploratory research design, the individuals reported on demographics as well as prevalence, severity, frequency and chronicity of LBP. In addition, data was obtained regarding various psychosocial risk factors including depression, exam stress and anxiety, socio-economic status, family history of LBP, smoking, alcohol and drug abuse amongst the respondents.

Results: The prevalence of LBP was 57.42% with a median frequency of 8 times a month. About a third (33.9%) of the respondents experienced difficulty bending whilst 35% reported that their LBP spread down to the legs below their knees. The daily activity most affected by LBP was having a good night's sleep (50.6%), followed closely by playing sports (47.4%) and concentrating in class (46.6%). The majority of the respondents that suffered from LBP had taken pain relief medication (47.1%) whilst only 21% of the respondents had missed school because of LBP.

With regards to the psychosocial risk factors under investigation, three of the risk factors did not show any association to LBP. They included socio-economic status, smoking and recreational drug use. In contrast, five psychosocial risk factors showed an

association to LBP. They included alcohol abuse, family history, exam stress, anxiety and depression. Finally, after adjusting for all other risk factors for adolescent LBP, depression and high exam stress showed the strongest correlation with the occurrence of LBP amongst Grade 12 learners in the Greater Durban area.

Conclusion: LBP amongst adolescents is a common problem that increases with age, representing a risk for LBP in adulthood. The researcher is of the opinion, that this illustrates the need for further investigations with more profound studies on the risk factors so that more light can be shed on how to manage this ever-growing problem.

Key words: low back pain, psychosocial, Grade 12, adolescence.

GLOSSARY

Adolescence:

Adolescence is the transition period from childhood to adulthood and is characterized by numerous developmental changes (Jordaan, Kruger, Stewart and Becker, 2005). Adolescence begins with the onset of puberty and extends into adulthood, usually encompassing the ages of 12 to 20 years (Louw, Morris and Grimmer-Somers, 2007).

Alcoholic myopathy:

Alcoholic myopathy is characterized by a reduction in skeletal muscle protein synthesis, total ribose nucleic acid (RNA) and protein content and the myofibrillary protein contents (Preedy and Peters, 1988; Reilly, McKoy, Mantle, Peters, Goldspink and Preedy, 2000).

Anxiety:

Anxiety 'is characterized by a diffuse, unpleasant, vague sense of apprehension, often accompanied by autonomic symptoms, such as headache, perspiration, palpitations, tightness in the chest and mild stomach discomfort' (Kaplan and Sadock, 1996:189).

Biopsychosocial:

Involving interplay of biological, psychological and social influences (Goldstein, 1994).

Content validity:

An instrument in which the content is considered effective to be able to assess a particular theory (Bernard, 2000).

Cortisol:

Cortisol is a steroid hormone that is synthesized and released by the human adrenal cortex. It is important for normal carbohydrate metabolism and for the normal response to any forms of stress (Oxford Medical Dictionary, 2007).

Depression:

Depression is defined as a common mental disorder that is characterized by an unhappy mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy and poor concentration (WHO, 2001).

Exploratory research:

Exploratory research is characterized by a flexible and versatile research process in which the research findings/results are more tentative (Cooper and Schindler, 2003).

Face validity:

This is determined by an agreement between researchers and those with a vested interest in the questionnaire, that on 'the face of it', the tool seems valid (Bernard, 2000).

Grade 12:

The Grade 12 year, commonly referred to as 'matric', is the final year of secondary education in South Africa and represents the culmination of a student's schooling career (Bester and Swanepoel, 2000).

Grade 12 learner:

A Grade 12 learner or matriculant is a school learner who is at their final year of study in their academic career at school, where they are taught and gain knowledge, experience and skills (Crowther, 1997).

Inflammation:

The body's natural response to injury in which the injury site might display various degrees of pain, swelling, heat, redness and/or loss of function (Quinn, 2008).

Low back pain (LBP):

LBP is defined as a 'pain of variable duration' (Ehrlich, 2003:671), 'localized in the area below the line of the twelfth rib and above the inferior gluteal folds, with or without leg pain' (Woolf and Pfleger, 2003:652).

Pain:

‘An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage’ (International Association for the Study of Pain {IASP}, 1979).

Phantom limb pain:

The sensation that an arm or leg, or part of an arm or leg, is still attached to the body after it has been amputated. Pain may seem to come from the amputated part (Oxford Medical Dictionary, 2007).

Placebo:

A medicine that is ineffective but may help to relieve a condition because the patient has faith in its powers (Oxford Medical Dictionary, 2007).

Prevalence:

Defined as the proportion of people in a given population that has a symptom or disease at a particular time (Borenstein, Wiesel and Boden, 1995).

Psychopathology:

Is the study of mental disorders and attempts to explain and describe erratic and aberrant behaviour (Oxford Medical Dictionary, 2007).

Psychosocial:

Refers to the interaction between the individual and the social environment, and the resultant influence of this interaction on behaviour (Goldstein, 1994).

Psychosomatic:

Relating to or involving both the mind and body: usually applied to illnesses that are caused by the interaction of mental and physical factors (Oxford Medical Dictionary, 2007).

Puberty:

Refers to the time at which the onset of sexual maturity occurs and the reproductive organs become functional (Goldstein, 1994).

Risk factor:

Characteristics (e.g. age, ethnicity, gender) or variables (e.g. smoking, depression, exam stress and anxiety) associated with increased probability of a toxic or adverse health effect (Karwowski and Marras, 1999).

Scoliosis:

A lateral deviation of the vertebral column caused by congenital or acquired abnormalities of the vertebrae, muscles and nerves (Oxford Medical Dictionary, 2007).

Socio-economic status:

Socio-economic status is defined by occupation, level of income or level of education (Adler and Ostrove, 1999).

Spinal stenosis:

Refers to a narrowing of the vertebral foramen in one or more vertebrae (Moore, Dalley and Agur, 2006).

Spondylolisthesis:

A forward shift of one vertebra upon another, due to a defect in the bone or in the joints that normally bind them together. This may be congenital or develop after injury. This vertebral displacement is most likely to occur in the lumbar (low back) or cervical (neck) regions of the backbone (Oxford Medical Dictionary, 2007).

Spondylolysis:

A bony defect in a vertebra between the lamina and the transverse process, thought to be due to a stress fracture (Oxford Medical Dictionary, 2007).

Stratified random sampling:

Stratified random sampling is the process by which a sample is constrained to include the various elements from each of the segments (Cooper and Schindler, 2003).

Stress:

Stress has been defined as the body's reaction to a change that requires a physical, mental or emotional adjustment or response (Lazarus and Folkman, 1984).

ABBREVIATIONS USED IN THIS STUDY

n	**=**	**Number**
n1	**=**	**Number of schools**
n2	**=**	**Number of learners**
%	**=**	**Percentage**
DUT	**=**	**Durban University of Technology**
ANOVA	**=**	**Analysis of Variance**
IVD	**=**	**Intervertebral Disc**
LBP	**=**	**Low Back Pain**
Ln	**=**	**Natural log**
***P* value**	**=**	**The probability of your results being due to chance or random error. If the p value is very small, one can conclude that the results are significant (Hicks, 2004).**
SD	**=**	**Standard deviation**
SADAG	**=**	**South African Depression and Anxiety Group**
WHO	**=**	**World Health Organisation**

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CHAPTER ONE

INTRODUCTION

A healthy functioning has been described as a mixture of social, mental and physical states (Morken, Riise, Moen, Hauge, Holien, Langedrag, Pedersen, Saue, Seljebo and Thoppil, 2003). This chapter provides the background of the study and attempts to create a context by providing details regarding the problem statement, aim, objectives and significance of the study.

1.1 BACKGROUND TO THE PROBLEM

Low back pain (LBP) is the most prevalent musculoskeletal condition experienced by human beings and the most common cause of disability in developed nations (Deyo and Phillips, 1996; Brooks, 2006). According to Manga, Douglas and Swan (1993), the World Health Organization describes LBP as an epidemic, which can be mediated by multidisciplinary management, including chiropractic interventions.

Recently, LBP amongst children and adolescents has become the focus of many researchers (Harreby, Nygaard, Jessen, Larson, Storr-Paulsen, Lindahl, Fisker and Laegaard, 1995; Balague*,* Troussier and Salminem, 1999; Feldman*,* Shrier, Rossignol and Abenhaim, 2001). Various studies in different countries have shown that the prevalence of LBP in these age groups can be as high as 70% (Watson, Papageorgiou, Jones, Taylor, Symmons, Silman and Macfarlane, 2003). This is consistent with a previous study by Troussier, Davoine, De Gaudemaris, Fauconnier and Phelip (1994), where 1178 school children were surveyed and back pain was found to be cumulatively prevalent in more than 50% of these children. This is thought to be due to partial skeletal maturity, resulting in a susceptibility to injuries (e.g. during sporting activities) and development anomalies, including scoliosis, spondylolisthesis and spondyloysis (Ralph, Martin, Herman, Emilie, Cheung, Peter and Pizzutillo, 2006).

Balague *et al.* (1999) reported that the incidence of LBP increases with age such that the lifetime prevalence of LBP amongst adolescents is very similar to that of the adult population. Hence, studying and understanding adolescent LBP is of particular

importance because LBP may occur initially during this time, but may then lead to subsequent severe and chronic morbidity in adulthood (Olsen, Anderson, Dearwater, Kriska, Cauley, Aaron and LaPorte, 1992; Louw, Morris and Grimmer-Somers, 2007).

This was demonstrated in a study by Harreby *et al*. (1995) where a sample of Danish adolescents were assessed for LBP and a follow-up assessment was conducted 25 years later. The results showed that those subjects who had suffered from LBP during adolescence had a significantly higher prevalence of LBP, a higher number of hospital admissions and a decreased work capacity due to the LBP when surveyed 25 years later as adults. The result of this study suggests that there is a positive correlation between the history of LBP during adolescence and the presence of LBP as an adult. Thus, it is important to investigate the factors that may contribute to adolescent-onset LBP.

Psychosocial factors, involving aspects of social and psychological behaviour, have previously been documented as potential risk factors in the development of adult LBP (Gatchel, Polatin and Mayer, 1995; Dempsey, Buckle and Vlachonikolis, 1999; Power, Frank, Hertzmann, Schierhout and Li, 2001; Van Vuuren, Zinzen, Van Heerden, Becker and Meeusen, 2005; Clays, De Bacquer, Leynen, Kornitzer, France and De Backer, 2007). A noteworthy study in this regard was done by Papageorgiou, Macfarlane, Thomas, Croft, Jayson and Silman (1997), in which adults, who were initially free of LBP, demonstrated that both work-related psychosocial factors and psychological distress were associated with the development of LBP over a 12 month period.

Studies on children and adolescents regarding the association between psychosocial factors and LBP were consistent with the findings of the various authors (Balague, Skovron, Nordin, Dutoit and Waldburger, 1995; Bejia, Abid, Salem, Letaief, Younes, Touzi and Bergaoui, 2004; Murphy, Buckle and Stubbs, 2006). Jones, Watson, Silman, Symmons and Macfarlane (2003) investigated the role of mechanical and psychosocial factors in the development of LBP amongst 1046 schoolchildren aged 11 to 14 years who were identified as being free of LBP. The results showed that children with high levels of psychosocial difficulties were more likely to develop LBP. In contrast, no

association was found between the role of mechanical factors and the development of LBP.

Similarly, another study conducted by Watson *et al.* (2003) showed that psychosocial rather than mechanical factors were more important in the prevalence of LBP amongst children and adolescents. However, more research is required to fully understand the nature of this relationship (Murphy *et al.*, 2006).

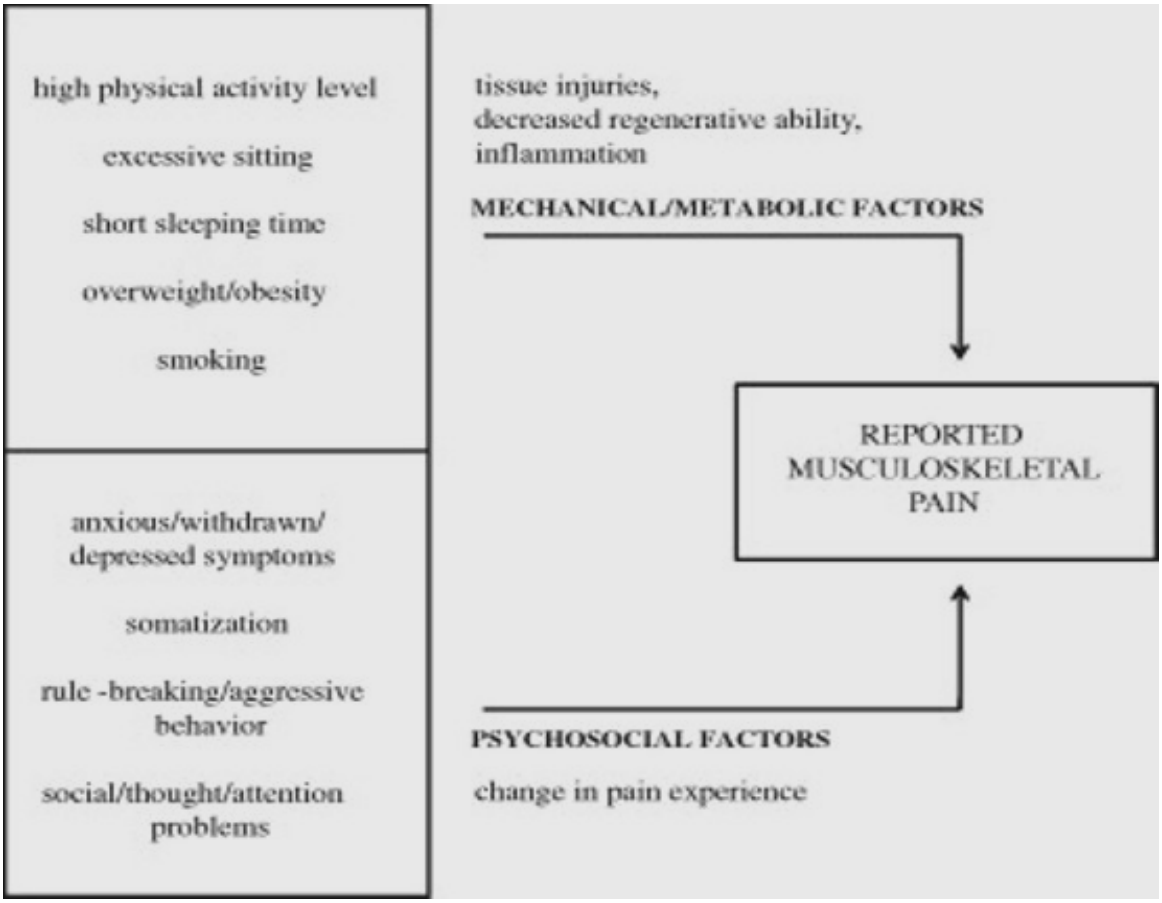

Figure 1.1: Conceptual model for reported musculoskeletal pains in adolescence (adopted from Paananen *et al*., 2009)

Various studies have indicated an association between adolescent psychosocial risk factors and the occurrence of low back pain (Balague *et al.,* 1995; Leboeuf-Yde, Wedderkopp, Anderson, Froberg and Hansen, 2002; Murphy *et al*., 2006). Psychosocial risk factors for adolescent LBP including exam stress and anxiety, depression, socio-

economic status, family history, smoking, alcohol and recreational drug use that have not previously been explored in South Africa, will be investigated in this study:-

- **Exam stress and anxiety**

Grade 12 is the final year of secondary education in South Africa and represents the culmination of a student's schooling career. This period in an adolescent's academic and social development has been described as a very stressful and uncertain time due to the emphasis placed on achieving good results as well as the pressure of deciding and formalizing future plans (Van Der Linde, 2005). Bester and Swanepoel (2000) have shown that stress amongst Grade 12 learners was substantially greater than the stress experienced by students in the lower grades.

One of the major consequences of stress is that it has a negative impact on a person's health (Notaro, Susan, Gelman and Zimmerman, 2001). Studies have shown that psychosocial factors such as stress and anxiety play a role in the onset of various pain conditions including low back pain (Hoogendoorn, Van Poppel, Bongers, Koes and Bouter, 2000; Sharrer and Ryan-Wegner, 2002).

- **Depression**

Past research (Leino and Magni, 1993; Simon and Van Korff, 1996; Carroll, 2004) has indicated that depression could be high amongst Grade 12 learners especially around the time of their final examination due to their fear of failure and feelings of hopelessness (South African Press Association {SAPA}, 2004). Students feel the pressure from their family, friends and teachers to achieve exceptional results (Stowell, 2003). This emotional turmoil is exacerbated by the exams critical effect on lifelong career options (Botha, 2005). According to Simon and Van Korff (1996), pain is strongly associated with anxiety and depression. The pain-depression co-morbidity that exists supports the correlation that psychological distress amplifies physical sensations including pain (Melzack, 2001).

- **Socio-economic status**

The association between poor socio-economic status and the incidence of low back pain has been recognized internationally (Kristjansdottir, 1996; Leboeuf-Yde *et al.,* 2002). Socio-economic status, as defined by occupation, level of income or level of education has been found to be a powerful predictor of health in adults (Adler and Ostrove, 1999).

The level of education attained by an individual has been found to govern health-related behaviour, attitudes and outcomes (Adler and Ostrove, 1999; Leboeuf-Yde *et al.,* 2002; Chen, Martin and Mathews, 2006). Education may also facilitate the efficient use of medical services including earlier care, demand for better services or higher levels of compliance in procedures (Holstein, Ito and Due, 1990). Adolescents are dependent on their parents for their basic health care (Ferguson and Shears, 2007). Therefore, it has been shown that children from homes with lower parental education are more likely to report increased levels of back pain than children with higher parental education (Leboeuf-Yde *et al.,* 2002).

- **Family History**

In a review of existing information on LBP amongst children and adolescents, Balague *et al*., (1999) found a significant association between parents' LBP and that of their children. Salminem (1984) showed that children with at least one parent complaining of back pain reported pain twice as often as other children. Further to the above study, Gunzburg, Balague, Nordin, Szpalski, Duyck, Bull and Melot (1999) found that a significantly higher number of children with LBP reported that at least one parent had either complained or suffered from LBP than those without LBP.

- **Smoking, Alcohol abuse and Recreational drugs**

Adolescence has been described as a period of exploration, opportunity and risk (Department of Health SA, 2002). The United States Department of Human and Health Services (1994) describes peer pressure as the primary reason as to why adolescents are at a much greater risk than adults to smoke and experiment with other substances, including alcohol and recreational drugs.

In adults, smoking has been found to be one of the major confounding factors in LBP (Gunzburg *et al.,* 1999). Recently, the increasing prevalence of smoking amongst adolescents has been found to be strongly associated with adolescent LBP (Gunzburg *et al*., 1999; Feldman *et al.,* 2001). It has been shown in a study by Hestbaek, Leboeuf-Yde and Kyvik (2006a) that smokers have a 1.5 to 2.5 time's greater risk of developing low back pain than non-smokers. It is thought this may be due to reduced oxygen supply to discs and decreased blood oxygen from the effects of nicotine on constriction of the arteries. In addition, Gorman, Potamianos, Williams, Frank, Duffy and Peters (1986) and Hestbaek *et al.* (2006a) indicated similar findings with regards to alcohol and illicit drug use and the association with low back pain.

Theorell, Nordemar and Michelson (1993) hypothesized that long-term elevated levels of cortisol may make muscles more vulnerable to mechanical loads. This does raise the possibility that the excess or deficiency of other chemicals in the muscles and nerves may lead to the same effect. Recreational drugs contain a cocktail of harmful chemical substances (Lubman, Hides, Yucel and Toumbourou, 2007). It is therefore plausible that toxins from recreational drugs could contribute to low back pain.

This study will attempt to assess and quantify the problem of LBP experienced in adolescents within the South African context. A further attempt will be made to determine the role of psychosocial factors on the prevalence of low back pain amongst Grade 12 learners and will conclude by determining the correlation between these psychosocial factors and the prevalence of LBP amongst grade 12 learners.

1.2 AIM OF THE STUDY

The aim of the study is to determine the prevalence of LBP and to identify selected psychosocial risk factors associated with LBP amongst Grade 12 learners in the Greater Durban area.

1.3 OBJECTIVES OF THE STUDY

In order to achieve the aim of the study, three objectives were identified, namely:

Objective 1: To determine the prevalence, frequency, severity and chronicity of LBP amongst Grade 12 learners in the Greater Durban area.

Objective 2: To determine how the selected psychosocial risk factors associate with LBP amongst Grade 12 learners in the Greater Durban area.

Objective 3: To assess the relationship between these selected risk factors and LBP amongst Grade 12 learners in the Greater Durban area.

1.4 SIGNIFICANCE OF THE STUDY

According to Watson *et al*., (2003), the prevalence of non-specific LBP in a British population of adolescents was found to be as high as 70%. In addition, the life-time prevalence of LBP was found to be very similar to that of the adult population (Balague *et al*., 1999). In South Africa, there is a paucity of literature available on the prevalence of LBP in adolescents.

Psychosocial risk factors and their implication on adolescent LBP has been identified internationally (Murphy *et al.,* 2006; Jones *et al*., 2003; Bejia *et al.,* 2004; Watson *et al.,* 2003; Gunzburg *et al.,* 1999; Balague *et al.,*1999; Leboeuf-Yde *et al.,* 2002). However, this relationship has not yet been determined amongst adolescents in a South African population. Therefore, this study aims to identify the selected psychosocial risk factors associated with LBP amongst Grade 12 learners in the Greater Durban area.

Recently, many studies (Olsen *et al.,* 1992; Phelip, 1999; Watson, Papageorgiou, Jones, Taylor, Symmons, Silman and Macfarlane, 2002; Isigkeit, Thyen, Stoven, Schwarzenberger and Schmucker, 2005) have highlighted the consequences of adolescent LBP on the quality of life. Adolescents with LBP reported increased absenteeism, poor concentration and decreased participation in sport activities, inability

to maintain social contacts, sleep disturbances as well as increased use of health services. This pain-related impairment in daily functioning occurs at a critical stage of development in scholars when participation in academic, social and sport activities and the achievement of independent functioning is of great importance. This study will attempt to determine the prevalence, frequency, severity and chronicity of LBP amongst Grade 12 learners in the Greater Durban area in order to highlight the need for the implementation of necessary prevention strategies in South African public schools.

Prevention and health education on LBP should begin before the adolescent enters the work force if it is hoped to decrease the burden of LBP amongst the adult population (Ebbehoj, Hansen, Harreby and Lassen, 2002). The results of this study will help to highlight the problem of adolescent LBP in South Africa, so that necessary health promotion programs can be developed to help adolescents deal with LBP before entering the workforce.

1.5 OVERVIEW OF THE CHAPTERS

In this chapter, the background as well as a context for this study was provided. Chapter two will present a review of the current literature in reference to the psychosocial risk factors being investigated in the context of a Grade 12 learner. Chapter three presents the instruments and methods used in this study. A quantitative, exploratory research design was employed in this study. Chapter four presents the statistical analysis of results together with the outcomes of the objectives outlined in this study. Chapter five includes a discussion of the results and its comparison with the literature. It also summarizes the limitations of the study encountered by the researcher. Finally, the conclusion to this study is presented followed by the recommendations for future investigations relating to this topic.

CHAPTER TWO

PSYCHOSOCIAL ASPECTS OF LOW BACK PAIN

Pain is one of the most powerful experiences in humans (Van Vuuren *et al.,* 2005). Pain is viewed as a complex, multidimensional developmental process in which various psychosocial factors play an important role (Gatchel and Turk, 1996). Back pain has been identified as one of the most common pain manifestations, affecting millions of people worldwide (Manga *et al.,* 1993). Mankind has been suffering from back problems for as long as documented records exist (Langworthy, 1993).

This chapter will review the literature regarding adolescent low back pain (LBP) and will provide an overview of the various psychosocial risk factors under investigation.

2.1 ANATOMY OF THE LOW BACK

In order to understand the pathology of LBP, it is important to recognize the anatomy and physiology of the lumbar spine. Outlined below are the important structures that form part of the low back which are anatomically referred to as the lumbar spine.

2.2.1 The Lumbar Spine

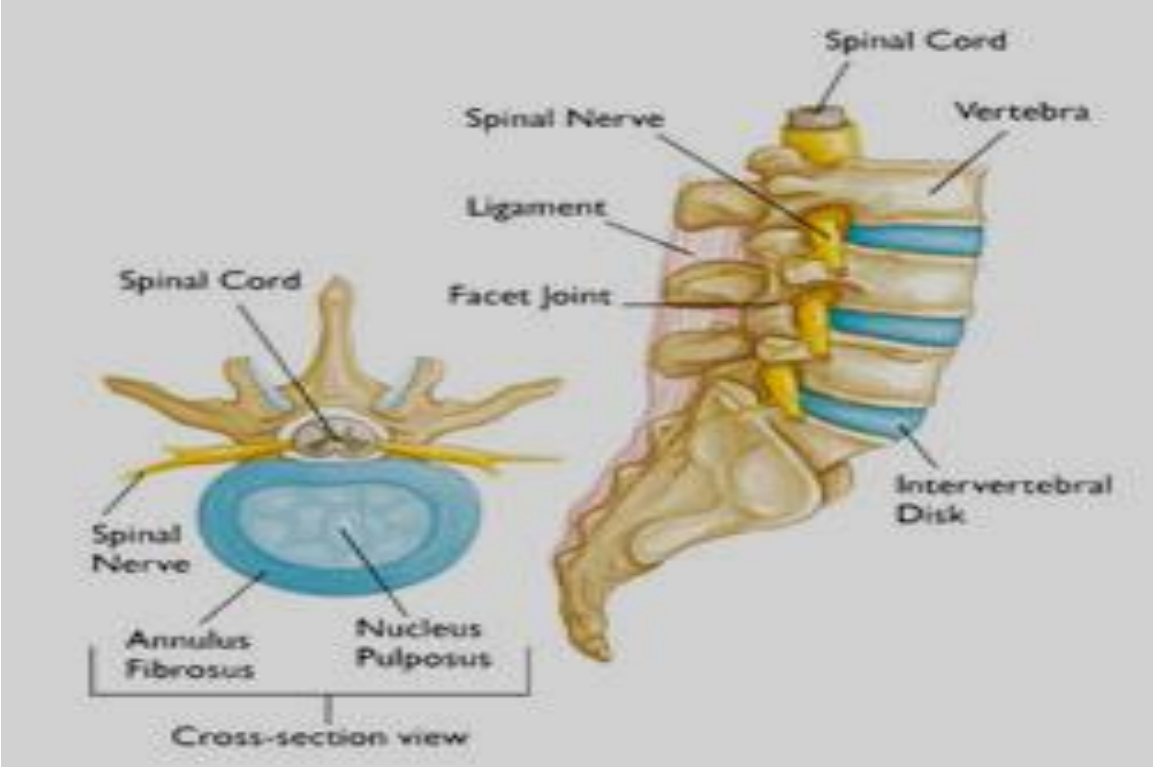

Figure 2.1: The Lumbar Spine (adopted from McMahon, 2007)

2.2.2 Structures forming the Lumbar Spine

The lumbar spine consists of the vertebral column (i.e. five lumbar vertebrae, intervertebral discs and associated ligaments), spinal cord and meninges, skin and subcutaneous tissue, muscles as well as various segmental nerves and vessels (Moore *et al*., 2006) as shown above in Figure 2.1.

a) The Vertebral Column

- *Five Lumbar Vertebrae* – The lumbar vertebrae are in the lower back between the thorax and the sacrum. Each vertebra consists of a vertebral body, vertebral arch and six processes (Moore *et al.,* 2006).
  - i) The lumbar vertebral bodies are much larger as they function to support the weight of the entire upper body.

ii) The vertebral arches collectively house and protect the spinal cord and the spinal nerve roots.

iii) The six processes i.e. one spinous process, one accessory process, two transverse processes and two mammillary processes, extend from the vertebral arch and provide attachment and leverage for muscles or direct movement between vertebrae.

- *Intervertebral Discs* – Intervertebral discs (IVDs) provide strong attachments between the vertebral bodies, uniting them into a continuous semi-rigid column (Moore *et al.,* 2006). They also form the inferior half of the anterior border of the IV (intervertebral) foramen. Their function is to permit movement between the adjacent vertebrae. In addition, their resilient deformability allows them to serve as shock absorbers, thereby minimizing the impact of stress on the spinal column (Gray, 2000). Each IVD consists of an annulus fibrosis, an outer fibrous part composed of concentric lamellae of fibrocartlage and a gelatinous central mass called the nucleus pulposis (Gray, 2000).
- *Ligaments* – Ligaments are the strong fibrous soft tissues that stretch between bones, holding them together (Oxford Medical Dictionary, 2007). Ligaments attach each of the vertebrae and surround each of the discs. They function to control the direction of movement, provide passive resistance and limit movement towards the end of the normal range (Moore *et al.,* 2006).

b) The Spinal Cord and Meninges

- *Spinal Cord* – The spinal cord is the major reflex center and conduction pathway between the body and the brain (Gray, 2000). It is a cylindrical structure that is slightly flattened anteriorly and posteriorly. The spinal cord is protected by the vertebrae, their associated ligaments and muscles, the spinal meninges and the cerebro-spinal fluid (Moore *et al*., 2006). The brain together with the spinal cord forms the central nervous system.
- *The meninges* – The meninges are composed of 3 membranous connective tissue layers (Oxford Medical Dictionary, 2007) i.e. dura mater (tough, thick external fibrous layer), arachnid mater (thin intermediate layer) and the pia mater

(delicate, internal vasculated layer). These membranous layers form an enclosed fluid-filled cavity called the sub-arachnoid space which is vital for the normal functioning of the brain and spinal cord (Moore *et al.,* 2006). They also provide protection and a supporting framework for arteries, veins and venous sinuses.

c) Muscles

According to Moore *et al.* (2006), the lumbar muscles are found in pairs on either side of the vertebral column. They attach to the spinous and transverse processes of the vertebrae. They provide the main stability of the vertebral column and are responsible for flexion, extension and rotation of the low back, the pelvis as well as the lower extremities. There are two major groups of muscles in the back i.e. the extrinsic and intrinsic back muscles (Gray, 2000). The extrinsic back muscles consist of the superficial and intermediate muscles that produce and control limb and respiratory movements respectively. The intrinsic back muscles are the deep muscles that act specifically on the vertebral column to produce its movements and to maintain posture.

d) Nerves

Nerves of the lumbar spine provide sensation and stimulate the muscles and the bony structures of the low back as well as the lower extremities (Gray, 2000). Each nerve exits the spinal column through a bony portal called the intervertebral foramen (Moore *et al*., 2006).

e) Tendons

Tendons attach the muscles to the bones. They aid in concentrating the pull of the muscles on the bones (Oxford Medical Dictionary, 2007).

2.2.3 Injury to the Lumbar Spine

According to McKeown and Twiss (2001), all the structures that form the lumbar spine are susceptible to injury, inflammation or irritation resulting in the symptom of pain and associated discomfort. Their studies have indicated that injuries to the soft tissues i.e.

muscles, tendons and ligaments are potentially responsible for the majority of the back injuries reported.

Furthermore, they state that these structures are more susceptible to injury when exposed to risk factors such as twisting, stretching, prolonged sitting and heavy physical work. Exposure to these risk factors can lead to a sprain, strain or spasm in any of the back muscles or the ligaments (McKeown and Twiss, 2001). If the spine becomes overly strained or compressed, a disc may rupture or bulge outward. This rupture may exert pressure on the nerves arising from the spinal cord. These nerves are responsible for controlling body movements and transmitting signals from the body to the brain (Latash, 2008). Compression or irritation to any of these nerve roots may result in back pain (Kirkaldy-Willis and Bernard, 1999).

2.2 HISTORICAL DEVELOPMENT OF THE UNDERSTANDING OF PAIN

The dominant medical belief of the early 20th century was that pain occurred as a direct result of tissue damage (Gamsa, 1994). No consideration was given to the psychological and psychiatric dimensions of pain (Innes, 2005). By the late 1950's, this school of thought started to change and acceptance emerged to support the notion that sensory explanations could not account for certain inexplicable pain phenomena e.g. pain relief from placebo interventions and phantom limb pain. Furthermore, Innes (2005) indicated that by the mid-20th century, several theories were developed which postulated that the experience of pain could be attributed to other causative factors and was not assigned to sensory input alone.

2.2.1 Theories of pain

2.2.1.1 The Specificity Theory

The specificity theory of pain, highlighted by Descartes in 1664, as cited in Melzack and Wall (1965), suggests that pain is caused by injury or damage to body tissue. The damaged nerve fibers in the body carry messages directly to the pain centre in the brain which in turn invoke the pain sensations (Adams and Bromley, 1998). This theory proposes that a strong link exists between pain and injury and that the severity of the

injury determines the amount of pain experienced by the individual (Brannon and Feist, 2000).

2.2.1.2 The Pattern Theory

The Pattern Theory of pain was developed by Von Frey and Goldstein in the 19th Century (Korn and Johnson, 1983). This theory was incorporated into the Specificity Theory which included more concepts to explain pain. The Pattern Theory states that the nerves that carry pain signals can also transmit sensations of cold, warmth and pressure if an injury or damage to the body occurred (Adams and Bromley, 1998). As a result, this theory postulates that pain is felt as a consequence of excessive stimulation (McCance and Huether, 1990).

Both the Specificity and Pattern Theories were part of a linear model of pain and did not explain any psychological aspects involved in the pain experience (Adams and Bromley, 1998).

2.2.1.3 The Gate Control Theory

The Gate Control Theory was proposed by Melzack and Wall (1965). This is a biopsychosocial theory that combined the medical approaches of the previous two theories (Specificity and Pattern Theories) with the psychological and social factors that contribute to pain (Brannon and Feist, 2000). The Gate Control Theory suggests that a gate mechanism exists in the spinal cord with the ability to control the passage of pain messages (Melzack and Wall, 1965). The degree to which the gate opens and closes depends on messages coming from the injured site and from the brain (Gamsa, 1994; Brannon and Feist, 2000). Table 2.1 highlights common factors that are known to open and close this gate (Gamsa, 1994) and Figure 2.2 diagrammatically illustrates the Gate Control Theory:

Table 2.1: Opening and closing factors in the Gate Control Theory

OPENERS	CLOSERS
Physical conditions: • Extent of injury • Physical stimulation e.g. rubbing	Physical conditions: • Medication • Counter stimulation e.g. massage
Emotional conditions: • Anxiety • Depression	Emotional conditions: • Positive emotions • Relaxation
Mental conditions • Focusing on pain • Boredom	Mental conditions: • Concentration • Distraction (hobby)

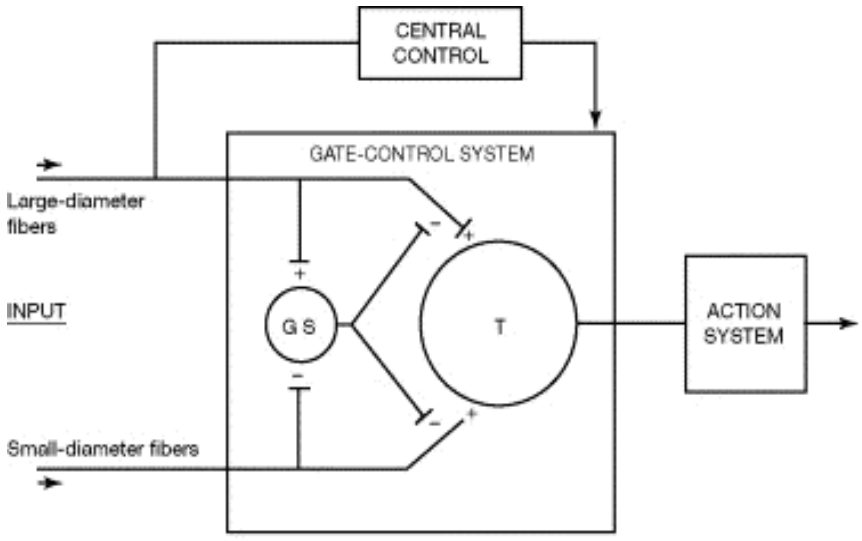

Figure 2.2: The gate control theory of pain as suggested by Melzack and Wall in 1965 (adopted from Calvino and Grilo, 2006)

The same principles as described in the Gate Control Theory can be applied to LBP. The muscles, ligaments, vertebrae, intervertebral discs, facet joints and their joint capsule in the lumbar region contain nerve endings that detect pain (Leone, Guflielmi, Cassar-Pullicino and Bonomo, 2007). Any form of physical stress (injury, irritation, inflammation or malfunctioning due to altered mechanics) to these structures results in a pain message. This message is transmitted by the peripheral nerves to the spinal cord and the brain (Wheeler and Murrey, 2002) and is interpreted as the pain sensation. Treatment administered to the patient produces signals which override the pain message (Wheeler and Murrey, 2002).

2.2.1.4 The Neuromatrix Theory

According to Melzack (2001), the Neuromatrix Theory of pain is based on the premise that pain is multidimensional.

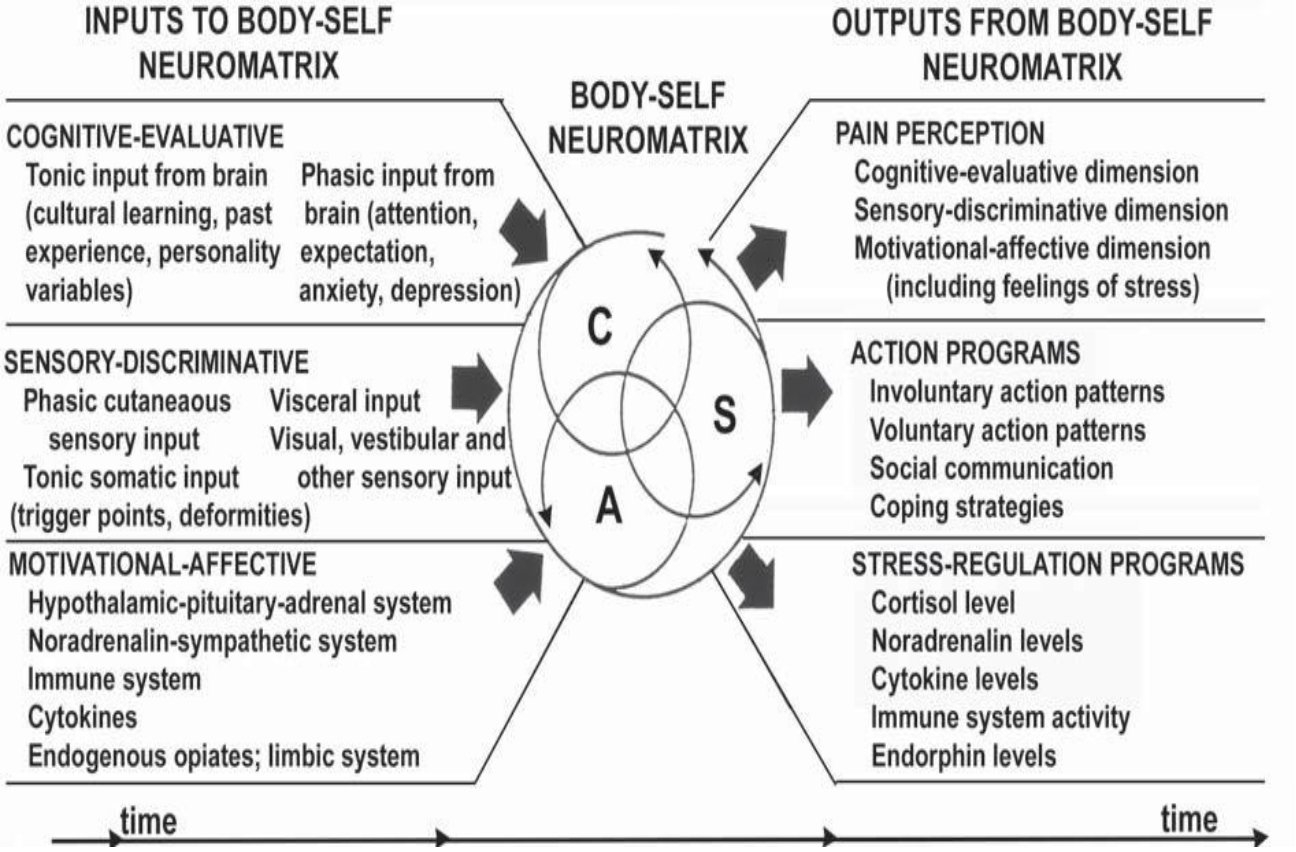

Figure 2.3: Factors that contribute to the patterns of activity generated by the body-self neuromatrix (adopted from Melzack, 2001)

This theory of pain stipulates that various body systems such as the sensory nervous system, the brain, the stress-regulatory system (endocrine, immune, autonomic and opioid systems) as well as genetic characteristics of an individual all combine to influence the pain experience.

Therefore, with regard to LBP, the Neuromatrix Theory states that there is a correlation between LBP and stress. The presence of stress negatively impacts on the treatment of LBP and the patient's subsequent recovery (Dewitt, 2006). This supports the rationale that a vital component for the successful treatment of low back pain is a reduction of stress (Mounce, 2002).

2.2.2 Theoretical Approach of the study

This study utilizes the principles of the Neuromatrix Theory in the understanding of adolescent LBP. The Neuromatrix Theory postulates that biopsychosocial factors play a role in the occurrence of LBP. However, for the purpose of the objectives outlined in this study, the focus will only concentrate on the psychosocial factors associated with LBP.

2.3 DEFINING LBP

LBP is defined as a 'pain of variable duration' (Ehrlich, 2003:671), 'localized in the area below the line of the twelfth rib and above the inferior gluteal folds, with or without leg pain' (Woolf and Pfleger, 2003:652). According to Krismer and Van Tulder (2007), LBP can be classified as either 'specific' (suspected pathological cause) or 'non-specific' (about 90% of cases). Back pain is usually defined as acute if it lasts less than six weeks, sub-acute if it lasts between six weeks and three months and chronic when it lasts for more than three months (Krismer and Van Tulder, 2007). Frequent episodes are described as recurrent back pain (Burton, Kim, Waddell, Tillotson, Malcolm and Summerton, 1999).

2.4 INCIDENCE AND PREVALENCE OF LBP

LBP is the most common and significant musculoskeletal condition (Borenstein, Wiesel and Boden, 1995; Deyo and Phillips, 1996; Ehrlich, 2003; Woolf and Pfleger, 2003, Jones *et al*., 2003; Louw *et al.,* 2007) due to its important medical and economic

implications (Frymoyer and Cats-Baril, 1991; Dept of Health, 2005; Jacob, 2006). The prevalence of LBP varies based on the 'definitions used and the population studied' (Woolf and Pfleger, 2003:646). According to Crook, Milner, Schultz and Stringer (2002), LBP has a lifetime prevalence of 60-90% and an annual incidence of 5%. Approximately 12-30% of adults have LBP at any given time (Krismer and Van Tulder, 2007).

South African statistics indicate that LBP is one of the most commonly treated conditions by physiotherapists in South Africa (Dept of Health, 2005). Approximately 80% of the South African workforce suffers from severe discomfort and disability due to LBP and its associated problems (Dept of Health, 2005). In 1997, a South African study by Van Der Meulen (1997) found the lifetime incidence rate of LBP amongst Black South Africans to be 57.7%. A further study by Docrat (1999), found the lifetime incidence rate of LBP to be 78.2% amongst the Indian population and 76.6% amongst the Coloured population.

2.5 SOCIO-ECONOMIC BURDEN OF LBP

LBP poses a major burden to society as it contributes to a substantial number of morbidity and disability statistics as well as economic loss (Frymoyer and Cats-Baril, 1991; Dept of Health, 2005; Jacob, 2006). In the United States, next to the common cold, LBP is the second most common reason for physician visits and work absenteeism (Deyo and Phillips, 1996; Mohseni-Bandpei, Stephenson and Richardson, 1998). Ehrlich (2003) has identified LBP as the leading cause of disability in Americans less than 45 years of age (Deyo and Phillips, 1996; Biondi, 2009) and the third leading cause of disability for all ages (Biondi, 2009).

Van Tulder, Koes and Bouter (1995) have mentioned that the impact of LBP on society is usually estimated by examining the overall costs involved. These costs can either be classified as direct or indirect costs. The direct cost of LBP includes the medical costs incurred in the treatment of LBP (Maniadakis and Gray, 2000). A study in the United Kingdom estimated that the total direct cost of LBP in 1998 amounted to approximately 1.6 billion pounds (Maniadakis and Gray, 2000). Another study in the Netherlands (Van Tulder *et al.,* 1995) estimated that the total direct cost of LBP in 1991 amounted to approximately 367.6 million US dollars.

The indirect cost of LBP refers to the number of work days lost (Krismer and Van Tulder, 2007) and its associated implication on the loss of productivity, (Jordaan, Kruger, Stewart and Becker, 2005; Diamond, Fellow and Borenstein, 2006) the impact on insurance costs (Kent and Keating, 2005) and compensation claims (Deyo, Cherkin, Conrad and Volinn, 1991). A 1998 health interview survey of approximately 30,074 people carried out in the USA, showed that LBP accounted for approximately 149 million lost work days annually (Hashemi, Webster and Clancy, 1998). This translated into an annual productivity loss of 28 billion dollars (Hashemi *et al.,* 1998).

2.6 PSYCHOSOCIAL FACTORS IN LBP

The term 'psychosocial' refers to the interaction between the individual and the social environment, and the resultant influence of this interaction on behaviour (Goldstein, 1994). The social environment includes family members, friends, colleagues, employers, educators and health professionals. Any interaction with these individuals may influence behaviour, levels of distress, attitudes, beliefs and experiences of pain. There is an increasing interest and acceptance of psychosocial factors and their correlation to subjective pain experiences (Innes, 2005).

Psychosocial factors have previously been documented as potential risk factors in the development of LBP amongst adults (Gatchel *et al*, 1995; Dempsey *et al.,* 1999; Power *et al.,* 2001; Van Vuuren *et al.,* 2005; Clays *et al.,* 2007) and adolescents (Olsen *et al.,* 1992; Balague *et al.,* 1995; Leboeuf-Yde *et al*., 2002; Jones *et al.,* 2003; Murphy *et al*., 2006). Limited information exists on the role of these psychosocial risk factors in the prevalence of LBP amongst South African Grade 12 learners. Hence, this study will attempt to provide valuable information regarding the correlation between psychosocial risk factors and adolescent LBP.

2.7 ADOLESCENCE

Adolescence is the transition period from childhood to adulthood and is characterized by numerous developmental changes (Jordaan *et al.*, 2005). Adolescence begins with the onset of puberty and extends into adulthood, usually encompassing the ages of 12 to 20

years (Louw *et al.,* 2007). Erikson (as cited in Bee and Bjorklund, 2000) indicated that the development of the individual identity was one of the key psychosocial developmental processes in this phase. The failure in identity formation could result in the adolescent being left with a sense of confusion in terms of the self.

Adolescence has been described as one of the most complex and challenging phases of life (Theron and Dalzell, 2006). This developmental phase is characterized by gradual biological, physical, cognitive and psychological changes which have major implications on an adolescent's transition from childhood to adulthood (Berger, 2003). All adolescents have to endure the same developmental challenges and overcoming these challenges successfully can be both difficult and stressful (Mwamwenda, 1996; Gouws, Kruger and Berger, 2000). The period of adolescence is therefore considered a time of increased vulnerability, as the significant changes and complexities that characterize the adolescent in each of the stages of development may interfere with adolescent wellness (Gouws *et al.,* 2000).

One of the major findings in adolescent wellness is the prevalence of LBP (Phelip, 1999). Various studies conducted in numerous countries such as United States of America (Olsen *et al.,* 1992), Tunisia (Bejia *et al*., 2004), Kuwait (Shehab and Al-Jarallah, 2003), Spain (Kovacs *et al*., 2003), Britain (Jones *et al*., 2003), Sweden (Sjolie, 2002), Canada (Feldman *et al*., 2001), Denmark (Harreby, Nygaard, Jessen, Larson, Storr-Paulsen, Lindahl, Fisker and Laegaard, 1999), Belgium (Gunzburg *et al.,* 1999) and Switzerland (Balague *et al*., 1995) have reported prevalence rates of 21-74% of LBP amongst adolescents.

2.8 AETIOLOGY OF LBP AMONGST ADOLESCENTS

Many researchers (Balague, Nordin, Skovron, Dutoit, Yee and Waldburger, 1994; Harreby *et al*., 1999; Ebbehoj *et al*., 2002; Sjolie, 2002; Watson *et al*., 2002; Jones *et al*., 2003) have explored the causes of LBP amongst adolescents. Risk factors investigated included demographic factors, physical factors and psychosocial factors. The majority of researchers (Balague *et al*., 1995; Watson *et al.,* 2003; Bejia *et al.,* 2004; El-Metwally *et al*., 2004; Hestbaek *et al.,* 2006a; Murphy *et al*., 2006) have concluded that more

research is required to fully understand the role of psychosocial risk factors on the prevalence of low back pain amongst adolescents.

2.9 PSYCHOSOCIAL FACTORS UNDER INVESTIGATION

Recent support has emerged for the notion that psychological factors play an important role in the experience of pain (Gatchel *et al.,* 1995; Clays *et al.*, 2007). This has resulted in pain clinicians incorporating psychological assessment methods as part of the process of multidisciplinary pain evaluation and treatment (Keefe, Rumble, Scipio, Giordano and Perri, 2004).

The way in which psychosocial factors cause LBP includes the affect of emotional disturbances on the autonomic nervous system. When individuals are under threat, the body experiences the fight or flight response i.e. it prepares the person to either stand and do battle or to run away (Goldstein, 1994). The main physiological change is the release of adrenalin which provides the energy to act. If the perceived difficulty is not physical but psychological e.g. depression, anxiety, tension, fatigue, stress, fear or resentment (Kirkaldy-Willis and Bernard, 1999), then the adrenaline is not used up. This may result in the individual experiencing any one of the following reactions including increased muscle tension, increased breathing rate, increased heart rate or increased alertness to touch or sound.

An increase in muscle tension results in areas of vaso-constriction in the muscles which in turn impairs local circulation (Nahit, Hunt, Lunt and Dunn, 2003). This may result in the formation of myofascial trigger points in the affected muscles, which coupled with restricted movement that is commonly found in Grade 12 learners when sitting and studying for prolonged periods of time, results in an exacerbation of physical pain and discomfort. Nahit *et al*., (2003), found that the most common areas affected by this phenomenon includes the neck and shoulders, arms, legs and low back

For the purpose of this study, eight psychosocial risk factors have been identified and selected as being relevant amongst Grade 12 learners in the Greater Durban area. The factors under investigation include exam stress and anxiety, depression, socio-economic status, smoking, alcohol abuse, recreational drug use and family history.

2.9.1 Exam stress and anxiety

Stress has been defined as the body's reaction to a change that requires a physical, mental or emotional adjustment or response (Lazarus and Folkman, 1984). Stress can arise from any thought or situation that makes an individual feel frustrated, angry, nervous or anxious. Anxiety 'is characterized by a diffuse, unpleasant, vague sense of apprehension, often accompanied by autonomic symptoms, such as headache, perspiration, palpitations, tightness in the chest and mild stomach discomfort' (Kaplan and Sadock, 1996:189). Individuals who are anxious often feel restless and are unable to sit still for extended periods of time (Kaplan and Sadock, 1996).

The Grade 12 year, commonly referred to as 'matric', is the final year of secondary education in South Africa and represents the culmination of a student's schooling career. This period in an adolescent's life is described as a very stressful and uncertain time due to the emphasis placed on achieving good results as well as the pressure of deciding and formalizing future plans (David, 2005).

The Grade 12 final examination is regarded as the most decisive examination most individuals will encounter (Crowther, 1997). The result of this examination is an important academic milestone for two main reasons. Firstly, the results determine eligibility for joining the workforce and secondly, the results determine eligibility for access to tertiary education. Therefore, the period leading up to this examination is often fraught with stress, panic and anxiety (Francis, 1979).

The outcome of this final examination represents the end of 12 years of studies. Various expectations are placed on the learners by their parents, educators, colleagues and fellow peers. These expectations exacerbate the intense pressure, nervousness and stress experienced by the Grade 12 learner. The pressure manifests itself during preparation, writing and awaiting the final results of the examination. This may result in a feeling of hopelessness and dejection among learners who do not perform as expected (SAPA, 2006).

Bester and Swanepoel (2000) conducted a study to determine the nature of stress amongst adolescents in a learning situation. Accordingly, a sample of 286 learners from

Grade 8 to Grade 12 was surveyed. It was found that the general nature of stress in a learning situation correlated to an inability to cope and feelings of hopelessness. This study also revealed that the average stress level was the highest for Grade 12 learners and differed significantly from the stress levels for Grade 8 to Grade 11 learners.

According to Conway (2004), the completion of Grade 12 represents a challenging and stressful time for an adolescent as it implies a transition from the controlled environment of school and family to an environment in which they are expected to accept personal responsibility for both the academic and social aspects of their lives. Furthermore, (Conway, 2004) states that the adolescent is required to make major life decisions at this time and pressure exists to ensure the appropriate decision due to the far reaching impact. It is this leap into the unknown that is likely to contribute to a great deal of anxiety and distress for a Grade 12 learner.

Notaro *et al*. (2001) suggested 2 major consequences of stress i.e. physical and mental (psychological). In the 1930s, Canon (1935) and Selye (1936) studied the physical consequences of stress. They found that it took the form of various psychosomatic symptoms including headaches, stomach aches, neck pain and/or dizziness (Canon, 1935 and Selye, 1936).

Lazarus (1966) was the first person to investigate the psychological consequences of stress which included fear, anxiety, tension and restlessness. Brobeck, Marklund, Haraldsson and Berntsson (2007), conducted a study to determine how pupils experienced stress in everyday life. One of the major findings was that adolescents found it extremely stressful when attempting to produce satisfactory results, and when lagging behind their class mates in terms of school work. These experiences of stress may result in the adolescents feeling inferior in comparison to their classmates.

In the same study by Brobeck *et al.,* (2007) a further significant source of stress occurred when the subjects had too much to do and too much to think about at the same time. Gillander-Gadin and Hammarstrom (2000) demonstrated that stress in children arose from intense pressure to achieve good results. In another study, Torsheim and Wold (2001) found a linear correlation between the level of secondary education and the

level of stress. Similarly, Danielsson (2006) found that in both boys and girls, stress related to schoolwork increased linearly with age.

Brobeck *et al.* (2007) further investigated both the physical and mental consequences of stress in children. The physical consequences of stress manifested as stomach pain, headaches and dizziness. In addition, subjects also described diffuse symptoms such as butterflies in the stomach, tingling sensations in the body and a pounding heart. The psychological consequences of stress were described by the subjects as feelings of sadness, nervousness, resentment and anger. The subjects further explained that they had difficulty thinking clearly and lacked concentration when subjected to stress.

After an extensive literature search, limited information was found on the direct affects of exam stress and anxiety on the prevalence of low back pain amongst Grade 12 learners in South Africa. This study will attempt to provide details in this regard.

2.9.2 Depression

Depression is defined as a common mental disorder that is characterized by an unhappy mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy and poor concentration (WHO, 2001). It has been found that the lifetime prevalence of depression amongst adolescents is very similar to that of adults, varying between15% to 20% (Birmaher, Ryan and Williamson, 1996; Goodman and Capitman, 2000). Reports indicate that approximately 10% of the general American population is depressed and more than 20% of the American adolescent population displays major symptoms of depression (Cooper, 1996).

It has been reported that there is an increase in the prevalence of depression amongst the 15-19 year old age group (Goodman and Capitman, 2000; Medifile, 2004). It is predicted that by the year 2020, depression will be the second most common factor resulting in death worldwide (Medifile, 2004).

McLean (2003) conducted a study to determine the prevalence and factors that influenced the development of adolescent depression in the greater Johannesburg area. Three hundred and eighty five (385) adolescents from Grade 11 participated in this

study. The results indicated that approximately 38% of the total number of adolescents surveyed experienced mild to severe symptoms of depression, and that negative family and peer relationships expressed the strongest correlation to depression.

The greatest danger associated with adolescent depression is the possibility of suicide (Ladikos, 2003). Suicidal thoughts and behaviours arise from the overwhelming feelings of hopelessness that are very common amongst depressed people (Cooper 1996). The high prevalence of suicide is exacerbated by the fact that only a small portion of depressed adolescents have their illness recognized (Ladikos, 2003).

The World Health Organisation estimates that there are over 1 million deaths by suicide each year and that suicide is the 10th leading cause of death amongst children (WHO, 2001). Globally with regards to children, one suicidal death occurs every 40 seconds and a suicide attempt is made at least every 3 seconds (WHO, 2001). These statistics are significant when considered in the context of the correlation between depression and suicide.

In South Africa, a National Youth Risk Behaviour Survey was carried out in 2004, in which more than 14 766 pupils from 20 different schools in each province participated. This survey revealed that more than 1000 pupils made one or more attempts at suicide and more than 1000 pupils had actively planned to commit suicide. In Kwazulu-Natal alone, 26.7% of girls and 21.3% of boys had made a suicide attempt which required medical attention (SAPA, 2006).

One of the major causes of depression and resultant suicide amongst adolescents is the daunting task of writing the Grade 12 matric examination (Botha, 2005). This exam period has been described as a time of gloom, worry and fear leading to thoughts of suicide (Botha, 2005). The main contributing factor highlighted in depression and suicidal thoughts amongst Grade 12 learners was the tremendous stress that the learners have to endure during this critical period. This coupled with intense pressure to perform well in their final examinations resulted in depression and attempts at suicide. Those learners, who were unable to cope and could not take the pressure, ended up taking their own lives (SAPA, 2004).

The South African Depression and Anxiety Group (SADAG), South Africa's largest mental health initiative, reported the highest frequency of calls during the period of the Grade 12 examination (SAPA, 2006). Learners struggle to cope with the pressure associated with the Grade 12 examination. SADAG also reported being inundated with calls primarily after the release of the examination results. According to SADAG, the learners who have performed below expectation contemplate suicide.

With regards to LBP, past research (Leino and Magni, 1993; Magni, Moreschi, Rigatti-Luchini and Merskey, 1994; Simon and Van Korff, 1996; Carroll 2004) has demonstrated a strong correlation between depression and the onset of LBP in adults. Leino and Magni (1993) conducted a study to determine if depressive and distress symptoms were predictors of musculoskeletal morbidity such as LBP and neck-shoulder pain. This study was conducted on 607 employees in a metal industry plant in Finland over a 10 year follow-up period. The study concluded that depressive symptoms predicted future musculoskeletal disorders.

A year later, Magni *et al.* (1994), conducted a study to determine the relationship between depressive symptoms and musculoskeletal pain. Two thousand three hundred and twenty four (2324) subjects were studied to determine whether depression caused pain or whether pain caused depression. The results of this study demonstrated that those subjects who were depressed for a year, were more prone to the development of musculo-skeletal pain in later years.

Carroll (2004) conducted a study at the University of Alberta and the results demonstrated that depression was a risk factor for the onset of both neck and low back pain. A random population of 800 adults was sampled and it was found that those subjects who suffered from depression were four times more likely to develop intense neck and low back pain than those who were not depressed. This shows that the role of depression in the onset of LBP needs to be explored further to full understand the nature of this relationship.

There exists limited literature demonstrating the association between depression and LBP amongst the adolescent population locally and internationally. This study will attempt to provide insight into this relationship.

2.9.3 Socio-economic status

The role of socio-economic factors in morbidity, mortality and disability has developed into a major focus in health research (Punnett, 2006). Socio-economic status, as defined by occupation, level of income or level of education has been found to be a powerful psychosocial predictor of health among adults (Adler and Ostrove, 1999). The importance of socio-economic status has already been demonstrated in many health conditions including obesity, depression, cardio-vascular disease and chronic headache (Kaplan and Manuck, 1999; Punnett, 2006).

Kaila-Kangas, Keskimaki, Notkola, Mutanen, Riihimaki and Leino-Arjas (2006) conducted a study in Finland to determine the socio-economic factors by age and gender involved in severe back morbidity leading to hospitalization. Males and females between the ages of 24 and 65 years were included in the study. The results of this study indicated that poor socio-economic status, determined by level of formal education was cited in those cases of severe back disorders.

With regards to adolescents, studies (Leboeuf-Yde *et al.,* 2002; Chen *et al*., 2006) have demonstrated a significant relationship between a parent's socio-economic status and the health status of their children. Those children whose parents received a lower income have been shown to have reduced access to health care and subsequently, poorer health (Lipowicz, Koziel, Hulanicka and Kowalisko, 2007). The reason cited for this is that adolescents from low income families are unlikely to have health insurance. This results in financial barriers to appropriate health care access (Montgomery, Kiely and Pappas, 1996).

Leboeuf-Yde *et al.* (2002) conducted a study to determine the impact of parents' education level on the incidence of back pain amongst children and adolescents. Four hundred and eighty one (481) children and 325 adolescents from different schools in

Denmark were included in this study and the study demonstrated that those participants from homes with the lowest parental educational level reported more back pain than those from families with higher parental education. This result was similar to that found by Holstein *et al.* (1990), who in a sample of 1600 Danish adolescents, found that back pain was reported in 22% of participants from the lowest parental social group, 18% from the middle social group and 15% from the highest social group.

Kristjansdottir and Rhee (2002) conducted a study in Iceland to determine the risk factors of back pain frequency in schoolchildren. The study examined physical, behavioral and social factors associated with schoolchildren's back pain amongst 2173 Icelandic 11-12 and 15-16 year old schoolchildren. It was found that older subjects reported back pain more frequently than the younger children and those children with lower social support were more likely to experience back pain.

Based on the studies by Ford, Bearman and Moody (1999) and Leboeuf-Yde *et al*. (2002), it can be inferred that those children, whose parents have a higher level of education, have increased access to health information and are therefore in a position to ensure successful prevention of illness and/or disease. Higher levels of education allow access to higher paying jobs, which eradicate the financial barriers to health care and result in better access to health services. In addition, educated parents are more efficient with regards to their use of medical services (Leboeuf-Yde *et al*., 2002), such as seeking medical attention early on, demanding improved health care services and showing a greater compliance to treatment.

In contrast, a study conducted by Sjolie (2002) in Sweden to determine which psychosocial factors correlated to LBP in adolescents, failed to show a positive association between socio-economic status of a parent and adolescent LBP. These findings of Sjolie (2002) were consistent with those of Kristjansdottir (1996) who had also found that social class was not associated with the prevalence of adolescent LBP. These results asserted by both Sjolie (2002) and Kristjansdottir (1996) could be attributed to the relatively mild social differences in those countries.

From an economic point of view, South Africa is regarded as a capitalist society (Adler and Webster, 1995), and is characterised by a strong socio-economic differences between its citizens (Anderson, 2000). Therefore, it can be inferred that socio-economic status is a reliable factor for use in this study as a predictor of LBP amongst adolescents.

In South Africa, limited information exists regarding the association between socio-economic status of individuals and their related health condition. This study will attempt to provide a greater insight into this association, in order for this relationship to be better understood.

2.9.4 Smoking, Alcohol and Recreational Drug Use

Adolescence has been described as a period of exploration, opportunity and risk (Department of Health SA, 2002). Research by Shedler and Block (1990), Cookson (1992) and Jackson and Dickinson (2004) have shown that the consequences of such behaviour can be very dangerous. One such consequence is unhealthy lifestyle choices such as smoking, alcohol and drug use which could potentially translate into a range of chronic diseases later on in life (Nakaishi, 2007).

Smoking, alcohol and drug use amongst adolescents continues to be a significant health problem in all parts of the world (Nkonzo-Mtembu, 1994; Goodman and Capitman, 2000; Brook *et al*, 2004; Faeh, Viswanathan, Chiolero, Warren and Bovet, 2006). During the adolescent phase, the individual faces numerous challenges in the family and peer relationships while searching for their self identity (Erikson as cited in Bee and Bjorklund, 2000). This coupled with the difficult developmental changes that the adolescent has to endure, makes the adolescent vulnerable to the use of narcotics and/or alcohol as a means of escapism from the world of stress and pressure (Woodman, 2003). The use of narcotics at a young age increases the risk of addiction which could potentially lead to numerous health problems (Centre for Disease Control and Prevention, 1997).

Ntomchukwu and Matla (2003) conducted a study in Pietersburg, South Africa to determine illicit drug use, cigarette smoking and alcohol drinking behaviour from a

sample of high school adolescents. Four hundred and thirty five (435) subjects from Grades 9-12 were included in this study. The results of this study indicated that the prevalence of illicit drug use was found to be 19.8%, cigarette smoking to be 10.6% and alcohol consumption to be 39.1% of the sample. The main reasons cited for narcotic use were stress, boredom, tiredness or the availability of these substances at parties.

Alcohol, tobacco and drug use amongst the Kwazulu-Natal youth is not uncommon. Brandt (2002) reported that the substance most commonly used amongst Kwazulu-Natal youth was alcohol. Those youngsters who consumed alcohol were more concentrated in the older age group i.e. mid to late adolescence. Tobacco use was also fairly common among the Kwazulu-Natal youth but to a lesser extent than alcohol use and appeared to be mainly a male phenomenon. Amongst the illicit drugs, cannabis was the most commonly used drug. In addition, the use of solvents has also been reported as fairly common amongst Kwazulu-Natal adolescents.

Research has found that experimentation with cigarette smoking is common amongst adolescents (Covey and Tam, 1990; Johnson, Bottorff, Moffat, Ratner, Shovellar and Lovato, 2003). More than one-quarter of high school students in the United States of America have smoked a cigarette before the age of 13 (Centre for Disease Control and Prevention, 1994). Research has already indicated that smoking is one of the major confounding factors in the development of LBP amongst adults (Boshuizen, Verbeek, Broersen and Weel, 1992; Gunzburg *et al.,* 1999; Palmer, Syddall, Cooper and Coggon, 2003). With regards to adolescents, studies (Harreby *et al.,* 1999, Power *et al.,* 2001, Shehab and Al-Jarallah, 2003) have shown that smoking increased the risk of LBP.

It has been postulated that the relationship between smoking and LBP is attributed to the fact that nicotine found in cigarettes leads to poor blood supply to the muscles, tendons and ligaments (Leino-Arjas, 1998; Quilter, 2000). Restricted blood circulation caused by nicotine results in poor waste removal, causing the accumulation of waste in soft tissues (Pascarelli and Quilter, 1994; Leino-Arjas, 1998; Quilter, 2000) which can lead to the symptoms of pain. If this phenomenon were to occur in the lumbar spine region, LBP will result.

The National Institute on Alcohol Abuse and Alcoholism (1997) has reported that alcohol is the substance most commonly used by adolescents in the United States of America. The use of alcohol is associated with problems in school, motor vehicle accidents, fighting, crime and other serious misbehaviors. The Institute for Social Research at the University of Michigan (1997) has reported that approximately eight out of ten students in the United States of America will have consumed alcohol by the time they reach Grade 12. Of these students, more than 60% will have reached the point of intoxication.

Alcohol is a toxin in the body. According to Campion and Maricic (2003), alcohol decreases calcium absorption and has a direct toxic effect on bone metabolism. Excessive alcohol intake is associated with an increased incidence of osteoporotic fractures (Campion and Maricic, 2003). If these fractures were to occur in the lumbar spine, then severe LBP will result.

Myopathy is the weakness of muscle attributed to the breakdown of muscle tissue (Nicolas, Garcia, Fatjo, Sacanella, Tobias, Badia, Estruch and Fernandez-Sola, 2003). Myopathy due to alcohol use is known as Alcoholic Myopathy (Nicolas *et al*., 2003). Acute alcoholic myopathy can occur suddenly after binge drinking and is usually associated with the sudden onset of muscle pain, swelling and weakness (Guha, 2007). Those patients who use alcohol for many years can develop chronic alcohol myopathy which is characterized by pain and weakness of the limb muscles, the trunk muscles and the girdle muscles (Guha, 2007) which will lead to LBP. The exact way in which alcohol destroys muscle tissue is not yet well understood.

Cortisol is a hormone that is produced naturally in the body (Haslett, Chilvers, Boon and Colledge, 2002) when the body is subjected to various stressors i.e. physical or emotional stressors that affect the body's normal metabolism (Henry, 1993). Recreational drugs contain a cocktail of harmful chemical substances (Lubman *et al.,* 2007). It is therefore plausible that toxins from the use of recreational drugs interfere with the normal metabolism of the body. This, in turn, places significant stress to the body, which subsequently leads to excess cortisol secretion.

Theorell *et al.* (1993) hypothesized that long-term elevated levels of cortisol may make muscles more vulnerable to mechanical loads. Cortisol reduces the use of amino acids for protein formation in muscle cells. Excess cortisol subsequently leads to a progressive loss of protein in the muscle. This results in muscle weakness and atrophy. In addition, cortisol inhibits the proliferation of periosteal cells (Chyun, Kream and Raisz, 1984). Periosteal cells are responsible for the formation of osteoblasts, which stimulates new bone formation (Delany, Jeffrey, Rydziel and Canalis, 1995). Therefore, excess cortisol in the body leads to a loss of bone mass which in turn, makes the bone more susceptible to injury such as fractures.

This study will attempt to determine the relationship that exists between smoking, alcohol and recreational drugs on the prevalence of LBP amongst South African adolescents in the Greater Durban area in order to highlight this ever-growing problem.

2.9.5 Family History

Studies (Salminem, 1984; Gunzburg, Fraser and Fraser, 1990; Balague *et al*., 1994) have demonstrated an association between parental LBP and that of their children. Salminem (1984) demonstrated that children with at least one parent complaining of back pain reported pain twice as often as other children. Balague *et al*. (1994 and 1995) found a significant relationship between parents' history of LBP and that of their children. This study showed that the lifetime prevalence of LBP was 14% amongst those subjects whose parents were healthy, 21% among those who had one parent already treated for LBP and 24% among those whose parents had already been treated for LBP.

In contrast, a study by Sjolie (2002) attempted to determine psychosocial correlations of LBP in adolescents. This study did not find any association between parents and their adolescent children's LBP. These findings were supported by a Canadian study (Feldman, 1998) which similarly found the correlation between parental LBP and that of their children to be inconclusive.

As limited information exists in South Africa with regards to the association between parental LBP and that of their children, this study will attempt to provide valuable information to facilitate a greater understanding of this relationship.

2.10 CONCLUSION

It has been demonstrated that LBP often begins in adolescent years (Balague *et al.,* 1995) and that previous LBP predicts future LBP (Hestbaek *et al.,* 2006b). The objective of this study is to gain a deeper insight into the role of selected psychosocial risk factors on the prevalence of adolescent low back pain.

Adolescence represents the transitional period between the juvenile stage and adulthood (Jordaan *et al.,* 2005). Therefore, prevention and health education on LBP should begin before the adolescent enters the work force to try and decrease the burden of LBP amongst the adult population. The results of this study will help to highlight and provide a further understanding of the problem of adolescent LBP in South Africa, so that necessary health promotion programs can be developed to prevent LBP in adolescents.

Limited information exists on the role of psychosocial risk factors on the prevalence of LBP amongst Grade 12 learners in South Africa. This study will determine the influence of exam stress and anxiety, depression, socio-economic status, family history and smoking, alcohol and drug abuse on the prevalence of LBP amongst Grade 12 learners in South Africa.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter will discuss the methods and instruments used to conduct the study and the statistical methodology employed. The topics to be discussed include the study design, methodology, sampling procedure, sample characteristics, data collection, ethical considerations, research instrument, data coding and capturing and the statistical methodology.

3.1 STUDY DESIGN

The study adopted a quantitative research approach and made use of a structured questionnaire (Appendix K) to collect data. In order for the research questions of this study to be answered, an exploratory research design was employed. Exploratory research is necessary when researchers lack a clear idea of the problems that they will encounter during the study (Stebbins, 2001). Through exploration, researchers are able to develop concepts and ideas more clearly, establish priorities, develop operational definitions and improve the final research design. This type of research is therefore conducted to provide insight and understanding about a given topic (Cooper and Schindler, 2003).

Exploratory research is characterized by a more flexible and versatile research process in which the research findings/results are more tentative (Cooper and Schindler, 2003). Exploratory research is generally followed by further exploratory research or by more formal studies, which begin with a hypothesis and involve precise procedures and data sourcing in order to test the hypothesis (Aaker, Kumar and Day, 1995). Exploratory research can also save time and money because if the topic being researched is not as important as initially thought, then the more formal studies can be cancelled (Cooper and Schindler, 2003).

Despite its value, it has been suggested that exploratory research is under-utilized by researchers as it does not provide immediate answers (Stebbins, 2001). In addition,

exploration has been linked to biases such as subjectiveness, non-representativeness and non-systematic design (Cooper and Schindler, 2003).

3.2 METHODOLOGY

Cooper and Schindler (2003) points out that research designs are classified by the approach taken to gather primary data (Cooper and Schindler, 2003). The two main approaches used are the observation and communication approaches. Gathering primary data using the observation approach occurs when one observes conditions, behaviours, events, people or processes (Dyer, 1997). Gathering primary data by the communication approach involves communicating with people about attitudes, motivations, intentions and expectations (Dyer, 1997).

The communication approach involves surveying people and recording their responses. These responses are later analyzed. The advantages of survey research include (Dyer, 1997; Cooper and Schindler, 2003):

- Information can be gathered from a large and dispersed group of subjects.
- It is a versatile way of collecting primary data.
- Abstract information can be gathered by questioning others.
- It is more efficient and cost-effective.

3.2.1 Primary data

The primary data for this exploratory research study was collected using the communication approach, by means of a self-administered questionnaire that recorded the responses of the participants to the various questions.

3.2.2 Secondary Data

Secondary data was used to develop the research questions as well as to write up the dissertation. This secondary data was obtained from journal articles, published

dissertations, internet websites, books, government publications as well as personal communication to the researcher.

3.3 THE RESEARCH INSTRUMENT

3.3.1 The Questionnaire

A questionnaire is an important research instrument because it is an effective tool for collecting data (Patten, 1998). A questionnaire usually comprises a series of questions asked to individuals in order to obtain statistically useful information about a given topic (Cooper and Schindler, 2003). When properly constructed and responsibly administered, questionnaires become a vital instrument through which statements can be made about specific groups, people or entire populations (Mouton, 1996). Generally, questionnaires are good sources of information, provided that it has been tested for reliability and validity (Mouton, 1996).

Researchers can either use structured or unstructured questionnaires (Bowling, 2002). A structured questionnaire is one that provides different response options for each question and the respondent is required to select the applicable response (Babbie, 1998). Unstructured questionnaires require more contact and co-operation from the respondents as the respondents are required to answer each question in their own words (Babbie, 1998).

Table 3.1 provides a context for the use of a questionnaire by detailing the advantages and disadvantages of using a questionnaire as a data collection instrument.

Table 3.1: The advantages and disadvantages of using a questionnaire as a method of data collection (Welman and Kruger, 1999).

ADVANTAGES	DISADVANTAGES
A relatively cheap method.	Could potentially result in a low response rate.
Significant time saving opportunity – large amounts of information can be collected within a short time period.	The researcher has low control over the conditions under which the questionnaire is completed.
A greater possibility of anonymity.	The explanation and clarification of concepts are not possible.
Standardized questions simplify the coding of data.	Anonymity complicates the following up of questionnaires.
The answering of questions can be kept impersonal.	The method can only be used for short surveys with mainly closed questions.

Listed below are the reasons for the use of the questionnaire as the instrument for data collection in this study:

- The questionnaire method facilitated ease of administration via a simple visit to the selected school.
- The inclusion criteria required all selected respondents to be literate in English (respondents must be able to read and write in English). This allowed the respondents to complete the questionnaires on their own without any assistance.
- The researcher was able to achieve anonymity. This was in keeping with the requirements of the Kwazulu-Natal Department of Education.
- The questionnaire was a relatively cheap method for the researcher.

3.3.2 Questionnaire development

A structured questionnaire was used in this study (Appendix K) for data collection. According to Joubert (2000), most studies concerned with back disorders made use of this type of questionnaire to elicit responses from the study subjects. The questionnaire allowed the researcher to gather important information regarding the demographics of the respondents, prevalence of LBP, quantification of LBP and the selected risk factors.

As discussed below, numerous studies were consulted for the successful compilation of the questionnaire that was used in the study.

3.3.2.1 Demographical questionnaire

A demographical questionnaire was developed to gather information about all the respondents. All questions were presented in a Table form and required the respondent to select the appropriate answer. This questionnaire was used to obtain important information regarding the respondent's age, gender and race.

3.3.2.2 Quantification of LBP

To assess the prevalence, frequency, severity and chronicity of LBP amongst the Grade 12 learners, the researcher included a body map question, similar to those used in the studies of Ramroop, Shaik and Govender, (2006) and Harreby *et al*. (1999). Respondents were asked to indicate if they suffered from back pain in the area demarcated on the Nordic manikin (Kuorinka, Jonsson, Kilborn, Vinterburg, Biering-Sorenson, Andersson and Jorgenson, 1987) since the beginning of the year (see Figure 3.1.).

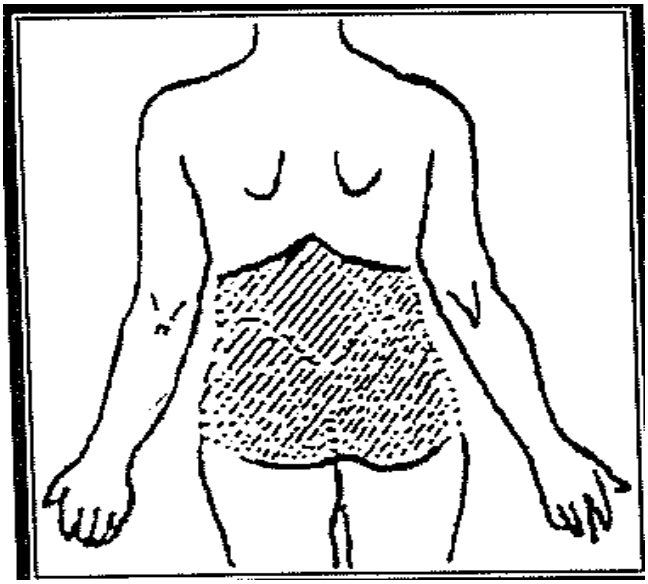

Figure 3.1: Area of LBP demarcated by the Nordic Manikin (Kuorinka *et al.* 1987).

The remainder of the questions in this section of the questionnaire was presented in a Table form and required the participant to select the appropriate answer. Using the responses to these questions, the researcher was able to successfully quantify LBP amongst the Grade 12 learners in the Greater Durban area.

3.3.2.3 Smoking, alcohol and drug abuse questionnaire

A study by Lubman *et al.,* (2007) which attempted to determine developmentally harmful substance use among youth populations was consulted to develop this section of the questionnaire. The literature on this topic was reviewed and the questionnaire was adapted for this study using this literature. The questions were selected for their ease of understanding (Dyer, 1997). Tables were constructed with pre-determined answers, which required the participant to select the appropriate answer. Using the responses to these questions, the researcher was able to obtain valid information regarding smoking, alcohol and recreational drug use amongst Grade 12 learners in the Greater Durban area.

3.3.2.4 Socio-economic status questionnaire

The level of education of the participants' parents was used as the key determinant for the participant's socio-economic status (Adler and Ostrove, 1999). Studies by Holstein *et al.,* (1990) and Leboeuf-Yde *et al.,* (2002) were reviewed and the external validity of socio-economic status was reported. In this study, participants were first asked to state the occupations of both parents. Thereafter, a Table was constructed with pre-determined answers relating to various academic qualifications of their parents. The participants were required to select the appropriate answer applicable to their parents under the 'mum' and 'dad' column. The different academic qualifications presented included grade 11 or below, grade 12, diploma, bachelor's degree, master's degree, doctorate and professor.

3.3.2.5 Family history questionnaire

This section of the questionnaire which attempted to assess family history as a risk factor for adolescent LBP was compiled by consulting a study conducted by Balague *et al.,* (1995). This study by Balague and colleagues investigated LBP in schoolchildren relative to familial and psychological factors. The questionnaire used in that study was adapted to suit the South African population.

A Table was constructed with pre-determined answers, which required the participant to select the appropriate answer. The incidence of LBP in the respondents' family was acquired by asking the participant if anyone in their family suffered with LBP. If the response to this question was positive, the respondent was required to select from a predefined list, as to which of their family members experienced LBP. The list of family members included paternal grandfather, paternal grandmother, maternal grandfather, maternal grandmother, dad, mum, sister or brother.

3.3.2.6 Exam stress questionnaire

A pre-validated questionnaire was used to assess exam stress amongst the Grade 12 learners in the Greater Durban area. This questionnaire was included in a study done on the global measure of perceived stress by Cohen, Kamarck and Mermelstein (1983).

The questionnaire required the participants to answer 13 questions regarding exam stress since entering Grade 12. All questions were presented in a Table and the participants were required to select the appropriate answer on a 3-point Likert scale. The options available included ‘never’, ‘sometimes’ and ‘often’. “Never’ indicated no exam stress, ‘sometimes’ indicated moderate exam stress and ‘often’ indicated high levels of exam stress.

3.3.2.7 Anxiety questionnaire

A pre-validated questionnaire was also used to assess anxiety amongst the Grade 12 learners in the Greater Durban area. This questionnaire was previously used in a study by Hembree (1988) on the correlates, causes, effects and treatment of test anxiety. In this questionnaire, the participants were required to answer 12 questions on the levels of anxiety experienced since entering Grade 12. Similar to exam stress, all questions were presented in a table and the participants were required to select the appropriate answer amongst the different options on a 3-point Likert scale. The options available included ‘never’, ‘sometimes’ and ‘often’. “Never’ indicated no anxiety, ‘sometimes’ indicated moderate anxiety and ‘often’ indicated high levels of anxiety.

3.3.2.8 Depression questionnaire

Depression was measured by including the Beck Depression Inventory-2 (Beck, Steer and Brown, 1996). The questionnaire is a simple answering system using marking boxes which facilitated fluent data collection (Fowler, 1995). This inventory consisted of a total of 21 questions. Those Grade 12 learners who scored more than 21 in this section were considered to be depressed. The severity of depression was not assessed here.

3.3.3 Focus Group

Kreuger and Casey (2000) describe a focus group as a discussion to determine participants’ perceptions regarding the research tool. The focus group is extremely important in the research process, to facilitate a greater understanding of the topic being

investigated and to assess the relevance of the data being collected (Morgan, 1998; Kreuger and Casey, 2000).

A focus group attempts to achieve both face and content validity (Redsell, Hastings, Cheater and Fraser, 2004) of the research tool. This is achieved by the identification of any uncertainties, misunderstandings or grammar and language errors in the research tool. This is followed by the editing of these identified problems. According to Cooper and Schindler (2003:157), the main advantage of a focus group in exploratory research, 'is its ability to quickly and inexpensively grasp the core of a topic'. This is because focus groups are brief, relatively cheap and extremely flexible.

Participants of the focus group are included based on their similarity and knowledge of the area of investigation as well as their knowledge of the research process (Greenbaum, 2000; Redsell *et al.,* 2004). Any discrepancies are discussed and altered following a unanimous agreement on how the question is transformed. The result is a questionnaire that is best suited to obtain the data appropriate to the aims and objectives of the study (Holder *et al.*, 1999; Bernard, 2000).

According to Cooper and Schindler (2003), an ideal focus group panel consists of six to ten respondents. Too large or too small groups result in less effective participation. The Focus Group employed in this study consisted of eight participants. The participants included four Grade 12 learners, two chiropractors, one psychologist and the researcher.

All participants were briefed on the aims of the study and were requested to maintain confidentiality regarding the issues discussed. The Grade 12 learners present were also informed of their exclusion from the study due to participation in the Focus Group. All participants received a Letter of Information (Appendix I), Code of Conduct Form (Appendix H) and the Informed Consent Form (Appendix J) at the Focus Group session.

Since three pre-validated questionnaires were included in this study, only the questionnaires on the demographical data, quantification of LBP, family history, socio-economic status and smoking, alcohol and recreational drug abuse were assessed during the focus group session. The questions were discussed in a sequential manner

(Morgan, 1998) and the participants were asked to recommend any changes that would improve the quality of the questions.

In addition, the students were asked to suggest any further aspects related to the study that they thought were not represented in the questionnaire. All submissions were discussed and critically analyzed before decisions were made regarding the omission or addition of questions or changes. A transcript of the focus group discussion is available which includes all the changes made to the questionnaire.

3.3.4 Pilot Study

A pilot study was undertaken, once the corrections to the questionnaire as determined from the focus group, were completed. The pilot study allowed for further evaluation of the questionnaire.

A pilot study involves using a small sample, representative of the population for which the questionnaire has been intended to be used and administering the questionnaire in the exact manner as it will be administered to the main sample (Fink and Kosecoff, 1985). The purpose of the pilot study was to determine whether the instructions could be followed clearly, determine the expected duration for completion of the questionnaire and finally to test the participants understanding of the questions.

The pilot study group consisted of three Grade 12 learners who satisfied the inclusion criteria. The respondents were asked to complete the questionnaire. The time taken to complete the questionnaire was recorded to be between 20-25 minutes. These respondents reported that the questions were straightforward and easy to understand. No changes were made to the post-focus group questionnaire (Appendix K). The participants of the pilot study were excluded from the main study.

3.3.5 The Final Questionnaire

After the final compilation of the questionnaire, an evaluation of the questionnaire revealed three distinct parts. These have been classified as Part A, B and C.

Part A deals with the identification and demographical information of the participants.

Part B comprises of questions that attempts to quantify LBP amongst the Grade 12 learners with respect to prevalence, frequency, severity and chronicity.

Part C deals with the assessment of the selected risk factors including family history, socio-economic status, smoking, alcohol and recreational drug abuse, exam stress, anxiety and depression.

The questionnaire ended with an open question to allow the participants to provide additional information in case anything of importance was omitted.

A questionnaire was the tool of choice for such a project as it ensured that bias, on the side of the researcher, was limited. There was also a less chance of misinterpretation of the results (Mouton, 1996).

3.4 SAMPLING PROCEDURE

A population-based study was conducted at 20 public secondary schools in the Greater Durban area. Data was collected through a stratified random sampling technique. The sample population consisted of the Grade 12 learners from the sample of public secondary schools in the Greater Durban area.

Most populations can be separated into several smaller sub-populations or strata. Stratified random sampling is the process by which a sample is constrained to include the various elements from each of the segments (Cooper and Schindler, 2003). After a population is divided into the appropriate strata, a simple random sample can then be taken within each stratum. In this study, the first strata consisted of the three educational districts. Thereafter, the sample was selected proportional to the size of the population of secondary schools in each educational district.

For this study, the researcher has opted for a stratified random sample to increase the statistical efficiency of the sample as well as to provide adequate data for analyzing the sample (Cooper and Schindler, 2003). In addition, choosing this sampling procedure allowed for successful exploratory research to be conducted. Sampling was then broken down into selecting the schools from the Greater Durban area and then selecting the participants.

3.4.1 School Sampling

a) Sample size

A stratified random sample (Mouton, 1996) of 20 public secondary schools in the Greater Durban area was included in the study. This equated to fifteen percent of the schools being chosen from the three educational districts.

b) Sample procedure

The sampling process involved obtaining a list of all the public secondary schools in the Greater Durban area. A comprehensive list of the schools in the area was obtained from the KwaZulu-Natal Department of Education (Poovalingham, 2008). The schools were then separated into the three respective educational districts or strata (see Table 3.1). The sample selected was proportional to the size of the population of secondary schools in each educational district. Fifteen percent of the schools from each district were chosen and a list of 20 secondary schools (n1=20) was compiled. The sampling procedure resulted in the inclusion of the following number of schools from each district:

Table 3.2: Proportion of schools from the population included in the stratified random sample

DISTRICT	***POPULATION OF SCHOOLS***	***SAMPLE OF SCHOOLS***
Umlazi	90	10
Pinetown	55	9
Ilembe	10	1
Total	155	20

3.4.2 Participant Sampling

a) Sample size

All the selected schools were personally visited by the researcher. A minimum response of 600 (n2=600) learners was considered statistically significant for this study. A minimum of 30 participants from each school were invited to participate in the study. In a study by Rattan (2007), a similar sampling technique was employed and yielded statistically valid results.

b) Sample procedure

The researcher approached the Kwa-Zulu Natal Department of Education in June 2008, and requested permission to conduct the study (Appendix A). Permission was granted by the Director: Kwa-Zulu Natal Department of Education to conduct the study (Appendix B).

After the 20 public secondary schools were selected, the researcher then sought permission from the principal at each of the selected schools to conduct the study. The most available Grade 12 class at the school was approached by the researcher. All those Grade 12 learners who complied with the inclusion criteria were then presented with a Letter of Information (Appendix D), Informed Consent Forms (Appendix E) and the Questionnaire (Appendix K).

Using this procedure, a sample size of 613 learners, in all 20 public secondary schools of the three educational districts, was obtained.

3.5 SAMPLING CHARACTERISTICS

The sample selected was divided into two categories. The first category included the schools where the study was to be performed and second category included the participants (Grade 12 learners) at each of the selected schools. Each category had to meet specific inclusion and exclusion criteria.

3.5.1 Sampling criteria for the schools

The secondary schools were accepted into the study based on the following inclusion and exclusion criteria.

Inclusion criteria for the schools:

- The school had to be willing to participate in this study.
- The secondary school had to fall under one of the three educational districts namely Umlazi, Pinetown or Ilembe. This approach would ensure that all parts of the greater Durban area were included in this study (Hawk and Dusio, 1995), thus eliminating any form of bias.
- English had to be taught either as a first or second language at the school. The respondents were required to be English literate. The reason for this criterion was that there was no validation of the questionnaire in either Afrikaans or Zulu. Hence, there were no comparable Afrikaans or Zulu translations of the questionnaire available for use in this study. The biggest problem one faces when translating a questionnaire is that it may lose face validity (Hunter, 2004). With translation, the questions themselves may not be well understood resulting in errors which could affect the results of the study (Hunter, 2004). In addition, even if the words in the questionnaire are translated correctly, a combination of words or the meaning of a phrase may then be unclear which could result in different interpretation of the questions by participants from different cultures, backgrounds and language capabilities (Scollen and Wong-Scollen, 1995). This is because Baynham (1995) highlighted that when words are taken out of context, they tend to lose their meaning.

Exclusion criteria for the schools

- Schools which did not comply with the above criteria.

3.5.2 Sampling criteria for the participants

The inclusion and exclusion criteria for the Grade 12 respondents are detailed below.

Inclusion criteria for the participants:

- Participants had to be in Grade 12.
- The Grade 12 learner had to be willing to participate in the study.
- Participants had to sign an Informed Consent Form (Appendix E) before completion of the questionnaire.
- If the Grade 12 learner was under the age of 18, a parent/guardian had to sign the Form of Consent (Appendix E).

Exclusion criteria for the participants

- Grade 12 learners who did not comply with the inclusion criteria.
- Those Grade 12 learners who had participated in the focus group and the pilot study during development of the questionnaire.

3.6 DATA COLLECTION

The collection of the data for this study was performed in November 2008 during the period of the Grade 12 examinations. The questionnaire was distributed and administered by the researcher at each of the 20 secondary schools.

The relevant school principals were contacted and provided with the following documents: a copy of the Department of Education's Letter of Permission (Appendix B), a Letter of Information (Appendix C) and a Letter of Confirmation of Visit (Appendix F). The Letter of Confirmation of Visit (Appendix F) had to be signed by the principal of each school once the researcher had collected all of the questionnaires. This ensured that the study was conducted at the schools in an ethical manner in keeping with the agreement with the Department of Education.

During the administration of the questionnaire, the researcher approached the most available Grade 12 class and was allowed to brief the students on the aims and

objectives of the study. Those Grade 12 learners under the age of 18 years were asked to complete the questionnaires only after Parental Consent Forms were obtained.

Once the questionnaires were completed, the Informed Consent Forms and Parental Consent Forms (where necessary) were then separated from the questionnaires by a neutral third party. The questionnaires were placed in a sealed box and were not viewed until all questionnaires were received. This was done to protect the identity of the participants.

3.7 ETHICAL CONSIDERATIONS

Permission to conduct the study was granted by the KwaZulu-Natal Department of Education (Appendix B) on condition that total confidentiality and anonymity be maintained with regards to both the names of the schools as well as the participants. In addition, the KwaZulu-Natal Department of Education imposed a condition that the permission of the principals of each of the selected schools would be required for the study.

Moodley and Myer (2007) assert that all studies should be conducted with the full disclosure of the aims and purposes of the study. In light of this, the Letter of Information and Informed Consent forms (Appendices D and E) were issued to the participants prior to the administration of the questionnaire. These Forms indicated the voluntary nature of participation and that the participants could withdraw from the study at any time. In addition, for participants under the age of 18, a Letter of Information (Appendix D) and a Letter of Consent (Appendix E) was sent to the parent/guardian for authorization to allow their child to participate in the study.

These forms were separated from the questionnaires by a neutral third party so that no form could be correlated to any questionnaire. This fulfilled the confidentiality code which Salant and Dillman (1994) define as the inability to associate individuals with specific questionnaire responses. Confidentiality was maintained throughout the study as participants were further instructed not to write their names anywhere on the questionnaires. The questionnaires were stored in a box and were not accessed until all questionnaires were received.

Access to the questionnaires was limited only to the researcher and the supervisor of the study. The data was coded and all information was treated with confidentiality. The results of the study will be made available to the participants and the KwaZulu-Natal Department of Education on request.

Ethical clearance for this study was provided by the Faculty of Health Sciences, Research Committee. An ethical clearance certificate was issued in line with the Declaration of Helsinki, 1975 (Williams, 2008).

3.8 DATA CODING AND CAPTURING

According to Aaker *et al*., (1995), all data obtained from questionnaires are required to undergo preliminary preparation which includes data coding and statistical adjustments. The questionnaires in this study were only assessed after the researcher had visited all 20 of the public secondary schools in the greater Durban area that were selected for participation in the study. The questionnaires were first checked for any errors in the responses as well as any omissions. Illegible or missing answers were coded as '0' in order to simplify the data analysis without distorting the interpretation of the results.

Using the Microsoft Excel package, all questionnaires were then coded and the results entered into a spreadsheet provided by the statistician. This spreadsheet contained columns for variable identification and the response values obtained from the participants. This spreadsheet was made available to the statistician for use in the statistical analysis.

3.9 STATISTICAL ANALYSIS

SPSS version 15.0 (SPSS Inc. Chicago, IL, USA) was used in this study for the analysis of data. A p value <0.05 was considered as statistically significant. Frequency Tables and bar charts were used for descriptive purposes in the case of categorical variables, while summary statistics reporting mean, standard deviation and range were used for quantitative variables.

Bivariate logistic regression analysis was used to assess crude relationships between independent variables and presence of LBP. Those which were found to be significant

were entered simultaneously into a multivariate logistic regression model and backward selection based on likelihood ratios was used with entry and removal probabilities set to 0.05 and 0.1 respectively. The final model reported adjusted odds ratios, p values and 95% confidence intervals.

3.10. CONCLUSION

This chapter presented the methods, design and instruments used to conduct this study as well as the statistical analysis employed. Detailed strategies for sampling, data collection and data coding methods were discussed. The practical steps taken to ensure that ethical measures were adhered to, was also outlined.

Chapter four presents the results and analysis of the information obtained to determine the role of psychosocial risk factors on the prevalence of LBP amongst Grade 12 learners in the Greater Durban area.

CHAPTER FOUR

RESULTS

This chapter presents the results obtained from the questionnaires that were administered to the Grade 12 learners. The results are discussed under the following subheadings: response rate, demographic statistics, quantification of LBP, relationship between LBP and selected psychosocial factors and multivariate logistic regression.

4.1 RESPONSE RATE

For the purposes of the study, 613 learners from 20 different secondary schools in all three Educational districts in the Durban Region were selected by means of a stratified random sample. The researcher recorded an overall 100% response rate. All of the questionnaires that were administered to the selected learners were returned.

4.2 DEMOGRAPHIC STATISTICS

4.2.1 Age

The mean age recorded for the study was 18.4 years (SD = .588). The respondent ages ranged from 16 to 22 years.

4.2.2 Ethnicity

The ethnic distribution of the population sample is recorded in Table 4.1. The majority of the respondents were Black (43.9%), followed by Indian (24.8%), White (20.2%) and Coloured (10.6%) participants. Three (0.5%) participants were from other ethnic groups.

Table 4.1: Ethnic distribution of the population sample

Ethnic group	Frequency (n)	Percent (%)
Black	269	43.9
Indian	152	24.8
White	124	20.2
Coloured	65	10.6
Other	3	0.5
Total	613	100.0

4.2.3 Gender

The gender distribution is shown in Figure 4.1. The results indicate that more female respondents participated in the study than male respondents (54.5% vs. 45.5% respectively).

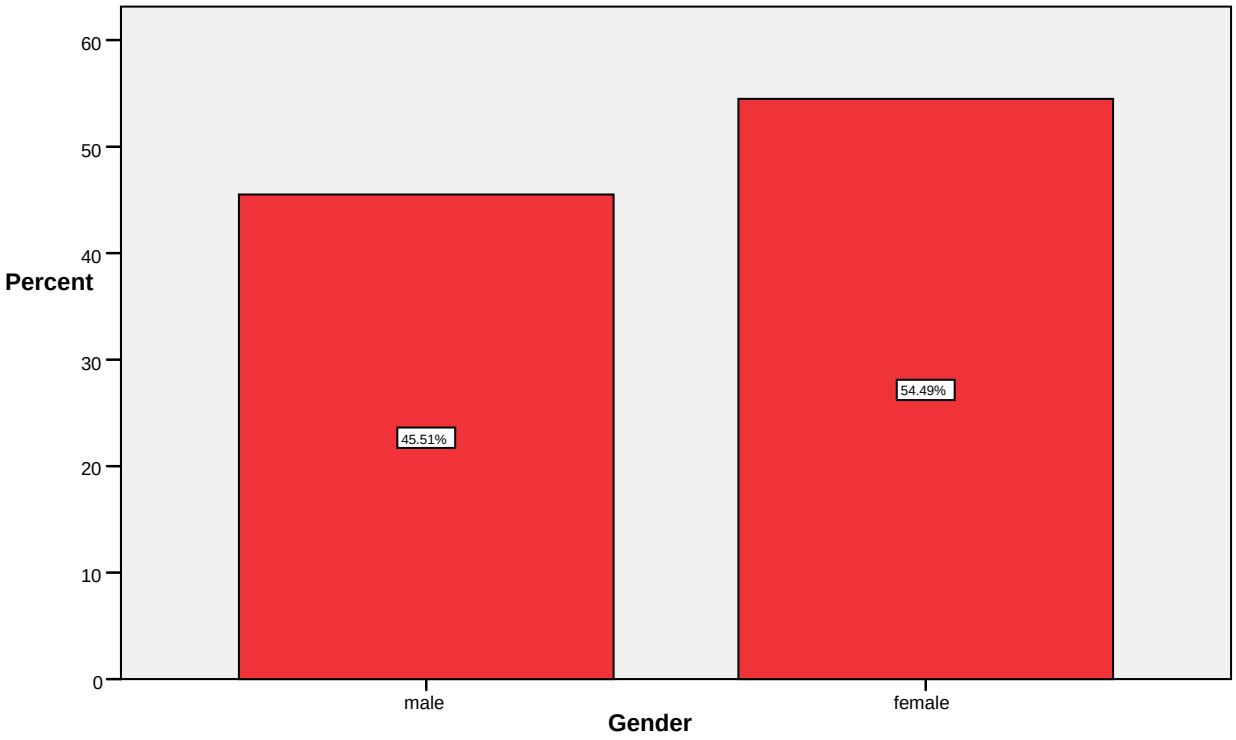

Figure 4.1: Gender of respondents

4.3 QUANTIFICATION OF LBP

Objective 1: To determine the prevalence, frequency, severity and chronicity of LBP amongst Grade 12 learners in the Greater Durban area.

4.3.1 Prevalence of LBP

Of the 613 respondents in the sample population, 352 Grade 12 learners reported experiencing LBP since the beginning of the year. The prevalence of LBP was 57.42%.

Table 4.2 indicates that 57.4% (352) of participants reported LBP since the beginning of the year.

Table 4.2: Percentage of participants reporting LBP since the beginning of the year

LBP	Frequency (n)	Percent (%)
Yes	352	57.4
No	261	42.6
Total	613	100.0

4.3.2 Frequency of LBP

Table 4.3 records the frequency of LBP experienced by the respondents per month. The questions were answered by only 341 of the 352 participants who reported having LBP. The median frequency of LBP was 8 times a month, with a range from 0.08 times a month (once a year) to 120 times a month (4 times daily).

Table 4.3: Frequency of LBP experienced by the respondents per month

N	Valid	341
	Missing	11
Median		8.00
Minimum		.08
Maximum		120.0
Percentiles	25	3.00
	50	8.00
	75	24.00

4.3.3 Severity of LBP

4.3.3.1 Difficulty bending

Table 4.4 records the results to the question regarding difficulty experienced when putting on socks and indicates that the majority did not experience difficulty (66.1%). Four respondents did not complete this question.

Table 4.4: Difficulty experienced when putting on socks, stockings or tights due to their LBP

Does the pain make it difficult or impossible to put on socks, stockings or tights?	Frequency (n)	Percent (%)
No difficulty	230	66.1
Difficult but not impossible	88	25.3
Impossible	30	8.6
Total	348	100.0

4.3.3.2 Spread of LBP

With regards to the spread of LBP down to the legs to below the knees, 35% of those who suffered from LBP reported that the pain spreads down the legs to below the knees. This is demonstrated in Figure 4.2.

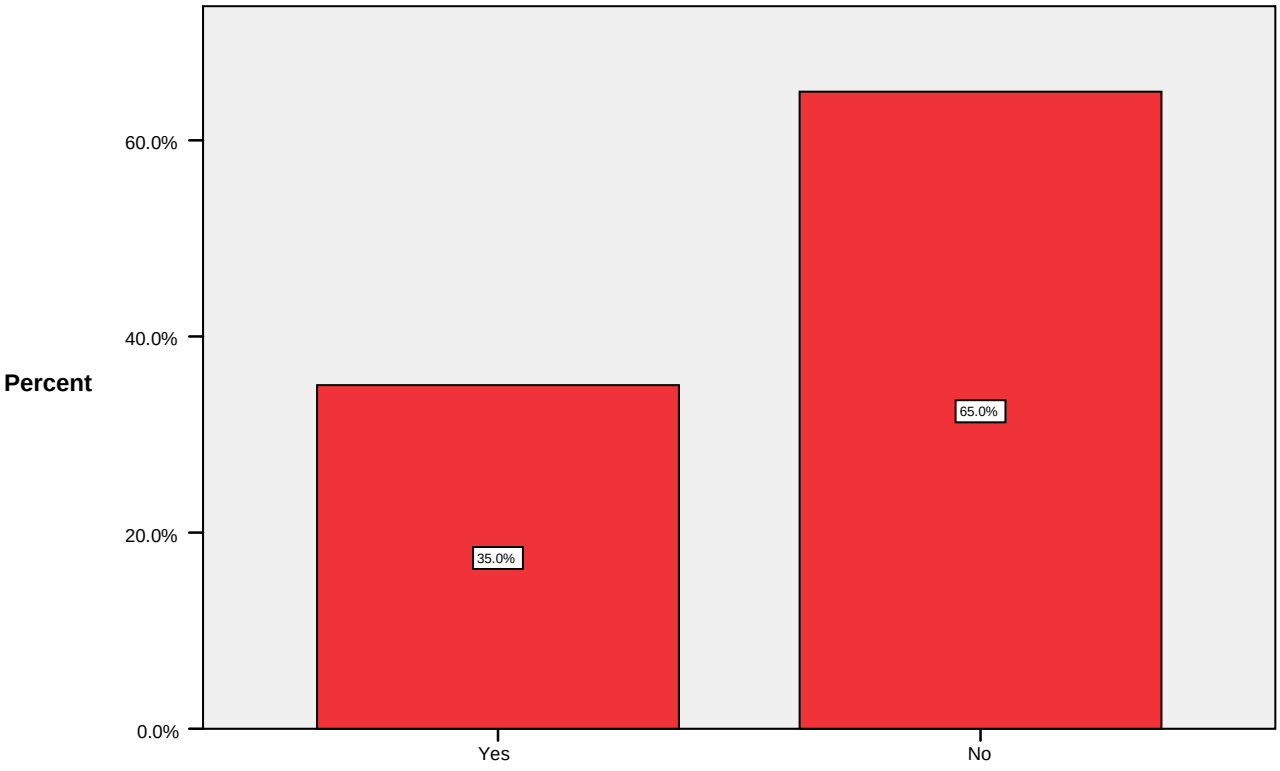

Figure 4.2: Percentage of LBP spreading down the legs to below the knees

4.3.3.3 Limitations of Daily Activity

According to the responses recorded from the questionnaires, the daily activity commonly affected by LBP was having a good night's sleep (50.6%), followed closely by playing sports (47.4%) and concentrating in class (46.6%). This is shown in Figure 4.3. Activities, like enjoying their hobbies were affected for 36.1% of the sample, while only 18.2% indicated that LBP affected their daily washing and dressing routines.

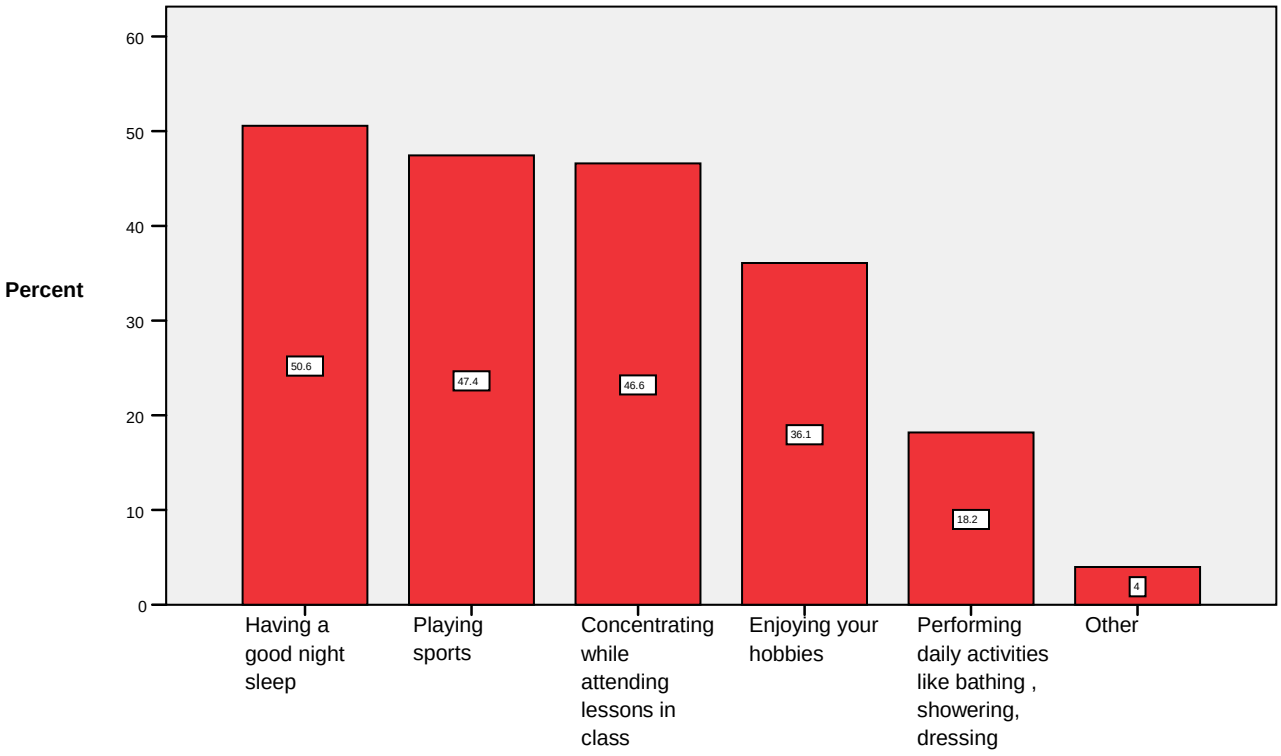

Figure 4.3: Daily activities limited by LBP

4.3.3.4 School Absenteeism

Table 4.5 indicates that 21% percent of the respondents affected by LBP had missed school because of LBP. Six respondents did not answer this question.

Table 4.5: Absenteeism from school due to LBP

Did you ever stay at home and miss school because of your low back pain?	Frequency (n)	Percent (%)
Yes	73	21.0
No	273	79.0
Total	346	100.0

4.3.3.5 Usage of pain medication in the treatment of LBP

Table 4.6 indicates that 47.1% of the respondents that had suffered from LBP had taken pain relief medication. Six respondents did not complete this question.

Table 4.6: Pain medication usage in the treatment of LBP

Did you ever take pain relief medication for your low back pain?	Frequency (n)	Percent (%)
Yes	163	47.1
No	183	52.9
Total	346	100.0

4.3.3.6 Treatment sought from a medical professional for LBP

Table 4.7 indicates that only 35.8% of the respondents had visited a medical professional because of LBP.

Table 4.7: Treatment sought by a medical professional for LBP

Did you ever visit a medical professional because of your low back pain?	Frequency (n)	Percent (%)
Yes	126	35.8
No	226	64.2
Total	352	100.0

4.3.3.7 Chronicity of LBP

Table 4.8 shows that the majority of respondents (63.6%) had suffered with LBP before entering Grade 12. Eleven respondents did not complete this question.

Table 4.8: Previous episodes of LBP

		Frequency	Percent
Valid	Yes	217	63.6
	No	124	36.4
	Total	341	100.0

4.3.3.8 Level of discomfort

The level of discomfort experienced by the respondents was assessed using the 5-point Likert scale in which level 0 equated to “No discomfort or pain experienced” and level 5 equated to “Extreme levels of discomfort or pain experienced”. As demonstrated in Figure 4.4, the majority (31.3%) of the respondents scored their discomfort as a 3 (Mean = 2.79, SD = 1.22). Level 3 equates to “significant levels of discomfort or pain experienced”. More than half (57.7%) of the respondents reported significant levels of discomfort due to LBP.

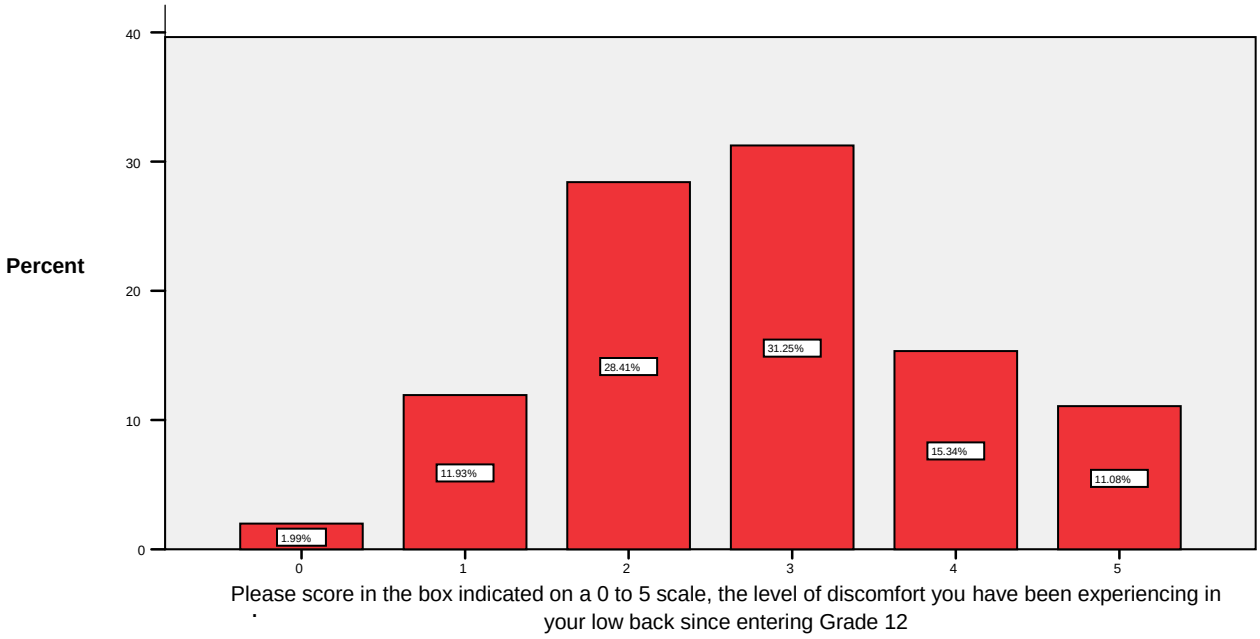

Figure 4.4: Percentage of discomfort caused by LBP

4.3.3.9 LBP rating

Table 4.9 records the median, minimum and maximum of LBP experienced by the respondents when the LBP was at its worst and when it was at its least. A rating scale of 0 to 10 was used in both instances, where a rating of 0 equated to “no low back pain at all” and a rating of 10 equated to “low back pain at its worst”. The median level of pain recorded by the respondents was 5.

Table 4.9: Levels of LBP reported when at worst and at least

		Please rate your low back pain on a scale of 0 to 10 when your low back pain is at its worst.	Please rate your low back pain on a scale of 0 to 10 when your low back pain is at its least.
N	Valid	337	337
	Missing	15	15
Median		7.50	3.00
Minimum		0	0
Maximum		10	8
Percentiles	25	6.00	1.00
	50	7.50	3.00
	75	9.00	4.00

Figure 4.5 illustrates (on a scale from 0 to 10) the level of LBP when the LBP experienced by the respondents was at its worst. The majority of the respondents rated their LBP as 8 when the LBP was at its worst, with a mean score at worst of 7.11 (SD = 1.98).

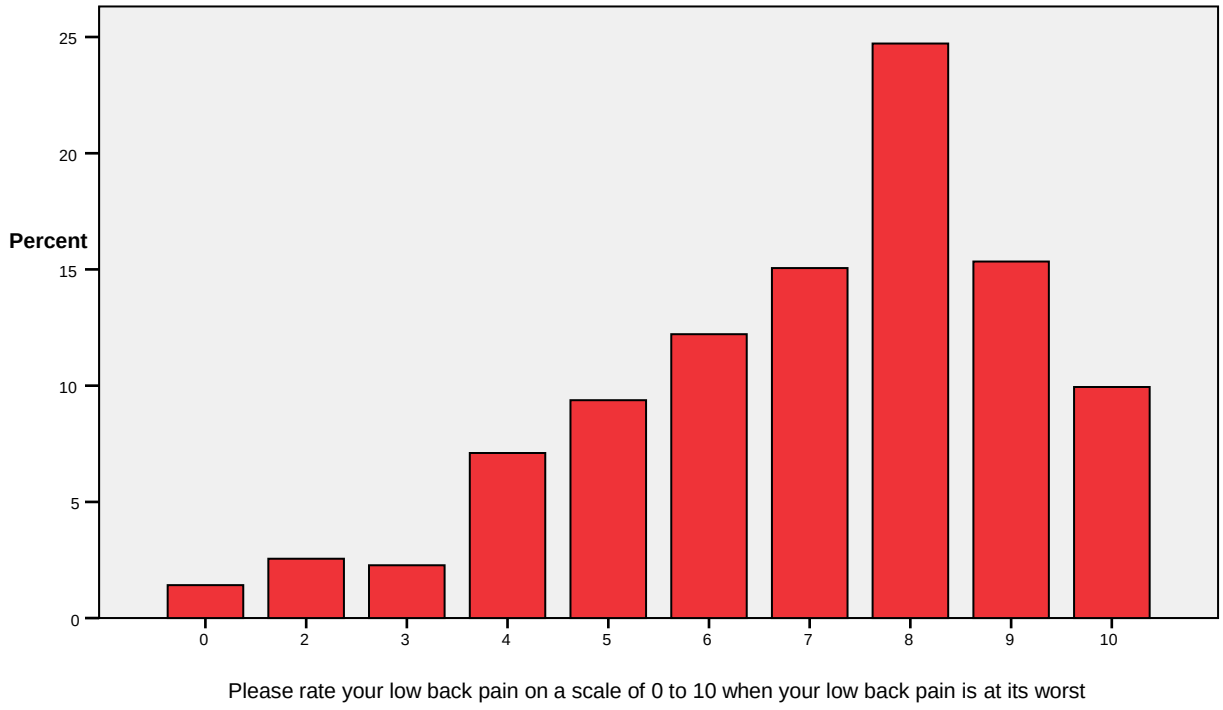

Figure 4.5: Histogram indicating the participants' LBP when it is at its worst

Figure 4.6 illustrates (on a scale from 0 to 10) the level of LBP when the LBP experienced by the respondents was at its least. The majority of the respondents rated their LBP as 0 and 2 respectively when the LBP was at its least, with a mean score of 3.45 (SD = 1.61).

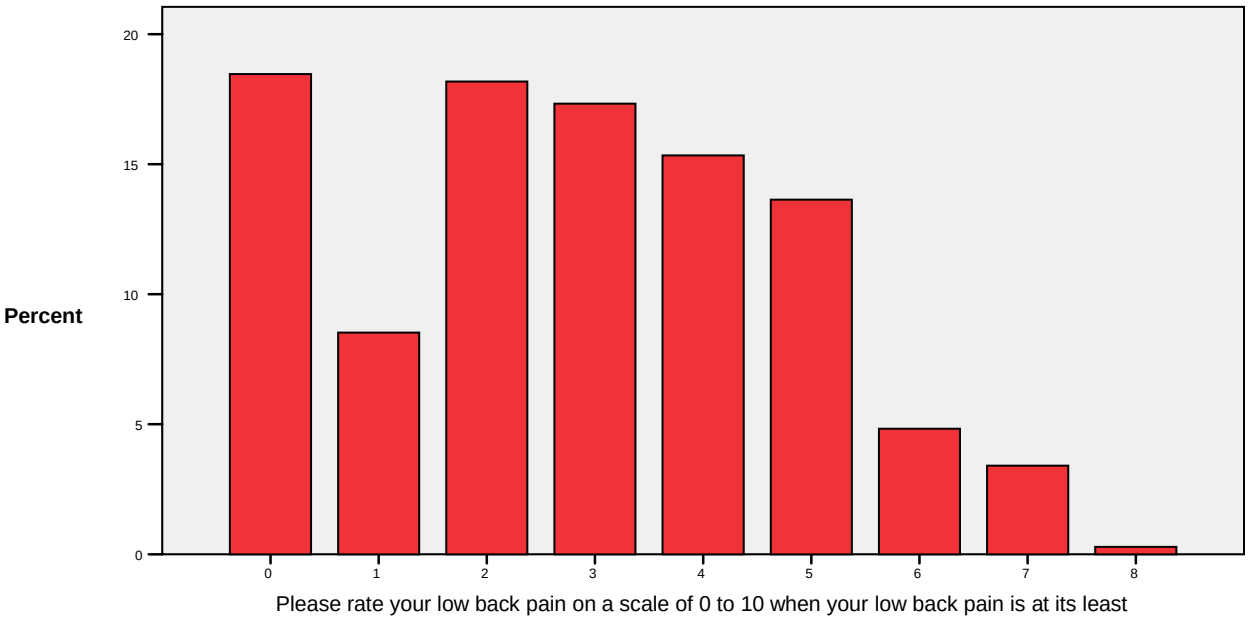

Figure 4.6: Histogram indicating the participants' LBP when it is at its least

Figure 4.7 indicates that on a scale from 0 to 10, the average level of LBP experienced by the respondents was 5.28.

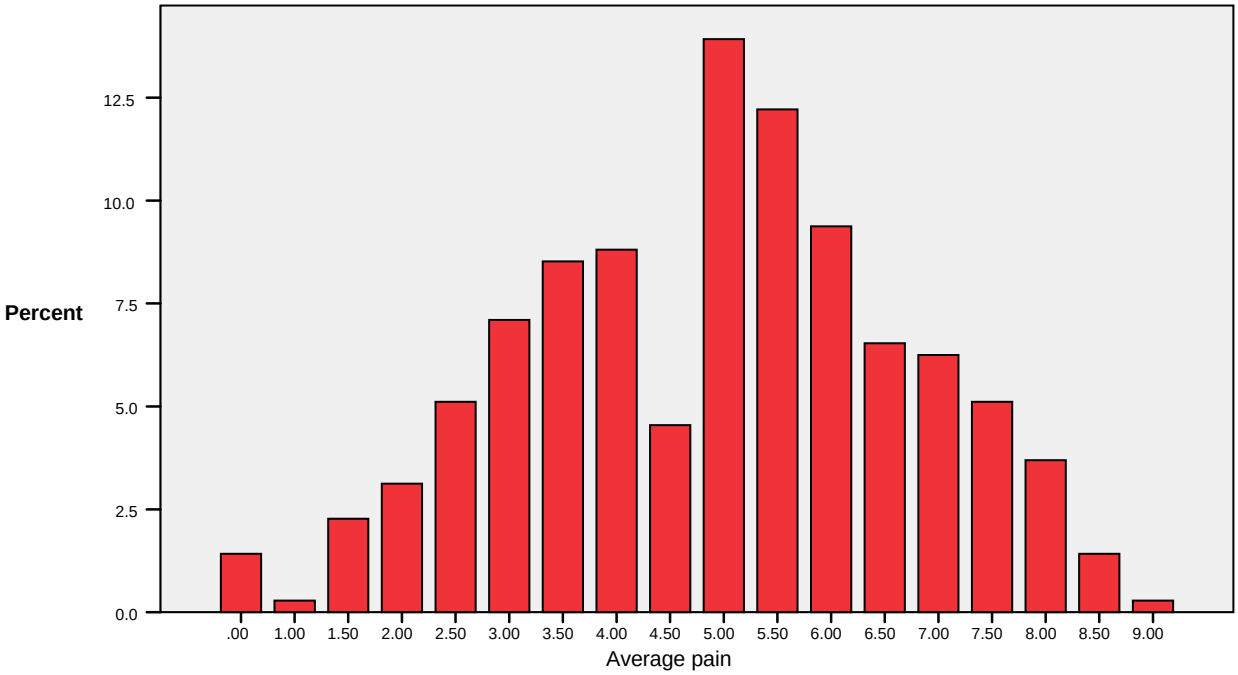

Figure 4.7: Average pain between the worst and least LBP ratings

4.4 RELATIONSHIP BETWEEN LBP AND SELECTED PSYCHOSOCIAL FACTORS

Objective 2: To determine how the selected psychosocial risk factors associate with LBP amongst Grade 12 learners in the Greater Durban area.

4.4.1 Depression

Table 4.10 indicates that a high percentage of the respondents (71%) demonstrated signs of depression according to the Beck Depression Inventory (BDI).

Table 4.10: Percentage of participants' level of depression

Level of Depression	Frequency (n)	Percent (%)
21 (no depression)	158	25.0
>21 (depression)	436	71.0
Total	594	96.0

A significant association was found between the BDI score and LBP (p=0.012). Table 4.11 indicates that the proportion of respondents with LBP was greater in those with depression than in those without. A total of 19 participants did not answer all the questions on the depression scale and were subsequently excluded. Thus, for this tabulation, n=594.

Table 4.11: Cross-tabulation of depression and LBP

			Since the beginning of this year, have you suffered with back pain in the area shown on the diagram?	
			No	**Yes**
Becks category	21 (no depression)	(n)	80	78
		%	31.9%	22.7%
	>21 (depression)	(n)	171	265
		%	68.1%	77.2%
Total		(n)	251	343
		%	42.3%	57.7%

4.4.2 Exam stress

Table 4.12 provides details regarding levels of exam stress experienced by the respondents. A low number of respondents showed no exam stress (0.5%), while most participants reported moderate exam stress (67.3%) and 11.5% reported high exam stress. Fourteen participants did not answer the exam stress questions correctly and were subsequently excluded. Thus, for this tabulation, n=599.

Table 4.12: Level of exam stress experienced by the respondents

	Frequency (n)	**Percent (%)**
No exam stress	3	0.5
mild exam stress	112	18.2
Moderate exam stress	413	67.3
high exam stress	71	11.5
Total	599	97.5

There was a statistically significant association between exam stress and low back pain ($p<0.001$).

Table 4.13 shows the proportion of participants with LBP who experienced no, mild, moderate or high exam stress.

Table 4.13: Cross-tabulation of exam stress score category by LBP

			Since the beginning of this year, have you suffered with back pain in the area shown on the diagram?	
			No	Yes
Exam stress category	No exam stress	Count	3	0
		% within Exam stress category	1.2%	0%
	mild exam stress	Count	59	53

		% within Exam stress category	23.2%	15.4%
	Moderate exam stress	Count	179	234
		% within Exam stress category	70.5%	67.8%
	high exam stress	Count	13	58
		% within Exam stress category	5.1%	16.8%
Total		Count	254	345
		% within Exam stress category	42.4%	57.6%

4.4.3 Anxiety

As demonstrated in Table 4.14, the majority of the respondents had a moderate level of anxiety (71.2%). Only 8.1% of respondents experienced a high level of anxiety.

Table 4.14: Level of general anxiety experienced by the respondents

	Frequency (n)	**Percent (%)**
No anxiety	5	.8
mild anxiety	112	18.2
Moderate anxiety	437	71.2

high anxiety	50	8.1
Total	604	98.3

There was a statistically significant association between anxiety and LBP (p=0.008).

Table 4.15 shows the proportion of participants with LBP that experienced no, mild, moderate or high anxiety. A total of nine participants were excluded as they did not complete the anxiety questions

Table 4.15: Cross-tabulation of anxiety score category by LBP

			Since the beginning of this year, have you suffered with back pain in the area shown on the diagram?		Total
			No	Yes	No
Anxiety score category	No anxiety	Count	4	1	5
		% within Anxiety score category	1.6%	0.2%	100.0%
	mild anxiety	Count	57	55	112
		% within Anxiety score category	22.2%	15.9%	100.0%
	Moderate anxiety	Count	183	254	437
		% within Anxiety score category	71.2%	73.2%	100.0%
	high anxiety	Count	13	37	50
		% within Anxiety score category	5.0%	10.7%	100.0%
Total		Count	257	347	604
		% within Anxiety score category	42.5%	57.5%	100.0%

4.5 MULTIVARIATE LOGISTIC REGRESSION

Objective 3: To assess the relationship between these selected risk factors and LBP amongst Grade 12 learners in the Greater Durban area.

Table 4.16 provides details regarding the relationship between the psychosocial factors and the influence of these factors on LBP.

Crude odds ratio:

There were many variables found to be significantly associated with LBP on the crude bivariate analysis. These included several demographic and traditional risk factors as well as all three of the selected psychological risk factors.

Adjusted odds ratio:

All significant variables were entered as independent variables into the multivariate logistic regression model and after 12 steps, 7 variables remained as significant predictors of LBP in the model.

Age was a significant risk factor for LBP, with every one year increase in age, the risk of LBP increased by 1.643 times. Females had a higher risk for developing low back pain (1.428 times higher) than males. Alcohol intake was significantly associated with LBP (with an adjusted odds ratio of 1.609). If a respondent's mother had LBP, then he/she is 3.373 times more likely to develop LBP than if his/her mother did not have LBP. Similarly, if a respondent's father had LBP, then he/she is 2.514 times more likely to develop LBP than if his/her father did not have LBP.

Depression was statistically significant in relation to LBP. Those with depression had a 1.632 times higher risk of having LBP than those without depression. Anxiety was not associated with LBP after controlling for all the other independent variables. However, exam stress was significant, particularly to those participants who reported high exam stress (OR = 2.158) as compared to those with moderate exam stress. Therefore, after adjusting for all other risk factors for LBP, depression and high exam stress were still significantly associated with LBP.

When interpreting the results of this study, it should be noted that due to the cross sectional nature of this study design, it was not possible to conclude that some of these factors are risk factors, since we do not know whether they preceded the onset of LBP or if they were present as a result of LBP (modification behaviours). For instance, alcohol consumption could result from having LBP as a mechanism to cope with the pain. Similarly, depression and exam stress could have resulted from the LBP and not have been a cause of the LBP.

Table 4.16: Bivariate and multivariate logistic regression analysis for factors associated with LBP

Independent variable	Crude odds ratio	P value	Adjusted odds ratio	P value	95% CI
Other risk factors					
Age	1.557	0.003	1.643	0.004	1.173 -2.300
Gender (female vs. male)	1.150	0.393	1.482	0.034	1.029 – 2.133
Ethnic group		0.932			
Smoking	1.985	<0.001			
Alcohol	2.035	<0.001	1.609	0.017	1.008- 2.380
Recreational drugs	1.421	0.105			
Family history (any)	2.623	<0.001			
Family history – paternal grandfather	1.829	0.020			
Family history- paternal grandmother	1.308	0.205			
Family history – maternal grandfather	1.396	0.125			
Family history – maternal grandmother	1.630	0.021			
Family history – mum	4.178	<0.001	3.373	<0.001	2.039 – 5.579
Family history – dad	3.253	<0.001	2.514	<0.001	1.565 – 4.040
Family history – sister	2.103	0.018			
Family history – brother	1.704	0.218			
Psychosocial risk factors					
Depression (Beck's score >21)	1.582	0.012	1.632	0.015	1.098-2.425
Anxiety (baseline = none)		0.012			

Mild	3.862	0.233			
Moderate	5.514	0.128			
High	11.143	0.038			
Exam stress (baseline = none or mild)		<0.001		0.095	
Moderate	1.556	0.035	1.332	0.197	0.861 – 2.016
High	4.322	<0.001	2.158	0.031	1.072 – 4.345

Variable(s) entered on step 1: Becks score category, anxiety category, exam stress category, q1.1, q1.2, q1.3, q1.4, q3.1, q3.8, q3.10, q3.14.1, q3.14.2, q3.14.3, q3.14.4, q3.14.5, q3.14.6, q3.14.7, q3.14.8.

The adjusted logistic regression equation is:

In order to predict the occurrence of low back pain in adolescents, a logistic regression model is proposed:

Ln [p/1-p] = (0.496 x age) + (0.393 x gender) + (0.475 x alcohol) + (0.922 x family history-dad) + (1.216 x family history-mum) + (0.490 x depression) + (0.287 x moderate exam stress) + (0.769 x high exam stress)

Where Ln [p/1-p] = natural log of the predicted odds of LBP

4.6 CONCLUSION

This chapter presented the results obtained from the questionnaires that were administered to the Grade 12 learners. The results were outlined according to the aims and objectives of this study.

Chapter five provides a discussion of the findings of the study as well as an interpretation of the results. A literature control was done during the analysis to support and oppose the findings of this study. Included in the discussion are the limitations of the study and possible recommendations based on the various outcomes. It also contains the conclusion as well as general guidelines for future research.

CHAPTER FIVE

DISCUSSION OF RESULTS AND RECOMMENDATIONS

This chapter will discuss the findings of the study and will relate these findings to the available literature as well as the research objectives.

The discussion will be presented under the following sub-headings: response rate, LBP and the selected psychosocial risk factors. The discussion includes the interpretation of the results and provides recommendations based on the outcomes of this study. This chapter further provides a brief synopsis of the limitations encountered by the researcher and culminates with a conclusion of this research project.

5.1 RESPONSE RATE

Six hundred and thirteen (613) learners from twenty secondary schools in all three educational districts in the Greater Durban Region were randomly selected to participate in the survey. All 613 learners returned the questionnaires to the researcher. Thus, the overall response rate was 100%. This sample can be considered as an ideal representative sample in that it represented the population from which it was taken (Saunders, Lewis and Thornhill, 2003).

There are numerous reasons why the researcher was able to obtain a high response rate. Firstly, the schools were encouraged to participate in the study via telephonic communication and the researcher's personal visits to the schools. The researcher found that making prior arrangements with the schools helped facilitate the entire research process ensuring that it was completed with ease.

Secondly, on the day of administration of the questionnaires, the researcher waited for all questionnaires to be completed before collecting them. All learners had to complete the questionnaire in their classroom and hand it to the researcher before leaving the classroom. No learner was allowed to take the questionnaire out of the classroom at any given time. This also ensured a high response rate.

Thirdly, this sample was only taken from the Greater Durban area and did not involve a national sample. Therefore, no postage, written reminders, email and/or telefax communications were required to encourage the return of questionnaires (Brattberg, 2004).

5.2 LOW BACK PAIN (LBP)

LBP was quantified by assessing four different factors. These factors included the prevalence, frequency, severity and chronicity of LBP.

5.2.1 Prevalence of LBP

The prevalence of LBP was determined by assessing the pain experienced in the low back area since the participant had entered Grade 12 i.e. since the beginning of the year. The period prevalence of LBP amongst the Grade 12 learners was found to be 57.42%.

The prevalence of LBP amongst Grade12 learners in Durban, South Africa was similar to the prevalence of LBP found amongst adolescents in Denmark at 58.9% (Harreby *et al*., 1999) and Spain at 60% (Kovacs *et al*., 2003). However, it was lower than that found amongst adolescents in Switzerland, 69% (Balague *et al.,* 1995), Sweden, 67% (Sjolie, 2002) and in Kuwait which was at 74% (Shehab and Al-Jarallah, 2003).

In contrast, the prevalence of LBP amongst Grade 12 learners in Durban, South Africa was higher than the prevalence of LBP found amongst adolescents in Belgium which was at 36% (Gunzburg *et al.,* 1999), the United States of America which was at 30.4% (Olsen *et al*., 1992), Britain which was at 40.2% (Jones *et al*., 2003), Tunisia which was at 37% (Bejia *et al*., 2004) and adolescents in Canada which was at 21% (Feldman *et al*., 2001).

A possible reason as to why the Grade 12 learners in Durban, South Africa have shown a higher LBP prevalence as compared to the countries mentioned above could be attributed to the fact that in South Africa, adolescents have limited exposure to health education and appropriate medical resources (Diamond, 1996; Louw *et al.,* 2007). The

researcher believes that this lack of education and access to medical attention contributes to the higher prevalence of adolescent LBP in Durban, South Africa.

In comparison to these countries, the significance of a comparatively higher LBP prevalence amongst 57.42% of the Grade 12 learners in Durban, South Africa has several implications. Firstly, this finding highlights the need for health care professionals to realise the extent of adolescent LBP in Durban, South Africa. Health care professionals could become actively involved and work together with educators and the relevant education department in addressing this problem. There exists a need to develop a strategy to help decrease this problem at school level. Examples of such strategies could include the implementation of educational and back care programs at the Grade 12 level or earlier.

Secondly, this high prevalence of LBP amongst Grade 12 learners indicates the potential for a large number of people entering the South African workforce yearly with pre-existing LBP. LBP has the potential for decreased productivity (Hashemi *et al.,* 1998) and long term disability (Frymoyer and Cats-Baril, 1991; Department of Health, 2005; Jacob, 2006). As one of the core tenets of business is that the workforce be optimised, efficient, effective and productive (Schiller, 2000), the high prevalence of LBP among potential workers can have significant consequences on worker productivity and the economy of the country as a whole.

Thirdly, this finding has significant implications for the South African health care system. South Africa is considered a third world country (Diamond, 1996) with an associated problem of over-population (Klugman, 1991). In addition, South Africa has one of the highest rates of Human Immunodeficiency Virus (HIV) and Acquired Immune deficiency Syndrome (AIDS) cases in the world (Kaiser, 2000). These factors in isolation currently pose a major burden on the health care system of the country. The fact that this study has shown such a high prevalence of adolescent LBP implies a potentially greater burden on the health system. Innovative approaches would need to be defined and implemented early on in the adolescent's development to ensure that the problem of LBP is addressed, thereby limiting the transfer of adolescents with LBP, into the workforce.

Further research should focus on determining the consequences of LBP amongst adolescents in order to highlight the impact of LBP on their daily activities. This could emphasise the morbidity of this condition and provide more understanding of the consequences of LBP amongst adolescents.

5.2.2 Frequency of LBP

Of those participants in the prevalence group suffering with LBP, the median frequency of LBP was eight times a month. This equates to Grade 12 learners experiencing LBP approximately twice a week. This is consistent with the findings of Feldman *et al*. (2001), Jones *et al*. (2003) and Mikkelsson L.O., Nupponen, Kaprio, Kautiainen, Mikkelsson M. and Kujala (2006).

A frequency of adolescent LBP, two times a week further emphasizes the extent of the problem of LBP amongst Grade 12 learners in the Greater Durban area. It also highlights the need for future research to be conducted on adolescent LBP so that more insight can be gained into this problem. This in turn, could highlight the need for more effective preventative measures to be implemented.

5.2.3 Severity of LBP

The severity of LBP was determined by assessing numerous factors including the spread of LBP, difficulty bending due to LBP, activities affected by LBP, absenteeism from school due to LBP and the treatment sought for LBP.

5.2.3.1 Spread of LBP

The spread of LBP is closely related to the severity of LBP (Ramroop *et al*., 2006). The more severe the LBP, the more likely it is to spread (Balague *et al*., 1999). The results of this study showed that 35% of those suffering from LBP reported that the pain spread down their legs to below the knees. This was higher than the 24.4% of respondents who reported the spreading of LBP in a study conducted in Denmark (Harreby *et al*., 1999). The spreading of pain reported by the Grade 12 learners in the Greater Durban area could be attributed to the long hours of static postures that the learners are subjected to whilst attending lessons in class, tuition and even whilst studying (Balague *et al*., 1999).

Several studies have found an association between back pain and sitting. Salminem (1984) reported that 58.9% of those subjects, who reported neck and/or back pain, reported experiencing the pain whilst sitting. Furthermore, a significant difference was found between the prevalence of LBP in the sitting position as compared with the standing position, lying down or walking. In a similar study, Salminem, Pentti and Terho (1992) found that 38.9% of subjects with recurrent LBP considered sitting for more than 30 minutes at school, problematic. In addition, a significant difference was reported between the frequencies of LBP in the sitting position when compared to the same type of pain in the standing position, lying down or when walking.

This study did not assess LBP in relation to the different postures namely sitting, standing, walking or lying down. However, as a fairly significant number of Grade 12 learners did report a spread of the pain, it warrants further research into the effects of the various postures on the severity and spread of LBP.

5.2.3.2 Difficulty bending to put on socks, tights or stockings

Of the 352 respondents who reported experiencing LBP, the majority (66.1%) did not experience any difficulty while bending to put on their socks, tights or stockings. However, 25.3% of the respondents experienced some difficulty with this activity. Only 8.6% of the respondents found this activity difficult due to LBP.

Harreby *et al*. (1999) conducted a study on the risk factors associated with LBP amongst 1389 Danish schoolchildren and found that forward bending was commonly reported as one of the most painful activities related to their LBP. In contrast, Bejia *et al.* (2004) found no significant association between forward bending and the occurrence of LBP.

5.2.3.3 Activities affected by LBP

The respondents were required to indicate which activities were affected by LBP. Various activities were listed in the questionnaire including concentrating while studying, concentrating whilst attending lessons in class, having a good night's sleep, performing daily activities like bathing, showering, dressing, playing sports and enjoying their

hobbies. The activity greatest affected by their LBP was having a good night's sleep (50.6%), followed closely by playing sports (47.4%) and concentrating in class (46.6%).

5.2.3.3.1 Sleep

In this study, 50.6% of respondents reported experiencing sleep disturbances due to LBP. This finding is similar to that of Gunzburg *et al*. (1999) who surveyed a sample of 392 schoolchildren in Belgium to analyse the prevalence of LBP. He found that the incidence of self-reported LBP was significantly correlated with self-reported feeling of unhappiness and sleeplessness. These schoolchildren with LBP also reported being more tired without reason when compared to those schoolchildren who did not experience LBP. In contrast, Brattberg (2004) found that only 20% of respondents in Sweden experienced disturbed sleep due to their LBP.

Sleep is extremely important to recharge and repair both the body and the brain (Goldstein, 1994). The amount of sleep has been indentified as an important indicator of health and well-being in adolescents (Chen, Wang and Jeng, 2006). Sleep deprivation may result in tiredness, daytime sleepiness, and decreased mental acuity (Giannotti, Cortesi, Sebastiani and Ottaviano, 2002) which has a negative impact on the ability of adolescents to concentrate in class. This in turn, has a negative impact on the students' ability to learn in school (Wolfson and Carskadon, 2003). As Grade 12 is the most decisive examination that a learner has to write at a secondary school level, a lack of sleep could potentially have a direct negative impact on the learner's performance in school.

In this study, the high incidence of respondents that experienced a disturbed sleep due to their LBP indicates a significant finding. The researcher is of the opinion that scholars, teachers and parents could be educated on the importance of sleep. These individuals should also be made aware of the contribution of LBP to sleep deprivation so that preventative measures can be taken in order to promote a healthy lifestyle for our youth.

5.2.3.3.2 Limited Sporting Activity

This study reported 47.4% of respondents experiencing limited sporting activity due to LBP. This finding was similar to a study by Wigram (2006) which reported 42% of respondents experiencing limited sporting activity due to LBP. In contrast, a study by Gunzburg *et al*. (1999) found that 26% of those students who reported LBP had to limit their participation in sports activities. Olsen *et al.*, (1992) found that 33% of the students who experienced LBP indicated that their LBP prevented them from playing sports. In contrast, Feldman *et al*., (2001) found no association between LBP and physical activity of adolescents.

Physical activity and other extra-curricular activities are an integral part of development for all children and adolescents (Kohl III and Hobbs, 1998). Thus, the finding of this study is significant as it indicates that almost half of the adolescent population experienced limited sporting activity due to LBP. In addition, this finding provides an indication that LBP experienced by adolescents in the Greater Durban area does represent a problem that needs to be addressed as adolescents have to deal with consequences of their LBP such as limitations in sporting activity.

Future research should concentrate on exploring how LBP affects the daily lives of adolescents. This will help to provide more insight into the morbidity of LBP in the adolescent population.

5.2.3.3.3 Difficulty concentrating in class

The results of this study indicated that 46.6% of participants reported difficulty concentrating in class due to their LBP. This finding is lower than that reported by Brattberg (2004), who found that 74% of respondents who experienced LBP, found that it affected their ability to concentrate.

This finding further indicates that LBP experienced by Grade 12 learners in the Greater Durban area is problematic due to the impact that it could have on their daily lives. Concentration problems experienced by Grade 12 learners due to their LBP could have a significant bearing on their final examination results. This indicates a need to create

awareness amongst adolescents, teachers and parents on how to treat LBP as well as to prevent and limit the onset of future episodes of LBP.

5.2.3.4 Absenteeism due to LBP

The results of this study indicate that 21% of the respondents had missed school because of their LBP. This finding is similar to a study in the USA (Olsen *et al*., 1992) which found that 23.8% of students reported missing school due to LBP, and a study in Belgium (Gunzburg *et al*., 1999) which found that 25% of students reported absenteeism due to LBP. This finding is higher than the 10% absenteeism rate due to LBP, reported by Murphy *et al.,* (2006) in a UK based study. In contrast, the 21% absenteeism rate due to LBP in this study is lower than that reported by Bejia *et al*. (2004) who found that 41% of respondents in Tunisia missed school due to their LBP.

This result indicates that absenteeism due to LBP amongst Grade 12 learners in the Greater Durban area is an important problem that requires attention. Due to the emphasis placed on the Grade 12 final examination, there is a need for all Grade 12 learners to demonstrate commitment and dedication to ensure satisfactory results. High rates of absenteeism in this critical year may have a negative impact on the outcome of the Grade 12 learners' examination result. This in turn, can subsequently impact their future plans. Hence, it is imperative that future research concentrate on ways in which LBP amongst the adolescent population can be educated and treated effectively.

5.2.3.5 Treatment for LBP

Approximately 35% of those who reported experiencing LBP had visited a medical professional because of LBP. This is similar to the findings of Harreby *et al*. (1999) who studied 1389 schoolchildren and found that out of the 58.9% who reported suffering from LBP, 34.4% had consulted a medical professional including a physician, radiographer, physiotherapist and chiropractor. Similarly, Gunzburg *et al*. (1999) reported that in his study, 33% of subjects with LBP had reported visiting a medical doctor or physiotherapist for treatment of their LBP. This is moderately higher than the 27% of subjects who sought treatment for their LBP as reported by Olsen *et al*. (1992).

This result indicates that there are many adolescents who actively seek treatment for their LBP. It must be noted that the respondents were not asked to specify which medical professional they sought for treatment (i.e. physiotherapist, chiropractor, general practitioner, biokineticist). Nonetheless, this finding implies that if the problem of adolescent LBP is not addressed and adolescent LBP continues to rise, then health resources may become exhausted. Strategies should therefore be aimed at educating children and adolescents on the prevention of LBP at an early stage to prevent subsequent severe morbidity and disability later on in life.

Future research should concentrate on the remainder 65% of respondents who reported experiencing LBP but who did not actively seek any medical treatment. Such research would provide useful insight into the adolescence approach to pain management. For example, is their LBP manageable without treatment? ; Do they suffer in silence? Or do they actually have access to such medical treatment?

5.2.4 Chronicity of LBP

The chronicity of LBP was determined by assessing whether any of the learners had suffered from LBP prior to entering Grade 12. The majority of respondents (63.6%) had suffered with LBP for more than one year. This finding is higher than the 42% of adolescents who reported experiencing LBP for more than one year in the USA (Olsen *et al*., 1992) and the 37% of adolescents who reported chronic LBP in Canada (Feldman *et al*., 2001).

This result indicates that Durban adolescents in general, experience LBP. Treatment and preventative measures could therefore be developed to target this population by health professionals e.g. Chiropractors. Chiropractors and other health care practitioners can play an important role in these campaigns. Chiropractors are educated health care professionals trained in the treatment of LBP. Chiropractors could campaign and become actively involved to highlight the problem of LBP in society.

Parents, teachers and adolescents need to be educated on LBP and treatment should be sought as soon as possible to prevent and limit LBP from becoming chronic. Chronic LBP can lead to subsequent disability (Phelip, 1999).

Future research is required in this field, to identify the degree to which the aetiology, associated risk factors and severity predict the subsequent recurrence of LBP. This may help to identify those adolescents who are at the greatest risk for developing LBP so that preventative measures can be taken to reduce its recurrence and prevent or limit those adolescents from entering adulthood with pre-existing chronic LBP.

5.2.5 Respondents pain rating

A numeric rating scale of 0-10 (Mannion *et al*., 2007) was used to assess the levels of pain experienced by the participants. According to Mannion *et al*. (2007), a pain rating of zero equals 'no pain' and a pain rating of ten equals 'pain as bad as it could be'. The majority of the respondents rated their LBP as zero and two respectively, when their LBP was at its least. The majority of the respondents rated their LBP as eight when their LBP was at its worst. The median level of LBP experienced by the respondents was five. The average level of LBP experienced when it was at its least was 2.79 (SD=1.22). The average level of LBP experienced when it was at its worst was 7.11 (SD=1.98).

This finding is similar to that of Wigram (2006) who also found that the average level of LBP amongst a sample of 200 schoolchildren was five. Wigram (2006) had used a visual analogue scale of 0-10 for this pain assessment.

5.3 SELECTED RISK FACTORS

Eleven different risk factors for LBP was assessed in this study, three of which were demographic factors i.e. age, gender and ethnicity. The eight psychosocial risk factors assessed included depression, exam stress, anxiety, cigarette smoking, alcohol use, recreational drug use, family history and socio-economic status. Of these factors, only age, gender, alcohol use, family history, exam stress and depression have shown a significant correlation to the onset of LBP. These factors will be discussed in detail.

5.3.1 Age

The mean age of the sample of Grade 12 learners in the Durban public schools was18.04 years (SD=.588) and the respondents' ages ranged from 16 to 22 years. Age was a significant risk factor for LBP. With every one year increase in age, the risk of LBP

increased by 1.643 times. This is a significant finding which is consistent with the findings of Salminem (1984); Olsen *et al*. (1992); Balague *et al*. (1994); Troussier *et al*. (1994); Burton *et al*. (1996); Balague *et al*. (1999); Bejia *et al.* (2004); Brattberg (2004) and Wigram (2006), all of whom have reported that both the incidence and prevalence of LBP increases with age.

In accordance with the above studies, this study of the Grade 12 learners in the Greater Durban area suggested that LBP amongst adolescents is a common problem that increases with age, representing a higher risk for LBP in adulthood. The researcher is of the opinion that there is a need for further investigations with more detailed studies in this field, to identify aetiology, associated risk factors, severity and the degree to which these factors predict subsequent future LBP. This may help to identify those adolescents who are at greatest risk for developing LBP, so that preventative measures can be taken to reduce its occurrence and limit those adolescents from entering adulthood with pre-existing LBP.

This study also indicates that it is time for researchers in South Africa to look at pain, disability and disease in the context of younger individuals and not to simply apply adult definitions, hypotheses and research to children and/or adolescents and their LBP.

5.3.2 Ethnicity

According to the Durban Metro Local Agenda (2009), the majority of residents living in Durban are Black (56%), followed by a large Indian community (27%) and a minority White community (14%). Only 3% of Durban's population are Coloured. The majority of the respondents in this study were Black (43.9%), followed by Indian (24.8%), White (20.2%) and Coloured (10.6%) participants. Therefore, based on the racial distribution in Durban, the sample in this study is considered to be representative of the city's population.

This study did not find any relationship between the ethnicity of an adolescent and the prevalence of LBP. This finding is in contrast to that of Olsen *et al.* (1992), who found that in the USA, by the age of fifteen, Black adolescence were more prone to LBP than White adolescence (47% vs. 31%). The difference in this result between the South

African and American adolescents could be attributed to potentially important variables such as coping, social learning or attitude to pain perception (Robert, Edwards, Doleys, Fillingim and Lowery, 2001) which have been found to vary widely across different cultures and population groups (Moore and Brodsgaard, 1999).

It can be concluded that ethnicity was not a potential risk factor for the development of adolescent LBP in the Greater Durban area as adolescents from all ethnic groups are vulnerable to the development of LBP.

5.3.3 Gender

In this study, there were slightly more female respondents than male (54.5% vs. 45.5% respectively). However, proportionately 59% of females reported LBP while 55.6% of males reported LBP. Being female showed to be a significant risk factor for the onset of LBP (1.428 times higher risk than being male).

This finding is supported by other studies which indicated that the prevalence of LBP appears to be higher amongst females than males. Salminem (1984) described an increased prevalence of LBP amongst girls which was 24.2% as compared to 15.2% in boys. Eight years later, in a study of 1503 adolescents aged 14 years, Salminem *et al*. (1992) found an even higher prevalence of LBP amongst girls (33.9%) as compared to boys (27%). In addition, the girls reported more disability than boys. These findings compare with those found by Viikari-Juntura, Vuori, Silverstein, Kalimo, Kuosma and Videman (1991), Brattberg (1994) and Watson *et al*. (2003).

In contrast, Burton *et al*. (1996) reported a 52.6% prevalence of LBP amongst boys as compared to 34.3% LBP prevalence in girls. In this study, boys who were involved in sports activities complained of LBP more often than those who did not play any sports. Newcomer and Sinaki (1994) also reported an increased prevalence of LBP amongst boys (57%) as compared to that of the girls (44%). However, Olsen *et al*. (1992), found almost the same frequency of LBP amongst boys (30.7%) as among girls (30.0%). These findings were supported by Gunzburg *et al*. (1999).

It has been theorized that gender disparities of pain responses are due to the fact that males and females process pain in different ways. A study at the University of California – Los Angeles (2003) found that when males and females were subjected to painful stimuli, different parts of their brain were activated. For males, the cognitive or analytic region of the brain was activated. In females, it was the limbic system or emotional region that was activated. This, in turn, influenced their perception of the painful experience.

Psychologists have also postulated that women are generally more in attuned to how they feel physically which might mentally predispose them to the sensation of pain (Toomey, 2008). In addition, research (Soledad-Cepeda and Carr, 2003; Toomey, 2008) has indicated that female bodies respond more intensely to painful stimuli than males. In one study, women's pupils dilated faster than men's when uncomfortable pressure was applied to the subjects' fingers. As pupil dilation is a physiological response to pain that is controlled by the autonomic nervous system, this study showed that a female's response to pain is beyond conscious control (Toomey, 2008). In addition, female hormones can also play a role to either amplify or dampen the pain on any given day (Kritz, 2006).

5.3.4 Family History

The results of this study indicated that those respondents whose mothers had LBP were 3.373 times more likely to experience LBP than those respondents whose mothers did not have LBP. Similarly, if their fathers had suffered from LBP, the respondents' were 2.514 times more likely to suffer from LBP.

Several cross sectional studies have shown a significant association between LBP amongst parents and their children. A familial incidence has been shown for disc herniation (Gunzburg *et al*., 1990), spondylolysis (Afshani and Kuhn, 1991) and non-specific LBP (Murphy *et al.,* 2005). Salminem (1984) showed that children with at least one parent complaining of LBP reported LBP twice as often as other children.

Balague *et al*. (1994 and 1995), found a significant association between parents' history of low back pain and that of their children. Those schoolchildren, whose parents were

healthy, showed a 14% prevalence of LBP, while those schoolchildren who had one parent who had already been treated for LBP, showed a 21% prevalence of LBP. Schoolchildren whose parents had already been treated for LBP, showed a 24% prevalence of LBP. In this study, logistic regression analysis showed an odds ratio of 2:1 for subjects with a positive parental history.

The findings of this study are in contrast to that found by Sjolie (2002), who surveyed 105 adolescents in Norway and found no association between parental LBP and that of their children. This lack of association for familial LBP is supported by the results of a Canadian study (Feldman, 1998) which also failed to support the association with familial LBP.

The result of this study has shown that it is becoming more important to create awareness amongst parents on the familial predisposition of LBP. In this way, any parent suffering with LBP could become more cognisant of the implication of LBP on their children. Parents could also be educated on preventative and protective mechanisms for LBP and the importance of practicing healthy daily habits. This may help to facilitate a potential decrease in the significant contribution that familial LBP has on the prevalence of adolescent LBP.

5.3.5 Socio-economic status

This study failed to demonstrate any relationship between socio-economic status and adolescent LBP. This is similar to the findings of other cross sectional studies (Kristjansdottir, 1996; Vikat, Rimpela, Salminem, Rimpela, Savolainen and Virtanen 2000; Sjolie, 2002) and prospective studies (Viikari-Juntura *et al*., 1991). It has been postulated that these results, primarily from the Nordic region, could be due to the relatively mild social differences within the Nordic countries.

In contrast, Leboeuf-Yde *et al.* (2002) found that children from homes with a lower parental education group reported more back pain than children with higher parental education. In addition, Holstein *et al.* (1990) surveyed 1600 Danish adolescents and found that the majority of those subjects suffering with LBP were from the lowest parental social group.

In South Africa, we have a capitalist society (Adler and Webster, 1995) with a potentially stronger socio-economic difference amongst the citizens in contrast to the Nordic region. Therefore, one would have expected there to be a difference in results between the different socio-economic groups. On the contrary, the results seem rather inconsistent and inconclusive. A possible reason for this could be attributed to the fact that the questions used to assess socio-economic status in this study were not extensive enough to effectively investigate this factor. In light of this, the researcher is of the opinion that there is a need for further research in this regard. More attention could be given to all socio-economic factors including family income, area of residence etc. and not just limited to level of education and type of employment. This will help to adequately assess the role that socio-economic factors play in the prevalence of adolescent LBP.

5.3.6 Smoking

The results of the study revealed no relationship between smoking and the prevalence of LBP amongst Grade 12 learners in the Greater Duran area. These findings are consistent with those of Bejia *et al.* (2004). In contrast, several cross-sectional studies (Troussier *et al*., 1994; Harreby *et al*., 1999; Feldman *et al*., 2001) have shown that adolescents who smoke are more likely to develop LBP.

A possible reason as to why smoking was not shown to be a potential risk factor in the prevalence of LBP could be due to the notion that there were not enough smokers in the sample to adequately investigate this factor. Another possible reason could be that the answers to the questions on smoking may not have been answered honestly as smoking amongst adolescents is illegal according to the South African law.

Even though this study showed no correlation between smoking and the prevalence of adolescent LBP, future research is still warranted. The prevalence of smoking amongst South African adolescence is on the increase (Ntomchukwu and Matla, 2003). Future research should make use of more formal studies to further investigate the possibility of this association. Using more precise procedures and data source specifications may result in more focus placed on determining the relationship between smoking and the prevalence of adolescent LBP in South Africa.

5.3.7 Alcohol abuse

The results of this study show a significant association between alcohol intake and adolescent LBP. A review of the literature has revealed very little information regarding the association between alcohol consumption and adolescent LBP.

Sandstrom, Andersson and Wallerstedt (1984) conducted a study on 50 patients and found that alcohol use was significantly associated with LBP. Muscle symptoms were more generalised but pain and swelling affected certain muscle groups like the calf and back muscles. In contrast, Leboeuf-Yde (2000), who conducted a review on the existing literature, did not find any positive association between alcohol consumption and LBP.

Past studies (Ntomchukwu and Matla, 2003) in South Africa have shown that the most common narcotic used by South African adolescents between Grades 9-12 is alcohol. In comparison, cigarette smoking and recreational drug use was less common. The main reasons cited for narcotic use were stress, boredom, tiredness or the availability of these substances at parties.

A Grade 12 learner could be subject to all of the above especially alcohol use. This coupled with the finding of the relationship between alcohol intake and adolescent LBP has a significant impact on the future prediction of LBP amongst South African adolescents. An increase in alcohol intake amongst adolescents could result in an increased association with LBP.

The researcher is of the opinion that more effort is required in educating adolescents to address this problem of substance use amongst South African adolescents. More could be done to educate adolescents and their parents on the serious adverse affects of substance use and the detrimental effects that it could have on one's health. A collaborative effort could be considered to firstly highlight this ever-growing problem and secondly, to implement strategies so that these substances are not easily attainable by the youth of this country.

5.3.8 Recreational drug use

The results of this study failed to show any relationship between recreational drug use and the prevalence of LBP amongst Grade 12 learners in the Greater Durban area. However, Kirkaldy-Willis and Bernard (1999) have identified recreational drug use as a risk factor for the development of LBP.

A possible contributing factor as to why recreational drug use was not shown to be a risk factor in the prevalence of LBP in this study could be attributed to the authenticity of the answers. This study assumed that the responses to the questions were open and honest and it was therefore used to reflect the current status of the Grade 12 learners. However, the use of recreational drugs is illegal in South Africa. Even though the researcher stressed that all questionnaires were to be treated with anonymity and confidentiality, the respondents may have felt reluctant to divulge this information, especially in writing.

5.3.9 Exam stress

The results of this study showed that very few respondents experienced no exam stress (0.5%). Mild exam stress was experienced by 18.2% of respondents whilst the majority reported experiencing moderate levels of exam stress (67.3%). High exam stress levels were experienced by only 11.5% of respondents.

This study reported a positive relationship between LBP and exam stress. One of the confounding factors for this result could be related to the researcher administering the research instrument (the questionnaire) during the period of the matric examination. This is a time when the adolescence stress levels are considered to be at its highest (Bester and Swanepoel, 2000). The researcher was unable to find literature on the direct affects of exam stress on the prevalence of adolescent LBP. However, there are a few noteworthy studies (Balague *et al*., 1995; Mikkelsson, Sourander, Salminem, Kautiainen and Piha, 1999) that assessed the influence of non-specific psychological stress in relation to adolescent LBP that deserves a mention.

Balague *et al.* (1995) assessed the role of familial and psychological factors (emotional factors, behavioral factors) in the prevalence of LBP amongst schoolchildren. The results of this study showed that psychological factors strongly predicted the onset of LBP amongst schoolchildren. In addition, a higher incidence of psychological factors amongst the participants, predicted a greater limitation of daily activities as well as an increased need for medical care. Another study performed by Mikkelsson *et al*. (1999) assessed the experience of widespread pain in schoolchildren. The results of this study showed a strong correlation between psychological stress and the persistence of musculoskeletal pain at various locations in the body.

As Grade 12 is regarded as the most important academic year for learners, their experience of exam stress and pressure is much more substantial as these results have a significant impact on their future. The high levels of exam stress could be attributed to the curriculum design, too many extracurricular activities, the focus of competition and academic achievement by parents and teachers or the inability of specific adolescents to cope. The researcher is of the opinion that educating parents and teachers on the stressors that children are facing and the signs to watch for in terms of emotional strain are important.

5.3.10 Anxiety

The results of the study demonstrated that very few respondents experienced no anxiety (0.8%) whilst 18.2% experienced mild anxiety. The majority of the respondents reported experiencing a moderate level of anxiety (71.2%). Only 8.1% of respondents reported high levels of anxiety.

Brattberg (2004), who sampled 335 schoolchildren in Sweden, found that the prevalence of anxiety amongst those scholars aged 10-16 years was 34%. Similarly, a South African study by Da Costa and Mash (2008), found that the prevalence of anxiety amongst Johannesburg adolescents, with an average age of 16 years and attending private schools only, was 40%. Some of the contributors to their high levels of anxiety were reported to be their worry about the future, their struggle with academic workloads, changeover to a new school and high parental expectations.

In this study of the Grade 12 learners in the Greater Durban area, there was a statistically significant association between the participants' anxiety and LBP. The proportion of respondents with LBP increased, as the anxiety score increased. The researcher was unable to find literature on the direct affects of anxiety on the prevalence of adolescent LBP. However, research (Croft, Papageorgiou, Ferry, Thomas, Jayson and Silman, 1995) is available on the effects of anxiety on adult LBP. Croft *et al*. (1995) showed that adults, who were initially free of LBP, were more likely to report an episode of LBP 12 months later when exposed to higher levels of anxiety in the workplace than those who were not.

The result of this study revealed that anxiety is a common experience amongst Grade 12 learners. This result provides motivation for further studies to be conducted that explore the role of anxiety in the prevalence of adolescent LBP. As this study was exploratory in nature, future research should make use of more formal studies in order to provide a more in-depth insight into this association.

5.3.11 Depression

Using the Beck Depression Inventory (Beck *et al.,* 1996), this study showed that a high percentage of the respondents who had LBP demonstrated signs of depression (71%). In addition, there was a significant association between Beck's score and LBP. After adjusting for other factors, depression was found to be significantly related to LBP as the proportion of respondents with LBP was greater in those with depression than those without. Those respondents with a BDI score >21 had a 1.632 times higher risk of LBP than those without depression.

This result concurs with a study by Murphy *et al.* (2006) who surveyed 679 schoolchildren between the ages of 11 and 14 years and found that emotional problems were significantly associated with chronic LBP. In another study by Sjolie (2002), LBP was also associated with poor well-being amongst adolescents aged 14-16 years. Gunzburg *et al.* (1999) also found that the incidence of self-reported LBP was significantly correlated with the respondent's self-reported feelings of unhappiness and sleeplessness.

This study raises the concern that the high frequency of depression amongst Grade 12 learners in the Greater Durban area is an issue that should be investigated more. This problem needs to be addressed proactively in view of its growing prevalence (Da Costa and Mash, 2008), as well as its potentially detrimental effects on physical health.

The researcher believes that incorporating a questionnaire on life stressors at the beginning of each school term as part of a guidance curriculum might assist teachers in identifying adolescents at risk of psychopathology such as depression. In addition, guidance and psychology services need to be available and structured in a manner that will make these services representative of the gender, population and language groups of the adolescents they serve in order to improve accessibility. Particular efforts may be needed during periods of transition, such as puberty, school changes and matriculation.

5.3.12 In Summary

This chapter concludes the study report. Based on the objectives of this study, it can be concluded that:

a) The prevalence, frequency, severity and chronicity of LBP amongst Grade 12 learners in the Greater Durban area is high and of concern to all adolescents, parents, teachers and medical professionals.
b) Demographic factors such as age and gender have been shown to be important parameters in the aetiology of adolescent LBP. In contrast, ethnicity failed to show this association.
c) Three psychosocial risk factors did not show any association to LBP amongst Grade 12 learners in the Greater Durban area. They include socio-economic status, smoking and recreational drug use.
d) In contrast, five psychosocial risk factors showed an association to LBP amongst Grade 12 learners in the Greater Durban area. They include alcohol abuse, family history, exam stress, anxiety and depression.
e) Finally, after adjusting for all other risk factors for adolescent LBP, depression and high exam stress showed the strongest association with the occurrence of LBP amongst Grade 12 learners in the Greater Durban area.

5.4 LIMITATIONS OF THE STUDY

A review of the literature revealed many different potential risk factors relating to LBP. This study is limited to three demographic factors i.e. age, gender and ethnicity and eight psychosocial risk factors i.e. depression, exam stress, anxiety, smoking, alcohol use, recreational drug use, family history and socio-economic status. These factors which were identified in the literature were supported by a focus group as being the most important. According to Davis and Heaney (2000), methodological factors including reliability and validity of study variables as well as uncontrolled confounders may contribute to inconsistency of results.

As presented in this study, research suggests that there are psychosocial factors related to LBP. Thus, in order to produce realistic results, certain confounding variables have to be controlled for in the analyses. For example, demographic variables such as age have been associated with the prevalence of LBP as well as the prevalence of psychosocial risk factors (Hildebrand, 1984). Thus, demographic variables including age, gender and ethnic group were included in this study.

Another important limitation of the study involved a flaw in the planning. Even though this study was based on the adolescent population i.e. those aged between 12-20 years, it was not specified as part of the inclusion criteria. Hence, the results included participants up to the age of 22 and was thus, not limited to an adolescent population.

It was also assumed that the responses to the questionnaires were open and honest and therefore reflected the current status of the Grade 12 learners. This allowed the research to be the best approximation of the role of psychosocial risk factors in Grade 12 learners with regards to LBP.

The researcher was present at the time during which the questionnaires were completed. It should be noted that this could have affected the results of sensitive questions such as smoking, alcohol and drug use. In addition, researchers should be wary of this approach as learners may feel under pressure to participate and may not feel comfortable to exercise their right to decline participation. This would also influence their perception on anonymity and confidentiality.

Furthermore, this study like all other self-reported questionnaires are prone to the effect of subjectivity (Mouton, 2002). In addition, this study was conducted during the period of the Grade 12 final examination. At this time the participants' were preoccupied with studies and were under stress associated with their final examinations. Thus, this may have contributed to an over-estimation of the results in terms of pain perception, anxiety and depression.

5.5 GENERAL GUIDELINES FOR FUTURE RESEARCH

From this study, many recommendations can be drawn. These include:

- LBP amongst adolescents is a common problem that increases with age, representing a risk for LBP in adulthood. This illustrates the need for further investigations with more profound studies on the risk factors so that more light can be shed on how to manage this ever-growing problem.

- This study was cross sectional in nature. Future research should consider using more longitudinal studies in order to distinguish between causal and prognostic factors that contribute to adolescent LBP.

- It is extremely important that the adolescents' own educational level, knowledge and attitudes with regards to LBP be further explored in order to make more evidence-based decisions in relation to the possible means of preventing LBP in this population. This serves more importance in terms of public health.

- The findings also demonstrate that there is a need for preventative and curative health programs to be implemented in earlier years of school. However, to design effective programs to address this public health problem of LBP amongst children and adolescents, further studies are needed to obtain a more profound understanding of the physiological and psychosocial correlates of pain in children and adolescents.

- It must be noted that this study did not examine the impact of LBP on an adolescent's life i.e. the consequences of LBP in adolescents. By assessing this, more insight can be gained regarding the severity of LBP amongst South African

adolescents, in order to emphasize the need for preventative and curative programs to be implemented in schools.

- The findings of this research suggest an investigation of Chiropractors' perception of their role as health care practitioners in the management of LBP among adolescents. They need to become more actively involved in society to promote awareness of the problem of LBP and to educate parents, teachers and adolescents about LBP and that treatment should be sought as soon as possible to prevent LBP from becoming chronic.

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APPENDIX A – LETTER TO REQUEST PERMISSION

Department of Education
Durban
4000
27 June 2008
Dear Sir/ Madam

Re: Permission to conduct research study

I am a student currently enrolled for the Chiropractic (Masters) program at the Durban University of Technology (DUT). As part of my Masters qualification I am required to conduct a research study.

The title of my study is:

The role of psychosocial risk factors on the prevalence of low back pain amongst Grade 12 learners in the greater Durban area.

The aim of this study is to:

* To determine the prevalence, frequency, severity, duration and chronicity of LBP amongst Grade 12 learners.

* To determine the biographic and psychosocial risk factors for LBP. These include:

* To assess the strength of the correlation of the various factors listed above in relation to low back pain.

It is hoped that this study will provide important information about LBP amongst Grade 12 learners, thereby contributing to the existing body of research on LBP. By conducting this study amongst Grade 12 learners in particular, the number of adolescents already with existing LBP entering the South African work force can be highlighted.

It is hoped that the results of this study will highlight the need for the implementation of necessary prevention strategies in South African Public Schools.

I kindly request your permission to conduct this study. Participation in this study will be voluntary and anonymous and the information gathered will be treated with respect and confidentiality. The results of this study will be made available to the Department and the participants in the form of a mini-dissertation in the Durban University of Technology library.

Please contact me if you have any queries/concerns.

Kind regards,

_____

RESEARCHER: Ms V.J Seethal (031 3732512)

SUPERVISOR: Dr. Leon Van Niekerk (011 5592082)

APPENDIX B – LETTER OF PERMISSION

DURBAN UNIVERSITY of TECHNOLOGY

PROVINCE OF KWAZULU-NATAL
ISIFUNDAZWE SAKWAZULU-NATALI
PROVINSIE KWAZULU-NATAL

DEPARTMENT OF EDUCATION
UMNYANGO WEMFUNDO
DEPARTEMENT VAN ONDERWYS

Telephone: 033 341 8610
Facsimile: 033 341 8612

Private Bag X9137
Pietermaritzburg, 3200
226 Pietermaritz Street
Pietermaritzburg, 3201

RESOURCE PLANNING

INTLOKOHLOVISI	HEAD OFFICE	PIETERMARITZBURG
Enquiries: Mr S Alwar	Reference: 0034/2008	Date: 05 July 2008
Imibuzo:	Inkomba:	Usuku:
Navrae:	Verwysing:	Datum:

Ms V J Seethal
Durban University of Technology

RE: The Role of Psychosocial factors on the Prevalence of Low Back Pain Amongst Grade 12 Learner in a Selected Durban Urban Area

Your application to conduct the above-mentioned research in schools in the attached list has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educator programmes are not to be interrupted.
5. The investigation is to be conducted from 15 July 2008 to 15 July 2009.
6. Should you wish to extend the period of your survey at the school(s) please contact Mr Sibusiso Alwar at the contact numbers above.
7. A photocopy of this letter is submitted to the principal of the school where the intended research is to be conducted.
8. Your research will be limited to the schools submitted.
9. A brief summary of the content, findings and recommendations is provided to the Director: Resource Planning.

10. The Department receives a copy of the completed report/dissertation/thesis addressed to:

The Director: Resource Planning
Private Bag X9137
Pietermaritzburg
3200

We wish you success in your research.

Kind regards

R. Cassius Lublsi (PhD)
Superintendent-General

APPENDIX C- LETTER OF INFORMATION: PRINCIPALS

Date:

Dear Sir, Madam: Welcome to my research study.

Title: The role of psychosocial risk factors on the prevalence of low back pain amongst Grade 12 learners in the greater Durban area.

Name of researcher: Verusha Seethal (031-3732512)
Name of supervisor: Dr. Leon van Niekerk (011 5592082)
Name of Institution: Durban University of Technology

Introduction:

Mankind has suffered from back problems for as long as documented records and has been identified as one of the most common pain manifestations that affect millions of people worldwide. Low back pain (LBP) is the most prevalent musculoskeletal condition and the most common cause of disability in developed nations. Manga *et al*. (1993) reports that the World Health Organization describes low back pain as an epidemic which can be managed by multidisciplinary management, including chiropractic.

During the past two decades, LBP amongst children and adolescents has become the focus of many researchers. Various studies in different countries have shown that the prevalence of non-specific LBP in these age groups is very high.

Procedure:

Attached is a copy of the Letter of Permission from the Department of Education to conduct this study. Your school has been randomly selected to participate in this study and your assistance will be appreciated. I would like to approach the Grade 12 learners of your school with the view to requesting their voluntary participation in this survey. Your school will be visited, the questionnaire will be introduced, and learners will be requested to complete the survey. Parental assent will be requested for all minors. Depending on the number of Grade 12 learners participating in the survey in your school, the survey should not take more than 30 minutes. It will be made clear to each learner that participating in this survey is not compulsory and that the responses of each individual and the school involved will remain confidential and anonymous. Participation or non-participation will not affect the education of the learner.

Benefits:

By conducting this study amongst Grade 12 learners in particular, the number of adolescents already with existing LBP entering the South African work force can be highlighted.

Remuneration:

None. Participation in this study is entirely voluntary.

Thank you for your most valuable time and participation in this survey.

Yours faithfully

V. Seethal (Researcher) Dr. Van Niekerk (Supervisor)

DURBAN UNIVERSITY of TECHNOLOGY

APPENDIX D – LETTER OF INFORMATION

Date:

Dear Parent and Student, welcome to my research study.

Title	**:**	**The role of psychosocial risk factors on the prevalence of low back pain amongst Grade 12 learners in the greater Durban area.**
Name of student	**:**	**Verusha Seethal, 031 3732512**
Name of Supervisor/s	**:**	**Dr. Leon van Niekerk, 011 5592082**

Background to the Study:
Low back pain (LBP) is the most common musculoskeletal condition and can result in long term disability. In the past twenty years, research has shown that LBP in children and teenagers may be as high as 70%. Therefore it is important to investigate factors that may result in LBP.

Outline of procedures:
You/your child have been selected to participate in this study. The study involves filling out a questionnaire, it is only for those students who currently in Grade 12 and are no older than 19 years. There are no risks involved in this study.

Benefits of the study:
This study aims to determine how many Grade 12 learners suffer from LBP and how psychosocial factors influence the frequency of LBP. This information will be useful as there is very little information on this subject in a South Africa teenage population.

Confidentiality and ethics:
Participation is voluntary and you/your child is free to withdraw from this study at any time. The information given is also private, so please do not write your name anywhere on the questionnaire. All information will be treated with the strictest of confidence and the results of the study will be made available to all participants on request.

Please do not hesitate to ask questions on any aspect of this study. Should you have any queries or complaints, you can kindly contact me, Verusha Seethal on 0833877333, my supervisor, Dr Van Niekerk on 011 5592082 or the Faculty of Health Sciences Officer, Mr. Vikesh Singh on 031 3732704.

In order to participate in the study please can you sign the informed consent as the parent giving consent for your child to participate in the study or as the child agreeing to participate. Thank you for your time.

Yours sincerely,

V. Seethal

Dr. van Niekerk **– European Masters in Exercise and Sport Psychology (2007)**

ISAHLUKA D
Usuku:
Mzali nabafundi abathandekayo, ngiyanamukela kulolucwaningo lwami.

Isihloko	**:**	**Indima edlalwa ukukhandleka komqondo ngenxa yezinhlungu zeqolo kubafundi bebanga leshumi Ethekwini nama phethelo**
Igama Lomfundi	**:**	**Verusha Seethal, 031 3732512**
Igama likanstumpa / Onstumpa	**:**	**Dr. Leon van Niekerk, 011 5592082**

Umsuka wocwaningo:
Ubuhlungu beqolo phecelezi [Low back pain (LBP)] yibona obuyimvamisa kwizinhlungu zezicubu zomzimba kungase kube imbangela yobudala. Eminyakeni eyamashumi amabili adlule, ucwaningo seluveze ukuthi izinga ubuhlungu beqolo (LBP) ezinganeni nasentsheni lingaze lifike emaphesentini awu 70%. Ngakhoke, kubalulekile ukuphenya izimbangela ezingadala umphumela wobuhlungu beqolo (LBP).

Okulindelekile:
Ukhethiwe ukuthi ube ingxenye yalolucwaningo. Sicela uphendule imibuzo ehleliwe mayelana nalolucwaningo mangabe usebangeni leshumi, ungaphansi kweminyaka ewu (19). Akuzuba khona buhlungu, nakulimala, nabungozi mayelana nalolucwaningo.

Inzuzo ngalolucwaningo:
Lolucwaningo lizokwenza ukuthi kutholakale ukauthi bangaki abafundi bebanga leshumi abaphethwe ilesisisifo sobuhlungu beqolo (LBP) nokuthi **ukukhandleka komqondo** kungaba namthelela muni wokubanga lesisifo (LBP). Ulwazi ngalesisifo (LBP) lubalulekile njengoba luncane ulwazi olusatholakele ngasa la eNingizimu Africa ebantwini abasha emiphakathini.

Imfihlo ngamagugu ngocwaningo:
Ukuba ingxenye kuloluccwaningo akuphoqelelike, ungahoxa noma yinini uma usufisa. konke okubhalile kugcina kuyimfihlo, asikho isidingo sokubhala igama lakho nemininingwane ndawo ephepheni lemibuzo. Konke okuwulwazi oluzotholakala ocwaningweni kuzohlonishwa kugcinwe kuyimfihlo yocwaningo. Imiphumela ngocwaningo izonikezwa bonke abebekade beyingxenya yocwaningo uma uyidinga.

Sicela ungangabazi ukubuza imibuzo ngalolucwaningo. Uma unezikhalo nongakuqondi, ungakubhekisa ku Verusha Seethal kwinombolo 0833877333, noma kuNstumpa wami uDokotela Van Niekerk kwinombolo 011 5592082 noma iFaculty yeHealth Sciences Officer, uMnm Vikesh Singh kwinombolo 031 3732704. Siyabonga ngokubambu iqhaza.

Ozithobayo,

V. Seethal

Dr. van Niekerk **– European Masters in Exercise and Sport Psychology (2007)**

DURBAN UNIVERSITY of TECHNOLOGY

APPENDIX E

INFORMED CONSENT FORM

(To be completed by parent/guardian and patient / subject)

Date **:**

Title of research project **: The role of psychosocial risk factors on the prevalence of low back pain amongst Grade 12 learners in the greater Durban area.**

Name of supervisor/s **: Dr. Leon van Niekerk – European Masters in Sport and Exercise Psychology 2007**

Tel **: 011 5592082**

Name of research student **: Verusha Seethal**

Tel **: 031 3732512**

Please circle the appropriate answer

	YES / NO
1. Have you read the research information sheet?	Yes No
2. Have you had an opportunity to ask questions regarding this study?	Yes No
3. Have you received satisfactory answers to your questions?	Yes No
4. Have you had an opportunity to discuss this study?	Yes No
5. Have you received enough information about this study?	Yes No
6. Do you understand the implications of your involvement in this study?	Yes No
7. Do you understand that you are free to withdraw from this study?	Yes No
at any time	Yes No
without having to give any a reason for withdrawing, and	Yes No
without affecting your future health care.	Yes No
8. Do you agree to voluntarily participate in this study	Yes No
9. Who have you spoken to regarding this study?	

Please ensure that the researcher completes each section with you
If you have answered NO to any of the above, please obtain the necessary information before signing

Please print in block letters:

Parent/Guardian Name: _____ Signature: _____

Scholar Name: _____ Signature: _____

Witness Name: _____ Signature: _____

Research Student Name: V. Seethal Signature _____

ISAHLUKA E

INCWADI YE NVUMO

(KUFANELE IGCWALISWE ABAZALI \ISIHLOBO KUNYE NESIGULANI)
Ilanga :

Igama lophenyo lo hlelo : **Indima edlalwa ukukhandleka komqondo ngenxa yezinhlungu zeqolo kubafundi bebanga leshumi Ethekwini nama phethelo**

Ugama likaNstumpa/Onstumpa: Dr Leon Van Niekerk011 559 2082

Igama Lomfundi : Verusha Seethal, 031 373 2512

Sicela ukHethe impendulo efanele

	YEBO \ CHA
1. Ingabe ufundile Iphepha lemininimgwane mayelana nocwaningo?	YEBO CHA
2. Ingabe ubenalo ithuba lokubuza imibuzo ngalolucwaningo ?	YEBO CHA
3. Uthole impendulo eku jabulisayo	YEBO CHA
4. Uthole Ithuba lokukhuluma ngalocwaningo?	YEBO CHA
5. Uthole ulwazi olwanele ngal ocwaningo?	YEBO CHA
6. Ingabe uyazwisisa ngokulindelwe kuwe ngokuzifaka kulolucwaningo?	YEBO CHA
7. Uya zwisisa na ukuthi uvumelekile ukuphuma noma ukuyeka	
Noma ngasiphi isikhati osifunayo	YEBO CHA
Ngaphandle kokuthi unike isizathu	YEBO CHA
Ngaphandle kokuthi kuphath kabi ikusasa lakho kwezempilo yakho	YEBO CHA
8. Uyavuma ukusiza kulolucwaningo ngesikhathi sakho	YEBO CHA
9. U khulume no bani ngalolucwaningo?	YEBO CHA

Qiniseka ukuthi umphathi walolucwaningo ugcwalisa zonke izingxenye nawe. Uma uphendule cha kule mibuzo ebuziweyo ngaphambile sicela uthole lonke ulwazi olufanele ngaphambi kokuthi usayine

Bhala ngama Gama amakhulu

Mzali/isihlobo: Sayina:

Umfundi: Sayina:

Ufakazi: Sayina:

Igama lomfundi owenza lolucwaningo: V.Seethal Sayina:

APPENDIX F

Confirmation of visit by Principal

District of school:

Date of visit:

I hereby confirm that I have approved that Miss V.J. Seethal from the Department of Chiropractic at the Durban University of Technology has attended this school and conducted a survey amongst the Grade 12 learners under the agreed conditions of permission by the KwaZulu-Natal Department of Education.

Principal/ Counsellor

APPENDIX G

LETTER OF THANKS TO PARTICIPATING SCHOOLS

Sir/Madam

I would like to take this opportunity to thank you most sincerely for your willingness and assistance in allowing me to conduct my research study at your school. I would also like to thank all your Grade 12 learners for their participation in my survey on the prevalence and role of psychosocial factors on low back pain amongst Grade 12 learners in the greater Durban area.

I trust that this exercise was of value to your learners and I assure you that the information gleaned from this survey is of great significance.

The published results of the survey will be available to you in the library of the Durban University of Technology.

Yours faithfully,

V. Seethal (031 3732512)

Dr. L. van Niekerk **(**011) 559 2082

APPENDIX H – FOCUS GROUP

CODE OF CONDUCT

This form needs to be completed by every member of the Focus Group prior to the commencement of the focus group meeting.

As a member of this committee I agree to abide by the following conditions:

1. All information contained in the research documents and any information discussed during the focus group meeting will be kept private and confidential. This is especially binding to any information that may identify any of the participants in the research process.

2. None of the information shall be communicated to any other individual or organisation outside of this specific focus group as to the decisions of this focus group.

3. The information from this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

Member represents	Member's Name	Signature	Contact Details

APPENDIX I

LETTER OF INFORMATION – FOCUS GROUP

Dear Participant,

I would like to welcome you into the focus group of my study.

The title of my research project is:

The role of selected psychosocial factors on the prevalence of low back pain amongst Grade 12 learners in the greater Durban area.

Background to the study:

Mankind has suffered from back problems for as long as documented records and has been identified as one of the most common pain manifestations that affect millions of people worldwide. Low back pain (LBP) is the most prevalent musculoskeletal condition and the most common cause of disability in developed nations. Manga *et al*. (1993) reports that the World Health Organization describes low back pain as an epidemic which can be managed by multidisciplinary management, including chiropractic.

During the past two decades, LBP amongst children and adolescents has become the focus of many researchers. Various studies in different countries have shown that the prevalence of non-specific LBP in these age groups is very high.

Balague (1999) reports that the incidence of LBP increases with age such that the lifetime prevalence of LBP amongst adolescents is very similar to that of the adult population. Hence, adolescent LBP is of particular importance because LBP may occur initially during this time but may then lead to subsequent severe and chronic morbidity in adulthood.

Therefore the research would require you as members of the focus group to assist in identifying as many pertinent factors as possible as a result of your participation or association with the programme.

Your participation in this study is much appreciated and you are assured that your comments and contributions to the discussion will be kept confidential. The results of the discussion will only be used for research purposes.

If you have any further questions please feel free to contact me.

Kind regards,

RESEARCHER : Verusha Seethal (083 3877 333)

SUPERVISOR: Dr Leon Van Niekerk (011 5592082)

APPENDIX J

INFORMED CONSENT FORM – FOCUS GROUP
(To be completed by the participants of the focus group)

Date :

Title of research project : The role of selected psychosocial factors on the prevalence of low back pain amongst Grade 12 learners in the greater Durban area.

Name of supervisor/s : Dr. Leon van Niekerk
Tel : 011 5592082

Name of research student : Verusha Seethal
Tel : 031 3732512

Please circle the appropriate answer

	YES /NO
10. Have you read the research information sheet?	Yes No
11. Have you had an opportunity to ask questions regarding this study?	Yes No
12. Have you received satisfactory answers to your questions?	Yes No
13. Have you had an opportunity to discuss this study?	Yes No
14. Have you received enough information about this study?	Yes No
15. Do you understand the implications of your involvement in this study?	Yes No
16. Do you understand that you are free to withdraw from this study?	Yes No
at any time	Yes No
without having to give any a reason for withdrawing, and	Yes No
without affecting your future health care.	Yes No
17. Do you agree to voluntarily participate in this study	Yes No
18. Who have you spoken to regarding this study?	

Please ensure that the researcher completes each section with you
If you have answered NO to any of the above, please obtain the necessary information before signing

Please print in block letters:

Focus Group Member: _____ Signature: _____

Witness Name: _____ Signature: _____

Researcher's Name: _____ Signature: _____

APPENDIX K

FINAL QUESTIONNAIRE

All questionnaires are strictly confidential. Please answer as truthfully as possible and tick one box per question unless otherwise indicated. Thank you again for your participation.

Part A:

1.1. How old are you? (Please tick the appropriate box).

16 years	
17 years	
18 years	
19 years	
20 years	
Older than 20 years	

1.2. Are you repeating Grade 12?

Yes	
No	

1.3. Are you male or female?

Male	
Female	

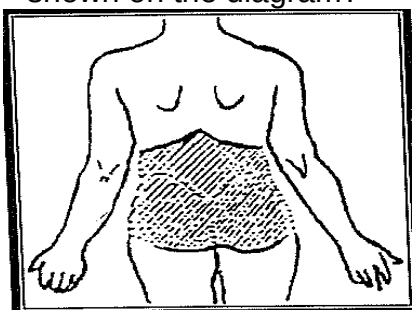
1.4. To which ethnic/cultural group do you belong to? (for statistical purposes only)

Black	
White	
Coloured	
Indian	
Other	

Part B:

For the following questions only consider low back pain that occurred in the last year unless otherwise indicated. Do not include pain occurring only during pregnancy, menstrual periods or during the course of a feverish illness such as flu.

2.1. Since the beginning of this year, have you suffered with back pain in the area shown on the diagram?



{Kuorinka *et al.* (1987)}

Yes	
No	

2.2. If you indicated ***Yes*** to the above question, how often do you suffer with back pain in this area?

Daily	
Weekly	
Monthly	
Every Year	

If daily, how many times per day	
If weekly, how many times per week	
If monthly, how many times per month	
If yearly, how many times per year	

2.3. Does the low back pain spread down your legs to below your knees?

Yes	
No	

2.4 Does the pain make it difficult or impossible to put on socks, stockings or tights?

No difficulty	
Difficult but not impossible	
Impossible	

2.5. Does the low back pain prevent you from:
(You may tick more than one box)

Concentrating whilst studying	
Concentrating whilst attending lessons in class	
Having a good night sleep	
Performing daily activities like bathing, showering, dressing	
Playing sports	
Enjoying your hobbies	
Other	

2.6. If you answered ***Other*** in question 2.5 above, please specify

_____
_____

2.7. Did you ever stay at home and miss school because of your low back pain?

Yes	
No	

2.8. Do you ever take pain relief medication for your low back pain (e.g. Ibuprofen, Panado, Dispirin)?

Yes	
No	

2.9. Did you ever visit a medical professional because of your low back pain?

Yes	
No	

2.10 Have you ever suffered with low back pain before entering Grade 12?

Yes	
No	

2.11 If you indicated yes to the above question, has your low back pain shown any change since entering Grade 12?

Has improved	
No change	
Has gotten slightly worse	
Has become significantly worse	

2.12 Please score in the box indicated on a **0 to 5** scale, the level of discomfort you have been experiencing in your low back since entering Grade 12.

0 – No discomfort or pain experienced. ☐
1 – Mild levels of discomfort or pain experienced. ☐
2 – Moderate levels of discomfort or pain experienced. ☐
3 – Significant levels of discomfort or pain experienced. ☐
4 – Severe levels of discomfort or pain experienced. ☐
5 – Extreme levels of discomfort or pain experienced. ☐

2.13 Please rate your low back pain on a scale of 0 to 10 when your low back pain is at its **worst.** A zero (0) would be "no low back pain at all" and ten (10) would be "**low back pain at its worst**". Please tick the appropriate value only.

0-☐, 1-☐, 2-☐, 3-☐, 4-☐, 5-☐, 6-☐, 7-☐, 8-☐, 9-☐, 10-☐

2.14 Please rate your low back pain on a scale of 0 to 10 when your low back pain is at its **least.** A zero (0) would mean **"no low back pain at all**" and a ten (10) would mean "low back pain at its worst". Please tick the appropriate box only.

0-☐, 1-☐, 2-☐, 3-☐, 4-☐, 5-☐, 6-☐, 7-☐, 8-☐, 9-☐, 10-☐

Part C:

3.1. Do you smoke?

Yes	
No	

If ***NO***, please proceed to question 3.5

3.2 Which one of the following describes your smoking habits?

Social smoker (occasionally)	
Habitual smoker (daily)	

3.3 For how long have you been smoking?

0 – 6 months	
6 – 12 months	
1– 2 years	
2 – 3 years	
3 – 4 years	
4 – 5 years	
More than 5 years	

3.4 On average, how many cigarettes do you smoke a day?

1-5 a day	
6- 10 a day	
11-15 a day	
16-20 a day	
More than 20 a day	

3.5 Do you have a previous history of smoking?

Yes	
No	

(If ***NO***, please proceed to Question 3.8)

3.6 If YES to 3.5) above: How many cigarettes did you smoke per day?

1 – 5	
6 – 10	
11 – 15	
16 – 20	
More than 21	

3.7 How long have you stopped smoking for?

0 – 6 months	
6 – 12 months	
1– 2 years	
2 – 3 years	
3 – 4 years	
4 – 5 years	
More than 5 years	

3.8 Do you drink alcohol?

Yes	
No	

(If ***NO***, please proceed to question 3.10)

3.9 If YES, How many alcoholic drinks do you consume per week?

1 – 3	
4 – 6	
More than 6	

3.10. Do you use recreational drugs?

Yes	
No	

(If ***NO***, please proceed to Question 3.13)

3.11 If YES, which of the following drugs do you use?

Dagga (Marijuana)	
Sugars	
Ecstasy	
Cocaine	

Crystal Meth	
Stilpain	
Other	

3.12. If ***OTHER***, please specify

_____
_____

3.13 Does anyone in your family suffer from low back pain?

Yes	
No	

3.14 If yes, who suffers with low back pain in your family? Please tick all relevant boxes.

Paternal Grandfather (dad's father)	
Paternal Grandmother (dad's mother)	
Maternal Grandfather (mum's father)	
Maternal Grandmother (mum's mother)	
Dad	
Mum	
Sister	
Brother	

3.15 What is your dad's occupation? _____

3.16 What is your mum's occupation? _____

3.17 What is the highest level of education that your parents have attained?

	Dad	**Mum**
Grade 11 or below		
Grade 12		
Diploma		
Bachelor's Degree		
Master's Degree		

Doctorate		
Professor		
Don't know		

PART D:

Please tick the appropriate column to indicate how you have been feeling since entering Grade 12. Choose the answer which best describes your feelings.

Since entering Grade 12 ,	Never	Sometimes	Often
4.1. Do you feel that you are under too much pressure?			
4.2. Do you feel that you are unable to control the important things in your life?			
4.3. Do you overreact when a conflict arises?			
4.4. Do you suffer with headaches?			
4.5. Are you having difficulty in sleeping?			
4.6. Do you feel refreshed at the beginning of the day?			
4.7. Are you having difficulty coping with all the things that you have to do?			
4.8. How often have you felt on top of things?			
4.9 Do you feel that things are not going your way			
4.10. Do you think that your difficulties are piling up so high that you cannot overcome them?			
4.11. Do you get angry very easily?			
4.12. Are you happy?			

PART E:

Please tick the appropriate column to indicate how you feel **about your up-coming Grade 12 examination**. Choose the answer which best describes your feelings.

	Never	Sometimes	Often
5.1 I am very worried about my examination			
5.2 I am concerned that I may not do as well in this examination as I could.			
5.3 I am concerned about failing my examination			
5.4 I am concerned about blanking out under pressure			
5.5 My heart races when I think about my examination			
5.6 I am concerned about performing poorly in my examination			
5.7 I am concerned that others will be disappointed with my performance			
5.8 I have a sinking feeling in my stomach when I think about my examination			
5.9 I am concerned that I may not be able to concentrate during my examination			
5.10 My hands get clammy when I think about my examination			
5.11 Even though I am well prepared for my examination, I am feeling very anxious and nervous			
5.12 I feel well rested and I am ready to write my examination			
5.13 I feel confident that I will do very well in my examination			

PART F

Please tick the appropriate column to indicate how you feel about yourself. Choose the option that best suits how you feel currently.

[A] 1. I do not feel sad ☐
2. I feel blue or sad ☐
3. I am blue or sad all the time and I can't snap out of it ☐
4. I am so sad or unhappy that it is very painful ☐
5. I am so sad or unhappy that I can't stand it ☐

[B] 1. I am not particularly pessimistic or discouraged about the future ☐
2. I feel discouraged about the future ☐
3. I feel I have nothing to look forward to ☐
4. I feel that the future is hopeless and that things cannot improve ☐

[C] 1. I do not feel like a failure ☐
2. I feel that I have failed more than the average person ☐
3. As I look back on my life, all I can see is a lot of failures ☐
4. I feel I am a complete failure as a person (as a student, child or friend) ☐

[D] 1. I am not particularly dissatisfied ☐
2. I feel bored most of the time ☐
3. I don't enjoy things the way I used to ☐
4. I don't get satisfaction out of anything anymore ☐
5. I am dissatisfied with everything ☐

[E] 1. I don't feel particularly guilty ☐
2. I feel bad or unworthy most of the time ☐
3. I feel quite guilty ☐
4. I feel bad or unworthy practically all the time now ☐
5. I feel as though I am very bad or worthless ☐

[F] 1. I don't feel I am being punished ☐
2. I have a feeling that something bad may happen to me ☐
3. I feel I am being punished or will be punished ☐
4. I feel I deserve to be punished ☐
5. I want to be punished ☐

[G] 1. I don't feel disappointed in myself ☐
2. I am disappointed in myself ☐
3. I don't like myself ☐
4. I am disgusted with myself ☐
5. I hate myself ☐

[H] 1. I don't feel I am any worse than anybody else ☐

2. I am very critical of myself for weaknesses or mistakes ☐
3. I blame myself for everything that goes wrong ☐
4. I feel I have many bad faults ☐

[I] 1. I don't have any thoughts of harming myself ☐
2. I have thoughts of harming myself but I would not carry them out ☐
3. I feel I would be better off dead ☐
4. I have definite plans about committing suicide ☐
5. I feel my family would be better off if I were dead ☐
6. I would kill myself if I could ☐

[J] 1. I don't cry any more than usual ☐
2. I cry more now than I used to ☐
3. I cry all the time now. I can't stop it ☐
4. I used to be able to cry but now I can't cry at all even though I want to ☐

[K] 1. I am not more irritated now than when I entered Grade 12 ☐
2. I get annoyed or irritated more easily than I used to ☐
3. I feel irritated all the time ☐
4. I don't get irritated at all at the things that used to irritate me ☐

[L] 1. I have not lost interest in other people ☐
2. I am less interested in other people now than I used to be ☐
3. I have lost most of my interest in other people & have little feeling for them ☐
4. I have lost all my interest in other people and don't care about them at all ☐

[M] 1. I make decisions about as well as ever ☐
2. I am less sure of myself now and try to put off making decisions ☐
3. I can't make decisions any more without help ☐
4. I can't make decisions at all anymore ☐

[N] 1. I don't feel I look any worse than I used to ☐
2. I am worried that I am looking old or unattractive ☐
3. I feel that there are permanent changes in my appearance and they make me look unattractive ☐
10. I feel that I am ugly or repulsive looking ☐

[O] 1. I can work about as well as before ☐
2. It takes extra effort to get started at doing something ☐
3. I don't work as well as I used to ☐
4. I have to push myself very hard to do anything ☐
5. I can't do any work at all ☐

[P] 1. I can sleep as well as usual ☐
2. I wake up more tired in the morning than I used to ☐

3. I wake up 1-2 hours earlier than usual and find it hard to get back to sleep ☐
4. I wake up early every day and can't get more than 5 hours sleep ☐

[Q] 1. I don't get any more tired than usual ☐
2. I get tired more easily than I used to ☐
3. I get tired from doing anything ☐
4. I get too tired to do anything ☐

[R] 1. My appetite is no worse than usual ☐
2. My appetite is not as good as it used to be ☐
3. My appetite is much worse now ☐
4. I have no appetite at all any more ☐

[S] 1. I haven't lost much weight, if any, lately ☐
2. I have lost more than 5 kilograms ☐
3. I have lost more than 10 kilograms ☐
4. I have lost more than 15 kilograms ☐

[T] 1. I am no more concerned about my health than usual ☐
2. I am concerned about aches and pains or upset stomach or constipation or other unpleasant feelings in my body ☐
3. I am so concerned with how I feel or what I feel that it's hard to think of much else. ☐ 4. I am completely absorbed in what I feel ☐

[U] 1. I have not noticed any recent change in my interest in sports ☐
2. I am less interested in playing sports than I used to be ☐
3. I am much less interested in playing sports now ☐
4. I have lost interest in playing sports completely ☐

In your opinion, is there any other **PSYCHOSOCIAL** factor/s (e.g. abuse, violence and fear at home, lack of parental support etc. which may influence your low back pain?

_____
_____
_____
_____
_____

* You have now successfully completed the questionnaire *
* Thank you for your participation in this study *