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Existing Strategies that Assist in Prevention of Low Back Pain in the College Student.

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CHAPTER 1

INTRODUCTION TO THE PROBLEM

Statement of the Problem

This paper is an investigation into the ways that a college student can prevent low back pain. Low back pain can be very challenging to treat due to the multitude of structures in the lumbar spine alone that can contribute to pain. Prevention, while challenging in itself, may provide a solution to the increasing prevalence of this condition. Back pain can affect an individual's ability to function in daily activities of living, leisure activities and necessary work duties. Activity limiting low back pain often leads to recurrent episodes of pain and can transition to chronic low back pain. Activity limitation and participation restriction can be an expectation of chronic low back pain affecting any age population (Delitto et al., 2012). The intention of this paper is to review the current literature regarding different existing strategies that assist in the prevention of low back pain, specifically in the college student.

Low back pain takes place in the lumbar vertebrae or spine (Easley, Murdock & Morgan, 2011). Common types of low back pain may include discogenic pain, muscular or mechanical pain, sacroiliac joint pain, scoliosis, and spondylolysis. Pain can originate from any innervated structure in the lumbar spine including the disc, joints throughout the spine, ligaments surrounding the spine, muscles of the low back and pelvis, and fascia, or connective tissue throughout the back (Delitto et al., 2012). An individual may present with pain in the low back, sharp, shooting pain into the buttock, one or both legs, and weakness. The symptoms of the different types of back pain are similar, thus challenging a provider to not only diagnosis the condition correctly but to also treat it effectively and efficiently.

The course of low back pain may be acute, subacute, recurrent, or chronic. Acute low back pain is defined as pain lasting less than one month, subacute is lasting between two to three months, recurrent is acute symptoms return repeatedly, and chronic is lasting greater than three months from the initial onset of pain. Low back pain is often recurrent in nature and the prognosis changes when the influence of recurrence is involved (Delitto et al., 2012). Hides, Richardson, and Jull (1996) found that when one experiences back pain, the multifidus, a muscle located deep within the low back musculature, does not spontaneously recover thus emphasizing the importance of specifically retraining these muscles. It is common for an individual to not retrain these muscles appropriately due to lack of knowledge of the healing process thus influencing recurrent low back pain. Factors that can influence the probability of developing chronic low back pain can include psychological distress or depression, fear of pain, movement, low expectations of recovery and passive coping style (Delitto et al., 2012).

According to Easley et al. (2011), risk factors for low back pain are multifactorial and can include a sedentary lifestyle, obesity, smoking, poor posture, prolonged slumped sitting, poor flexibility, and psychological factors. According to the American College Health Association-National College Health Assessment (ACHA-NCHA, 2012), only half of undergrads participate in the recommended amount of physical activity from the American College of Sports Medicine. Approximately 35% of young adults are either overweight or obese and while this does not cause low back pain some studies suggest it is a predictor of low back pain and associated with a longer duration of low back pain. Smoking has been shown to cause early degenerative changes in the disc and limit blood supply to the structures in the low back. Psychosocial factors, including feeling very sad, feeling exhausted, and feeling overwhelmed, have been identified to be significantly related to back pain (Gilkey, Keefe, Peel, Kassab, & Kennedy, 2010). The

ACHA-NCHA (2012) spring results found approximately 20% of college students were diagnosed or treated by a professional for one, two, or more mental health conditions in combination with depression and anxiety. In 2011, there were an estimated 45.6 million adults aged 18 or older in the United States with any mental illness, of those, 11.5 million with a serious mental illness (Substance Abuse and Mental Health Services Administration [SAMHSA], 2011). The contribution of these factors demand the need for skilled college health providers not only in the area of evaluating physical factors contributing to back pain but the related psychosocial factors (Gilkey et al., 2010).

According to the ACHA-NCHA (2012) spring results, the average age of a college student is 22.59 years with 45.8% of students in the 18-20 year old range. College students are predominantly female and of full time student status. The demographics of the American college student include students of all income levels and cultural backgrounds. A study conducted of 29,424 individuals revealed the prevalence of low back pain ever increased from 7% in the 12 year old participant surpassing 50% in 18 year old girls and 20 year old boys with a consistent trend for more women to report low back pain (Leboeuf-Yde & Kyvik, 1998).

Significance of the Problem

Low back pain affects more than 80% of adults at some point during their lives. It is the most common cause of disability and workers' comp claims for people under the age of 45 (Reis & Flegel, 1996). Pain recurs in 60-80% of people within a year of their first episode of low back pain (Hides et al., 1996). Approximately 50% of people with low back pain will seek health care and of those seeking care there was a greater fear that low back pain could impact their future and had higher pain levels than those who did not seek care (Kent & Keating, 2005).

Low back pain remains understudied in the college-aged population yet it has been documented as the most frequent health problem experienced by college students within a school year by the American College Health Association (ACHA). According to the ACHA, back pain has a 47% prevalence rate amongst college students within a school year. The National College Health Assessment (NCHA) supports this finding with consistently high prevalence with annual ranges from 44-51% (Gilkey et al., 2010). According to the ACHA-NCHA (2012) spring results, back pain is the third most common treatment diagnosis. At Southern Illinois University-Carbondale campus, back pain was the most frequent treatment diagnosis seen at the Student Health Center in 2011-2012 academic year (C. Casper, personal communication, January 14, 2013). Students with back pain access college health providers for treatment, thus highlighting a concern for demand of providers and cost of health care.

The most common clinicians consulted for back pain are chiropractors, general medical practitioners, orthopaedists, and physical therapists. There are numerous treatment options and evidence based practice guidelines for a clinician to choose from. The challenge of the unknown etiology of most low back pain and the lack of consistency in regards to treatment across disciplines results in high variability of management strategies and can result in patient dissatisfaction and ongoing pursuit of care (Kent & Keating, 2005).

There are direct and indirect costs related to the management of low back pain. Direct costs are related to health care while indirect costs are related to days off work and effects on industry production. Other non-financial costs to consider with low back pain include inability to participate in family and social activities (Kent & Keating, 2005). According to Kent and Keating (2005), the estimated direct costs annually for USA was 24,300 million dollars.

A study of 973 college-aged participants, Kennedy, Kassab, Gilkey, Linnel, and Morris (2008) found a significant relationship between the prevalence of back pain among women and psychological factors. Psychological factors are connected to the reporting of physical pain and some research suggests mental health does have an impact on physical health. Although this population is understudied, it is suggested that any mental illness is becoming increasingly prevalent in adults aged 18 and older and psychological factors affect the prevalence of low back pain. The extent or severity of low back pain may contribute to activity limitation which can conversely influence psychological health by impacting mood and an individuals' social network.

Physical effects of low back pain can include limited movement or flexibility, weakness, poor posture, and overall deconditioning. Activity limitation and participation restriction resulting from back pain, especially chronic low back pain, can impact quality of life and work performance (Ehrlich, 2003).

Purpose of the Project

The purpose of this project is to examine strategies that exist to assist in prevention of back pain, specifically in the college student population due to the high prevalence and impact on daily life. This will be accomplished by a critical analysis of research that has been conducted regarding prevention of low back pain. These specific questions will be addressed:

1. How effective is a back school education program in the prevention of low back pain in young adults?
2. What other preventative measures in regards to low back pain have been utilized and proven to be effective in young adults?
3. How is a person's psychological status affected by back pain or vice versa?

Limitations

The scope of this project is to review the current literature regarding prevention of back pain specifically in the college age student population. Although it may be used as a reference for other age populations, the preventative measures may not be as effective in all populations.

CHAPTER 2

LITERATURE REVIEW

A review of the current literature suggests several strategies that exist to assist in prevention of back pain in the general population. Strategies include but are not limited to, back school education program, brief education, physical conditioning, fear avoidance training, and population based public health interventions.

Back School

The strategy of back school as an educational tool in the prevention of back pain was reviewed. Back school was first developed in 1969 and described by a Swedish physiotherapist Marianne Zachrisson-Forsell. It is now utilized internationally (Klaber Moffet, Chase, Portek, & Ennis, 1985). Many different back school programs have since developed, but there are similarities in the program structure. A back school education program generally includes two components, an educational program and physical exercises. Lessons or education is provided to a group of people and supervised by a physical therapist or other medical provider (Paolucci et al., 2012). A general anatomical lecture related to the spine, its functioning and ergonomics is included. Information may be given regarding pain, psychological aspects and stress management. Physical exercises are included and taught to participants by trained professionals. Exercises may include stretching, lower abdominal strengthening and re-training or re-education of the erector spinae muscles located in the back. Medical providers attempt to relate education to functionality in daily life for the participants. Posture, body mechanics and ergonomics is addressed and related to activities of daily living such as dressing, bathing or even recreational activities such as sewing or gardening (Paolucci et al., 2012). The aim of back school is to help the patient take more responsibility of his or her pain, manage the condition independently, and

prevent recurring episodes of low back pain. Improving communication through back school can assist with the medical provider/patient relationship by building rapport and trust.

A Pubmed database search of randomized controlled trials (RCT) was conducted for relevant trials reported in English. RCTs that reported back school as an intervention were included with the population specified for college students or young adults. Five RCTs were found with the key terms of back school and college students but upon reviewing the articles, a back school program was used as a preventative tool in only two of the studies. Schenk, Doran, and Stachura (1996) assessed the learning effects of a back school program with 205 healthy adults in an industry setting, but age was not reported. Reis and Flegel (1996) assessed 243 undergraduates knowledge about back care and exercise. Two of the other three studies suggested and supported education as an effective tool in prevention of low back pain but did not evaluate back school specifically. The third study assessed the associations between psychological distress and musculoskeletal symptoms, not specifically back school. Brennan, Shafat, MacDonncha and Vekins (2007) found 65% of participants with lower back pain felt that not enough information was provided regarding lower back pain and would be interested in attending a back school program. The specific college student population in regards to low back pain prevention remains understudied, specifically the use of back school in this population. Therefore additional studies of back school utilization in the general population were reviewed.

The American Back School studied by Schenk et al. (1996) is an educational program consisting of video and classroom learning and teaches students to maintain lumbar lordosis while lifting. Lumbar lordosis would maintain the lumbar spine in an extended position and reduce pressure on the intervertebral disc (Schenk et al., 1996). The program involves a 2-3 hour lecture composed of anatomy and correct lifting techniques delivered by a physical therapist.

The use of audiovisual aids and demonstration of correct lifting techniques along with participant demonstration is included. Recommended student to instructor ratio is 15:1. The study included 205 healthy adults in an industry setting. Participants were placed into three groups, the interactive back education program group, a video group, and a control group that received no back education. This study not only assessed knowledge through an administered quiz but examined whether lifting posture changed as measured with a flexible ruler. The flexible ruler measured change in the lumbar lordosis, or extension, after back school. Participation in the back education program improved knowledge of correct lifting techniques and body mechanics. A significant difference was found in lifting posture, learning and affect when compared to the video and control groups. The video group was not interactive, and there was no feedback or communication with an instructor, and no opportunity for questions. The learning strategies were not available for the video group and may have influenced the lack of learning regarding lifting techniques. Schenk et al. (1996) found and supported a back school program that includes group interaction, practice of lifting techniques, and feedback can influence learning. It suggested further research regarding the long term effects of the back school program in prevention of low back pain.

The study by Reis and Flegel (1996) included 243 undergraduates at a large public university in the Midwest. The majority of the participants were white females with the average age of 19.4 years; 30% of the participants were enrolled in either community health or kinesiology programs. The study objectives were to obtain a descriptive analysis of the participants experience with back pain and knowledge of appropriate exercises for a healthy back. All participants completed a questionnaire on their back pain history, knowledge of back care and exercise patterns before initiation of any back education. Participants attended lectures

and a workshop on back mechanics. They also were individually evaluated for posture, flexibility of the hamstrings and hip flexor muscles due to their attachment at the pelvis, back and abdominal strength, and lifting technique. Participants were grouped based on their self-report of back pain with one group reporting no back pain (29%) and the other group reporting back pain one to five days a week (71%). Regarding posture, 70% of the participants claimed they had good posture most of the time yet with only 45% reporting they sat erect when seated. Approximately half of the participants reported studying for at least two hours without a break and with 70% of them sitting in a slouched posture at a computer. One third of the participants reported knowledge of what exercises to do to have a healthy back yet discovered they were performing harmful exercises for their back. Reis and Flegel reported that participants' knowledge of back care was not significantly associated with any of the general indexes of activity, including lifting, stretching, sitting or sleeping. The majority of the participants regularly strained their backs through poor posture during studying, lifting techniques and sleep positions. Carrying backpacks on only one shoulder also contributed to excess strain on the neck, shoulders and back. Ultimately, the participants who reported they were knowledgeable about back care were actually performing improper exercises that could potentially harm their back. No significant associations were found between physical measures of flexibility and strength and experience of low back pain. Lifting behaviors that put the participants at risk for back injury were observed. The participants were receptive to learning how to reduce low back pain and reported worrying about having a healthy back. A study limitation is that it may have attracted students with a greater concern about their own health due to the self selection of the sample.

The long-term effect of the Active Back School program on minimizing recurrent episodes of low back pain was studied by Glomsrod, Lonn, Soukup, Bo, and Larsen (2001). Active Back School was proven effective in a RCT with a one-year follow up period finding recurrences of low back pain and days of sick leave were significantly reduced. The purpose of this study was to assess the long term effects of the program three years after the intervention was conducted. Eighty-one individuals with an average age of 39.4 participated in the study, 43 were randomly allocated to the back school program and 38 to the control group. Participants of both groups were allowed to choose other treatments for low back pain or engage in other physical activity during the study. The Active Back School program consisted of 20 lessons with a theoretical and exercise component during a 13-week period. The control group did not receive any attention or information apart from follow-up assessments. The back school group received postal reminders twice a year to encourage focus on ergonomic principles in activities of daily life and to continue home exercises. The outcome variables of the long term follow-up were recurrences of low back pain and sick leave due to low back pain based on memory ratings. The participants were also asked about activities that provoked low back pain and habits concerning home exercises. The mean number of episodes of low back pain from three years before to three years after the intervention was significantly reduced for both groups. The number of new episodes of low back pain the three years after enrollment was significantly smaller in the Active Back School group and the time from enrollment until the first new episode of low back pain was longer in duration compared to the control group. The duration of sick leave was found to be shorter in the back school group. During the follow up period, the mean number of healthcare contacts in the back school group was significantly less compared to the control group. The mean overall experienced pain score was significantly less in both groups at

1-year and 3-year follow-up but in the favor of the back school program. The general low back function score significantly increased in both groups but also was in the favor of the back school program. Quality of life measurements showed significant improvement with the back school group but not the control group. At 3-year follow-up, both groups reported lifting, sitting for a prolonged period, and bending forward were movements associated with low back pain. The authors concluded that the Active Back School did have long term effects on reducing episodes of low back pain and days of sick leave. The back school program improved low back function and general functional activity was positive. A limitation of the study is the reliance on the participant's self-report of episodes of low back pain and sick leave.

Heymans, van Tulder, Esmail, Bombardier, and Koes (2004) conducted a Cochrane review of 3584 patients with chronic low back pain. The review showed that there is moderate evidence suggesting that back schools, specifically in an occupational setting, reduce pain, and improve function and return-to-work status, in the short and intermediate-term, compared to exercises, manipulation, myofascial therapy, advice, placebo or waiting list controls, for patients with chronic and recurrent LBP. There is conflicting evidence regarding the effectiveness of back school with long term results on pain and disability. A systematic review by Brox et al. (2008b) of eight studies found conflicting evidence to support the effectiveness of back school compared with wait list, no intervention, placebo, and limited evidence compared with exercises, usual care, and a cognitive-behavioral-based back school. For recurrences of back pain, conflicting evidence was found on the effectiveness of back school versus no intervention and limited evidence of back school versus exercises, usual care and a cognitive-behavioral based back school. When back school is part of a multidisciplinary intervention, it was found to be more effective than no treatment for short and long term pain reduction. It appears back school

is the most effective and supported in the occupational setting (Brox et al., 2008a). Back school education programs were also found to be effective for addressing and correcting lifting posture and educating individuals regarding spinal mechanics and lifting techniques when used in an industry setting (Schenk et al., 1996). Brennen et al. (2007) found consistency with high prevalence of low back pain and found a recurrence rate and behavioral habits of sufferers, which could be warning signs of potential for chronicity. The study supported the need for educational intervention and treatment focused on prevention of low back pain, but again did not assess the effectiveness of back school.

Denis et al. (2012) have proposed a study to evaluate the effectiveness of a global secondary prevention program for acute and sub-acute low back pain. The aim of the prevention program is to decrease recurrences of low back pain among health care professionals. The study also aims to assess the average time to recurrence of low back pain and ability to decrease likelihood of the condition progressing to a chronic state. The intervention group will participate in the global prevention program over a two month period. The program consists of cognitive training or providing information about pain pathways and factors that contribute to pain progressing to a chronic state. The program also includes a physical training component or implementation of an education and exercise program followed by a home based program. The education program will last two hours and include information regarding factors contributing to chronicity, anatomy, pain pathways and the impact of emotional factors. A copy of a French version of The Back Book is given to each participant to assist in reassuring the participant in the ability to manage their back pain. The training program includes five weekly rehabilitation sessions of 90 minutes each led by a physiotherapist. The session consists of a warm up, rhythmic exercises and changes in rhythm, a period of stretching, and postural exercises. The

sessions are progressive in nature; therefore a participant is not allowed to continue through the program in the event of an absence. The training program goals are to improve the participant's knowledge, lessen fear of movement through the use of repeated exercises in the aim of improving awareness towards avoidance behavior and encouraging return to physical activity, and to reinforce the importance of postural control. A booklet or handout of exercises is given to each participant at the end of the first session with instruction to perform the exercises on a daily basis. The control group will not receive any specific treatment of low back pain in this study but can pursue treatment on their own. All participants will be followed for two years. The results of the program's impact on low back pain recurrence will be known during 2014. The search for valid and effective prevention of low back pain, specifically recurrences and the conversion to chronicity persists.

Brief education

Brief education is another strategy for prevention of back pain and does possess some of the same concepts as back school. Brief education as an intervention involves brief contact with a medical provider, self-management patient led groups, educational booklets, and Internet discussion groups. Clinical involvement varies from no involvement, such as with a mailing of a back booklet, to an intensive course. The aim is to encourage patient accountability and self-management of back pain along with minimizing any concerns. Brief education can be managed in the physical therapy setting but also addressed through other providers (Brox et al., 2008b).

A systematic review including 10 RCTs was reported by Brox et al. (2008a). Moderate to strong evidence was found for brief education being better than usual care and as effective as routine physical therapy and aerobic exercise in reducing disability. Limited or conflicting evidence was found though regarding Internet-based interventions. Educational interventions

were found to be more effective than no intervention and as effective as other interventions such as massage and acupuncture. Brief education was recommended to reduce sickness absence and disability.

Brox et al. (2008b) also reviewed five RCTs with four of high-quality that evaluated brief education in the clinical setting. Brief education consisted of examination, information, reassurance, and advice to stay active. Strong evidence was found that brief education in the clinical setting is not more effective in reducing pain than usual care and there is limited evidence comparing it to back school and exercises. Moderate evidence was found for the short-term effectiveness of brief education on disability compared to usual care and limited evidence versus back school and exercise. Strong evidence was found for the effectiveness of brief education on sick leave versus usual care in three trials of 1596 patients, although one trial found no difference. Five studies were identified that compared back book or Internet education to different interventions. Pain was reported in all studies, disability was reported in four studies and sick leave was not reported. Limited evidence was found on the effectiveness of back book and Internet education versus yoga, massage, exercises, manipulation, and acupuncture and conflicting evidence compared to wait list or no intervention. Brief education is recommended to reduce sickness absence and disability but there is disagreement in the delivery of brief education. The lack of communication with a provider in the back book and Internet discussion may impact dissatisfaction.

According to Udermann et al. (2004), an educational book, “Treat your own back”, was proven to assist readers in decreasing their own low back pain and reduce the frequency of recurrent episodes of pain. The study included 62 subjects with the average age of 42.4 years, but 48 subjects completed the study due to attrition. One week after reading the book, 51% of

the subjects reported noticeable improvement in their pain. At 18-month follow-up, subjects had maintained statistically significant and clinically relevant improvement in reported pain magnitude with use of brief education through an educational book alone. It has been suggested that education, even alone, may be an effective intervention for pain management and pain resolution.

Physical Conditioning

Physical conditioning or activity has been thought of as a means to prevent low back pain. Lahad, Malter, Berg, & Deyo (1994) conducted a review through the MEDLINE database of relevant articles published between 1966 and 1993 to assess the effectiveness of exercise for the prevention of low back pain. Sixteen studies were found with four being RCTs. The studies were conducted in the workplace and included subjects with some prior back pain. Short-term benefits from exercise were found in each of the trials and with one trial finding fewer days of self-reported back pain. In the study by Linton et al. (1989), subjects in the intervention group received exercise and back education therefore it was not clear if prevention of back pain was due solely to exercise. Observational studies examined the influence of back strength, flexibility, and cardiovascular fitness on back pain. Subjects with the least flexibility incurred seven times greater costs for back injury compared to subjects with the most flexibility. Subjects with the weakest back had three times greater costs compared to those with the strongest back. Controversial studies were identified with findings that isometric strength of the back was not associated with back pain development in either men or women and baseline strength did not predict back pain. Lahad et al. concluded that subjects in an exercise intervention group had fewer days of back pain and fewer days of work loss compared to controls yet subjects were not followed beyond 18 months. Exercise at that time was identified as only mildly protective

against low back pain with aerobic exercise as effective as specific exercise for the abdominal or back muscles. Therefore, Maul, Laubli, Oliveri, & Krueger (2005) studied the long-term effects of supervised physical training in prevention of low back pain. The study included 183 hospital employees with chronic low back pain. The subjects were randomly assigned to a back school group or three months of supervised physical training and back school group. The back school group attended three sessions lasting 1 hour each. Information was provided regarding general anatomy, lifting techniques, coping strategies for stress management, the importance of physical activity, and lastly sports activities and lifting techniques for everyday situations. The exercise group received the same back school information along with physical exercises based on concepts of medical training therapy and use of machines. The exercise program lasted three months and included phases of individual training. The individual's physical tolerance, weight, number of repetitions, speed and range of movement was assessed and increased appropriately during the first four weeks of training. The training was performed two to three days a week lasting 1 hour in duration each, progressing per subject tolerance and documented records were kept of each individual's progress. Training was supervised by a physiotherapist and individual instruction and progression took place at the start of the exercise program and at two week intervals. Outcome measurements were obtained before and after intervention and at six months, one year and 10 years follow-up. Outcome measures included questionnaires, clinical investigation, lifting capacity, isokinetic trunk strength, range of motion, isometric muscular endurance, and aerobic capacity. At the conclusion of the program, subjects from both groups completed questionnaires and the exercise group performed all functional tests. Additionally, the exercise group was also asked to evaluate the effectiveness of the treatment with respect to pain and functional capacity to perform daily tasks. The self assessment of treatment created an

additional index for measurement. At six month follow up the entire initial evaluation was repeated in both groups and all subjects were asked to evaluate the treatment. At one year follow up both groups completed questionnaires only and evaluated the treatment they had received. At 10 year follow up a shortened version of the original questionnaires was administered along with questions to evaluate the long term effectiveness of treatment. At six month follow up the study found no major changes in pain intensity but the strongest treatment effect on isometric muscular endurance measurements. Both groups showed an increase however the exercise group showed a significantly larger increase. Isokinetic strength measurements also revealed an increase in both groups but a larger increase in the exercise group. All other functional measurements showed no significant difference between the groups. At one year follow up a significant pain reduction was found when considering both groups together but changes in pain intensity and pain quality was not significantly different between the groups. The groups together also showed a decrease in self-rated disability but again there was not a significant difference between the groups. The same results were found at 10 year follow up regarding pain intensity. The self-assessed treatment effectiveness at 10 year follow up revealed 61% in the exercise group and 54% in the back school only group had less pain than they had before treatment but no significant difference between groups. The exercise group had a higher perception that the treatment had reduced their pain and improved functional capacity. The study concluded that supervised physical training did effectively have positive short term effects on low back pain and at 10 year follow up the individual's ratings regarding the effectiveness of treatment supported supervised physical training as more successful in reducing pain intensity and improving functional capacity than a back school intervention alone.

Adams, Bogduk, Burton and Dolan (2002) suggested a U-shaped association between low back pain and activity. Too much activity or too little activity may influence low back pain. The association between low activity and low back pain may not be accurate. Athletes, for example, have suffered from low back pain due to the excessive training and loading of the lumbar spine thus straining the low back. It has been suggested that there is a need for further clarification of the amount of physical activity; however the definition of "optimal exercise" has yet to be defined. Specific core stability programs for prevention of injury have not been well-studied possibly due to the challenge of separating components of stability training from strength training. Joint stability depends on a combination of static or passive and dynamic stability. Static stability refers to structural stability of the bones and ligaments. Dynamic stability refers to the ability of the central nervous system to provide control and feedback for motor planning. For example, when an unexpected perturbation is sensed, the signal travels to the central nervous system which generates the appropriate motor response to maintain stability. This response is altered in people with chronic low back pain (Micheo, Baerga, & Miranda, 2012).

A RCT conducted by Sherman et al. (2011) compared yoga, stretching and a self-care book for chronic low back pain to determine if yoga was more effective for patients with chronic low back pain. Yoga has been identified with fair evidence for effectiveness for back pain but most studies were limited in small sample sizes. In this particular RCT, 228 adults were placed into one of three groups, a yoga group of 12 weekly classes (92 adults), a conventional stretching exercise group (ninety-one adults) or a self-care book group (45 adults). Yoga classes were found to be more effective than a self-care book and continued to show effectiveness when assessed several months later. Yoga was not more effective than conventional stretching exercises when assessed at any point in the study. The yoga classes included breathing

exercises, simple postures or positions, and guided deep relaxation. Classes were taught by experienced instructors. The stretching class included aerobic exercises, strengthening exercises, and stretches. Stretches focused on the major muscle groups but with emphasis on the trunk and leg muscles for a total of 52 minutes of stretching. Classes were taught by licensed physical therapists. Self-care participants received The Back Pain Helpbook which provided advice on exercises, life-style modifications, back pain causes and management of flare-ups. During the classes and during the post-class follow up period, 30-40% of the participants reported back pain related visits to medical providers including massage therapists and chiropractors. Medication use was reportedly decreased in the yoga and stretching groups throughout the study and follow up period. Study limitations included participants that were relatively well-educated and functional and the amount of stretching performed was greater than typically found in publically available classes. Sherman et al. found physical activity, including yoga and stretching, was effective in individuals with moderately impaired low back pain and may assist with decreasing recurrent episodes of back pain.

Garcia et al. (2013) explored the effectiveness of back school versus McKenzie exercises for patients with chronic low back pain. Both interventions are considered good options but no study has compared the effectiveness of the two methods for the outcomes of pain intensity, disability, quality of life and range of motion. The McKenzie method was developed in 1981 by Robin McKenzie and has three basic components of evaluation, intervention exercises, and prevention or an educational component. It is a classification-based treatment that involves examination of posture and range of motion of the spine. Subjects were randomly assigned to one of the two treatment groups, Back school or McKenzie method. Subjects in both groups participated in four 1 hour sessions over four weeks with the same physical therapist. Subjects

were given the same exercises for home to complete once a day. The subjects in the McKenzie group had individual tailored treatment and the therapist could progress the level of exercise as appropriate for the subject. The Back School group received new exercises and progressed in every treatment session, therefore the exercise progression was not individualized as it was in the McKenzie group. Outcome measures were taken at baseline, immediately after treatment, one, three and six months after conclusion of treatment. A reduction in pain intensity and disability was found after treatment in both groups, but subjects in the McKenzie group had greater improvements in disability after treatment. There was no statistically significant between-group difference for pain. Improvements were maintained at short-term follow-up at three and six months. The study concluded that the magnitude of the McKenzie treatment in regards to improvement in disability was small and may not be clinically important.

Investigators have proposed a relationship between low back pain and the musculature surrounding the back, abdominals and legs, but evidence is conflicting. Decreased endurance of the muscles surrounding the spine was found in subjects with low back pain. Abdominal muscle fatigue was found in a study of 190 adult subjects with low back pain (Ito et al., 1996). A conflicting study of 502 high school students with and without low back pain did not find a relationship between low back pain and poor abdominal strength (Feldman, Shrier, Rossignol, & Abenhaim, 2001). Flexibility has also been studied because of the effect on posture and associated effects on the biomechanics of the spine but again evidence is conflicting and does not consistently support the association of poor flexibility with low back pain. The study by Feldman et al. (2001) of the adolescent population did find hamstring and lower extremity flexibility to be associated with low back pain, while Nourbakhsh and Arab (2002) found a difference in hamstring length in adults with low back pain and a control group. Changes in

flexibility and strength may contribute to postural imbalances and abnormalities and can cause excessive stress on joints and weaken soft tissues by stretching them beyond their limits (Tuzun, Yorulmaz, Cindas, & Vatan, 1999). In a conflicting study, Moroder, Runer, Resch, and Tauber (2011) reported a high incidence of low back pain but found no difference in prevalence between relatively sedentary medical school students and active physical education students.

Handrakis et al. (2012) attempted to identify physical characteristics specifically associated with low back pain in college-aged adults. A convenience sample of 84 subjects (34 men and 50 women) with the average age of 24.4 participated in the study. History of low back pain or not did not effect inclusion in the study. Objective measures were performed by one examiner to ensure reliability. All subjects were tested through assessment stations in the same order and then divided into a pain or disability group. Subjects were classified into a "minimum or no pain" group and a "pain" group based on their score using the visual analog scale (VAS). The VAS consists of a scale of 0 to 10 to rate perceived pain. A second grouping was performed using the Oswestry Disability Index (ODI) to classify subjects into a "no disability" group or "disability" group. The ODI is a self administered questionnaire to determine pain-related disability in people with low back pain (Fairbanks & Pynsent, 2000). Hamstring length, hip flexor length, back extensor muscle endurance, abdominal muscle endurance, abdominal muscle strength and postural analysis were objective measures in this study. Decreased abdominal strength and endurance was not different between groups identified with and without low back pain. Hamstring length was not different between groups, which is consistent with the findings of Nourbakhsh and Arab (2002), nor was hip flexor length found to be different. Back extensor endurance was different between groups and Handrakis et al. speculated that impaired endurance may affect the muscles' ability to act against forces on the spine. The multifidus muscle is a

spinal stabilizing muscle and its normal bulk and strength does not return automatically after injury or low levels of activity (Hides et al., 1996).

A review conducted by Macedo, Bostick and Maher (2013) produced moderate evidence that an exercise program delivered to patients after their regular treatment for an episode of back pain in an effort to prevent recurrence of back pain were more effective than no intervention. Interestingly, an exercise program delivered during the initial treatment phase of a current episode of back pain was not found to be effective for prevention of new episodes. The study limitations included small trials and caution with generalizability. Exercise is the most consistent intervention in optimizing recovery from an episode of back pain and it is suggested that exercise is likely also effective in minimizing the number and severity of recurrences.

Fear Avoidance Training

The fear avoidance model was introduced in 1983 by Lethem et al. and a questionnaire for measurement was published in 1993 by Waddell et al. The concept of the fear-avoidance model is fear of pain. The avoidance of activities becomes an extreme response and can lead to decreased flexibility and loss of strength which can in turn lead to pain and a reinforcement of the avoidance cycle. Fear of movement contributes to behavior that is commonly observed in people with chronic low back pain who have been told to avoid certain movements or that a certain position may cause an increase in pain. This behavior is inhibitory and may contribute to chronicity of back pain. It is not known at this time if inhibition leads to a gradual development of depression (Brox et al., 2008b). Some studies suggest that fear avoidance beliefs may be a protective mechanism for someone with acute low back pain while other studies contradict the findings stating that elevated fear avoidance beliefs are a predictor of future disability (George, Fritz, Bialosky, & Donald, 2003).

Fear avoidance training as an intervention encourages a return to normal activities and physical exercise. The training is similar to the back school approach with some overlap but in addition addresses the patient's fears and may have a positive response in regards to coping (Brox et al., 2008a).

Suni et al. (2013) conducted an investigation of the effectiveness of a six month neuromuscular exercise (NME) and an educational counseling program for decreasing the incidence of low back pain and disability in young Finnish conscripts with a healthy back at baseline. All conscripts answered questions on prevalence of low back pain and related disability and underwent a medical screening by a physician within the first two weeks of the study. At least one day of low back pain or disability in everyday activities due to low back pain excluded conscripts from the study. The study included 690 men who were followed for 180 days, 356 in the intervention group and 334 in the control group. In addition to the standard military training program, an intervention program was initiated. The intervention program consisted of a NME program of progressive exercises and specific counseling material targeted to prevent low back pain and injury. Counseling aimed to increase conscript awareness of potentially harmful tasks for the low back and increase knowledge, understanding, and skills in performing these tasks in a less harmful manner. The conscripts also received a guidebook. Conscripts attended a 1 hour lecture during basic and special training periods and company leaders along with two educated exercise instructors addressed any potential hazards of field service. Conscripts in the control group participated in their service as usual but did fill in all study questionnaires. The intervention group was successful in reducing the total number of off-duty days by 58% compared to the control group but the number of health clinic visits due to low back pain was not different between groups. The results indicate that conscripts in the

intervention group experienced less severe injuries thus physicians prescribed fewer off-duty days. This concept supports the idea that NME and counseling may have had an impact on conscripts' knowledge of activities that were harmful to the low back and the conscripts had improved muscular endurance and trunk muscle stability therefore decreasing the severity of injury. Another explanation could include the psychosocial aspect of an altered pain-related fear avoidance belief. The conscripts in the intervention program could have been less afraid or felt more competent to return to duty regardless of low back pain. Limitations of this study include the inability to distinguish the specific effects of NME versus counseling. NME and counseling does have a prophylactic effect on low back pain and may provide insight in primary prevention of low back pain.

The effect of a fear avoidance based physical therapy intervention for people with acute low back pain was researched by George et al. (2003). Patients were between the ages of 18-55 and had to have an onset of low back pain in the last eight weeks. All patients received a standard physical therapy evaluation and completed self-report forms. The study included 66 patients that were randomly assigned to receive fear avoidance based physical therapy or standard care physical therapy. Patients underwent a re-evaluation at four weeks of treatment and treatment was discontinued. Follow up information by means of self-report forms was obtained at six months. Four physical therapists screened patients and attempts were made to standardize the delivery of treatment. The physical therapists attended a training session and demonstrated competency by passing a written exam. Treatment time was limited to 1 hour per patient per session and both treatment groups were required to have an educational component, standard exercises, and exercise progression. The Handy Hints educational pamphlet was issued to patients in the standard care treatment group. The pamphlet included patient education

regarding spine anatomy and pathology. The patient was assigned the pamphlet to read as part of their home program with self-report of compliance. The physical therapist answered any questions consistently with information from the pamphlet. The fear avoidance based treatment group received education utilizing a fear avoidance model which did not place much emphasis on anatomy but encouraged the patient to stay active and be responsible for management of the low back pain. Education utilizing the fear avoidance model informs the patient that back pain is a common condition and not a serious disease. The Back Book was issued to the patients in the fear avoidance based treatment group. The Back Book was assigned as part of a home program with self-report of compliance. The physical therapist involved in this treatment group answered questions consistent with The Back Book information. Disability from low back pain was the primary outcome variable measured in this study. Pain intensity was also rated by patients along with a secondary outcome variable of fear avoidance beliefs about physical activity. All patients reported reading the educational material at least one time and all reported receiving feedback consistent with the given treatment model during therapy sessions. At four weeks, no significant differences were noted between the treatment groups for follow up or physical therapy services. At six months, no significant differences were found between the treatment groups for follow up, selecting same treatment for low back pain, continued low back pain, or seeking additional treatment for low back pain. The standard care group had significant within group improvements for disability and pain intensity. The fear avoidance treatment group had significant within group improvements for disability, pain intensity and fear avoidance beliefs. The study found that participants with higher fear avoidance beliefs had a greater benefit from the fear avoidance treatment with less disability. Participants with lower fear avoidance beliefs receiving the fear avoidance treatment actually had more disability than participants receiving

the standard care treatment. The study supported the use of fear avoidance treatment with patients with higher fear avoidance beliefs versus those with lower fear avoidance beliefs and reported the reason is unclear.

Brox et al. (2008b) found no systematic reviews or meta-analysis of fear-avoidance training. A search of the latest Cochrane database review for behavioral treatment for chronic low back pain found 21 trials but none met the strict inclusion criteria. It was concluded that there is limited evidence that fear-avoidance or reducing techniques are more effective than usual care in reducing pain-related fear and disability. Moderate evidence was found to report fear-avoidance training included in a rehabilitation program is not different from spinal fusion on back pain.

Pincus, Vogel, Burton, Santos, and Field (2006) conducted a systematic review to research whether fear avoidance is a risk factor or predictor for back pain. The population included people consulting for musculoskeletal back pain in a variety of healthcare settings through January 2006. The review focused specifically on fear avoidance factors including pain-related anxiety. Nine studies were reviewed, but only seven contributed to the link between fear and outcome. Only one study was determined good for methodology and overall quality. None of the studies provided evidence for fear-avoidance beliefs as a risk factor for poor outcomes. Most studies, however, had less than 200 subjects and data could not be pooled due to the use of different instruments. One study found evidence only for depression as a predictor of poor prognosis for a person with low back pain. Pincus et al. speculated that depression may be correlated more with a general reduction in activity whereas fear might be more associated with a reduction of particular movements and activities.

More recently, “The Back Book” was developed with strong positive content and messages to change beliefs and behavior with respect to back pain. The idea is that negative beliefs and educating patients to avoid activities are barriers to recovery. Reduction of fear avoidance behavior continues to be researched as a strong contribution to prevention and/or treatment of low back pain. Training is focused on recovery and that long term relief depends on the patient’s effort. Emphasis is on activity with less information about anatomy, ergonomics and exercises. “The Back Book” explains low back pain to patients in an attempt to satisfy patients with medical care. Sparkes, Chidwick, and Coales (2012) researched the effect of general practitioners giving “The Back Book” to patients during the wait period before being assessed for physiotherapy compared to providing no information. The authors hypothesized that “The Back Book” would have a positive effect on fear avoidance beliefs, disability, and pain levels. Patients over the age of 18 with low back pain with referral to physiotherapy by a general practitioner were included in the study. The study included 62 subjects that were randomly allocated to “The Back Book” group or the no information group. All subjects were on the waiting list to be seen by a physiotherapist. The scores on the outcomes measures showed no clinical important changes in “The Back Book” group in regards to back pain beliefs, fear avoidance behavior, and disability. Current research does not support the use of “The Back Book” in isolation for treatment or prevention of low back pain in regards to changing fear avoidance beliefs (Sparkes et al., 2012).

Population Based Public Health Interventions

Attitudes and beliefs are increasingly recognized as having an important role in disability related to back pain. Physician behavior may be based on experience or influenced by patients’ expectations and other psychosocial factors (Buchbinder, Jolley, & Wyatt, 2001). Although

staying active is strongly recommended and more effective than rest and referral to a specialist is often not necessary it may still be a way of practice due to patient or physician beliefs. Re-education may be warranted due to the shift from the traditional treatment model to now a biopsychosocial model of illness with the concept of back pain being self-limiting (Brox et al., 2008b).

A public health campaign intervention was implemented in Victoria, Australia by Buchbinder et al. (2001). It was based on the messages in The Back Book. The campaign consisted of television commercials during prime time which were more concentrated during the initial three months but continued for one year. The commercials included information by recognized medical experts and Australian sporting and television personalities with their own success stories in overcoming back pain. The campaign also included radio and printed advertisements, seminars, workplace visits and advertisement on billboards. The Back Book was made widely available. Doctors received evidence-based guidelines for management of patients with low back pain. Telephone interviews before and two and two and half years after the campaign started were conducted with a computer assisted questionnaire. Participants were 16 to 65 years old and currently employed for at least 4 hours a week. The back beliefs questionnaire was used to measure beliefs about back pain. A higher score indicates a more positive belief about low back pain and better ability to cope with pain. Participants were also questioned about their awareness of the advertising campaign and whether their awareness influenced their beliefs or attitudes. A postal survey was administered to general practitioners before and 2 years after the campaign started with a similar design. The number and duration of worker' compensation claims and medical pay out was monitored during the campaign time period. Population surveys (n = 4730) were completed with approximately half of the

respondents stating awareness of the campaign at baseline. New South Wales, a similar demographic state which did not receive the campaign revealed awareness did not change over time however there was an increase in Victoria by approximately 50%. The increased awareness coincided with self reported change in beliefs about back pain. General practitioner surveys (n = 2556) were completed and similarly the number of doctors who were aware of the campaign significantly increased in Victoria between survey periods. This increased awareness also was accompanied by an increase in the number of doctors who reported a change in their beliefs about back pain. The doctors in Victoria were more likely to know that patients with low back pain could return to work before they were completely pain free and that complete bed rest should not be prescribed. Doctors in Victoria also reported they would be less likely to order tests solely due to patient expectations or normal practice patterns. There was a 15% reduction in workers' compensation claims over the duration of the campaign. Buchbinder et al. concluded that a population based intervention of advice about back pain can change beliefs about back pain in the general population and influence doctors' attitudes. Population based intervention may be an effective strategy for reducing disability and costs related to low back pain. Buchbinder et al. suggested that other strategies to reduce or prevent low back pain have been utilized once the problem has developed or modified occupational risk factors to reduce the occurrence of back pain. Population based intervention is aimed at changing back pain beliefs in an effort to reduce the initial occurrence of an episode of back pain or recurrence of back pain.

Education is typically effective to change beliefs, but social determinants may impact the ability to alter behavior. Gross et al. (2012) speculated that the effects of education may vary depending on the context in which it is delivered. With recent research findings of initial episodes of low back pain occurring in adolescence, it is suggested that education needs to target

these individuals when beliefs and attitudes are forming. The audience may require a change in the messaging or media used in future public health educational campaigns. The outcome of such strategies has not been measured and may take many years to assess.

Gross et al. (2012) explored law and public policy in regards to back pain when public health education is not enough in changing beliefs and attitudes. Availability of workers' compensation payments or ability to sue for pain and suffering have been found associated with delayed or prolonged recovery from an episode of back pain (Rasmussen, Leboeuf-Yde, Hestbaek, & Manniche, 2008). Legal or health policy could contribute to improving back pain related health behaviors by restricting the amount of advertising in favor of unproven treatments. System changes could be implemented to alter access to health services, workers' compensation benefits or reimbursement of non-curative treatments. Policy initiatives may need to be directed at employers to modify work policies to allow people to return to work despite back pain. Health care providers may also benefit from policy initiatives to change behavior towards evidence-based practice. The initiation of public policy is controversial due to several conflicting interests and workers' rights.

Social marketing, or the use of marketing techniques to influence a target audience to change behavior for the benefit of the individual or group, is another suggested intervention when education alone is not enough. A change in behavior may be due to a lack of opportunity but also could be due to a lack of motivation. Social marketers attempt to provide education about a health condition and change the social context and introduce an alternative solution. Social marketing may target individuals, government, or health policy makers (Gross et al., 2012).

The target audience should be considered in determining which strategy is the most effective for obtaining behavior change. Motivation, readiness to change, opportunity to change and the ability to change are all characteristics to consider. Rothschild (1999) proposed a conceptual framework to assist with determining the most effective strategy based on the target audience. According to this framework, if the population is motivated to change, has opportunity to change, and is likely to behave, education alone is suspected to be efficient. If the population is motivated but doesn't have the ability to change, social marketing may be a better choice for behavior change. If the audience is not motivated to change then legal or policy intervention may be necessary. Gross et al. (2012) suggested a combination of public health intervention, law and public policy, and social marketing should be considered due to most populations not being completely the same in terms of motivation, opportunity and ability to change.

CHAPTER 3

DISCUSSION

Low back pain affects about 25% of people in the United States at any given time. It is one of the most common medical problems affecting 80-90% of the general population at some point during their lives. Low back pain can limit an individual's activity level or ability to function in daily activities of living. It can impact an individual's ability to work or return to work. People with low back pain often seek health care for management of their condition and the cost of care in the United States alone has been estimated at 24,300 million dollars annually (Kent & Keating, 2005). Symptoms of low back pain vary and a number of anatomical structures can contribute to pain. Low back pain can present as different stages such as acute, subacute, recurrent or chronic. Most often, people who have an episode of low back pain will have a recurrence of pain. Many risk factors exist for low back pain. Mechanisms of low back pain vary and how various interventions impact recovery and recurrences remain unclear. It is not yet known the precise parameters needed to achieve this effect or the appropriate dose to achieve the desired outcome. The variability of low back pain, the number of contributing factors and risk factors lead to difficulty obtaining an accurate diagnosis. The many beliefs regarding low back pain and variety of interventions make it difficult to treat low back pain effectively. Prevention of low back pain would be preferred due to the nature of the condition and the variability described. Therefore, this research paper reviewed strategies that exist in prevention of low back pain.

The existing strategies of back school, brief education, physical conditioning, fear avoidance training, and population based public health interventions were explored through literature review. The strategy of back school as an educational tool was found to be supported

in the literature with moderate evidence to reduce pain, and improve function and return-to-work status, in the short and intermediate-term. Another review, by Brox et al. (2008b), found conflicting evidence to support the effectiveness of back school in comparison to other strategies. For recurrences of back pain, conflicting evidence was also found for the comparison of back school to other strategies. Back school appears to be the most supported in an occupational setting and when part of a multidisciplinary approach.

The strategy of brief education possesses many of the same concepts as back school. Brief education can be delivered by different providers and through the use of many sources such as patient led groups and social media. Limited or conflicting evidence was found to support brief education through Internet based interventions yet moderate to strong evidence was found to support brief education compared to usual care and other strategies when delivered personally. Brief education was found to reduce sickness absence and disability dependent on the delivery of the information (Brox et al., 2008a).

Physical conditioning or activity as a means to prevent low back pain was researched. Handrakis et al. (2012) cited trauma and decreased physical activity were correlated with low back pain. Risk factors for low back pain have been identified to include decreased flexibility and decreased strength of the musculature surrounding the low back. A study comparing yoga to a self-care book, or form of brief education, found yoga more effective. Yoga was not found more effective, though, than conventional stretching (Sherman et al., 2011). An exercise program delivered to patients after treatment of low back pain was found to have moderate evidence in preventing recurrence of back pain (Macedo et al., 2013). Short-term benefits from exercise were found with fewer days of self-reported back pain. Controversial studies were identified with findings that isometric strength of the back was not associated with back pain

development in either men or women and baseline strength did not predict back pain (Lahad et al., 1994). A 10 year study found exercise had positive short term effects on low back pain and the individual's ratings regarding the effectiveness of treatment supported supervised physical training as more successful in reducing pain intensity and improving functional capacity than a back school intervention alone (Maul et al., 2005). Most studies were conducted with subjects that had chronic back pain or had had low back pain in the past, therefore the effects of exercise truly on prevention of low back pain is difficult to accurately assess.

Fear avoidance training attempts to address an individual's response of avoidance of activities. This extreme response and can lead to decreased flexibility and loss of strength which can in turn lead to pain and a reinforcement of the avoidance cycle. The training is similar to the back school approach with some overlap but in addition addresses the patient's fears and may have a positive response in regards to coping (Brox et al., 2008a). A study of young healthy males who had reported not one day of back pain in the past was conducted and included a six month program of exercise and educational counseling. The results indicate that subjects in the intervention group experienced less severe injuries and less days off. The study found support for the idea that exercise and counseling may have had an impact on individuals' knowledge of activities that were harmful to the low back. The subjects did improve muscular endurance and trunk muscle stability therefore decreasing the severity of injury. Limitations of this study include the inability to distinguish the specific effects of exercise versus counseling but it was concluded that exercise and counseling have a prophylactic effect on low back pain. This finding provides insight in primary prevention of low back pain. Another study reviewed found support for the use of fear avoidance treatment with patients with higher fear avoidance beliefs versus those with lower fear avoidance beliefs and reported the reason is unclear. Therefore

identifying an individuals' fear avoidance beliefs is important and a outcome tool does exist to assess this with reliability. A Cochrane database review found limited evidence that fear-avoidance or reducing techniques are more effective than usual care in reducing pain-related fear and disability. A systematic review for fear avoidance beliefs as a risk factor or predictor for back pain was conducted. None of the studies provided evidence for fear-avoidance beliefs as a risk factor for poor outcomes but the quality of the studies were found to be poor (Pincus et al., 2006).

Population-based public health interventions have shown positive support for reduction of low back pain and cost for healthcare services. A study in Australia aimed to change attitudes and beliefs of physicians and the general population as they are increasingly recognized as having an important role in disability related to back pain. Buchbinder et al. (2001) concluded that a population based intervention of advice about back pain can change beliefs about back pain in the general population and influence doctors' attitudes. Population based intervention may be an effective strategy for reducing disability and costs related to low back pain. Population based intervention is aimed at changing back pain beliefs in an effort to reduce the initial occurrence of an episode of back pain or recurrence of back pain. Education is typically effective to change beliefs, but social determinants may impact the ability to alter behavior. The study conducted in Australia was conducted over a two year period and with significant cost. Similar studies have not been identified to reproduce similar results.

At time of review, no reliable evidence exists that chronic low back pain could be a predictor of psychological impairment. Psychological features of anxiety, fear, and avoidance can lead to the development of chronic pain status (Paolucci et al., 2012). A natural response to back pain may be a reduction in physical activity or rest. A reduction of physical activity due to

pain can lead to decreased flexibility and loss of strength which can in turn lead to pain and a reinforcement of the avoidance cycle. This activity limitation or reduction leads to less opportunity to regulate pain.

Low back pain has been found with increasing prevalence in the college-aged population, yet few studies exist specific to this population. Studies that were identified to include college-aged students were included in this research paper. Population based intervention programs, such as a back school program specific to the college aged population, can improve coping, recovery and quality of life for the low back pain sufferer. Increasing prevalence of low back pain in the college aged population with emerging poor low back health and poor management behavior demands the need for educational opportunities that will teach good back health practices to ultimately impact the prevention of low back pain. Gross et al. (2012) speculated that the effects of education may vary depending on the context in which it is delivered. With recent research findings of initial episodes of low back pain occurring in adolescence, it is suggested that education needs to target these individuals when beliefs and attitudes are forming.

Back school education has been shown to be most effective in the occupational setting for educating people on how to prevent back problems by learning about proper lifting techniques and related topics. The lifestyles of college students, particularly the growing use and reliance on computers and tablets and the accompanying issues with poor posture, add to the recommendation of new educational efforts on back care in this population.

Studies of the general population contributed to the majority of the research for this paper therefore the conclusion is made that results found for the general population can be generalized to the college-aged population specific. It was also found that studies of healthy individuals reporting not even one day of back pain are limited, most studies are conducted with people

already experiencing an episode of pain. Therefore it is recommended that more studies strive to assess strategies for prevention of low back pain instead of interventions for an individual already experiencing low back pain. It is recommended that more studies in the future will research the specific college-aged population to identify characteristics that may be specific to the age group.

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