CHALLENGES FOR THE IMPLEMENTATION OF EVIDENCE-BASED RESEARCH PROTOCOL INTO THE OUTPATIENT PHYSICAL THERAPY SETTING

By

Marge LaFlamme Taylor

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Kinesiology – Doctor of Philosophy

2015

ABSTRACT

CHALLENGES FOR THE IMPLEMENTATION OF EVIDENCE-BASED RESEARCH PROTOCOL INTO THE OUTPATIENT PHYSICAL THERAPY SETTING

By

Marge LaFlamme Taylor

Evidence-based practice has been identified as a vital component of clinical effectiveness which requires the clinician to select the most effective treatment based on research findings and clinical experience (Bury, 1998). While the last decade has shown a significant increase in the volume and accessibility of high-quality clinical research (Maher et al., 2004), the transition of PTs utilizing EBP clinically has not kept pace (Metcalfe et al., 2001; Turner & Mjolne, 2001). The purpose of this study was to provide PTs with a real time EBP workshop training and then qualitatively assess two main questions (1) What challenges do the PTs encounter when implementing the evidence-based graded activity for CLBP patients in the outpatient physical therapy setting? and (2) What recommendations do the PTs have to overcome the identified challenges?

Semi-structured interviews were completed on a total of 28 PTs employed in outpatient physical therapy settings in the Great Plains area prior to the workshop training, midway and at the completion of implementation. Analysis of the data demonstrated four major themes. Three of the themes, (1) PT buy-in, (2) lack of fit for individual patient, and (3) administrative aspects of clinic, confirmed that the PTs encounter challenges when attempting EBP implementation. While the lack of fit for individual patient and administrative aspects of clinic were challenges previously identified in the literature, the challenge of PT buy-in was not previously mentioned. The theme, PT buy-in, noted that the transition toward improving EBP will require the PTs to

alter their behavior. In addition, the subtheme, successful implementation, showed that the process of implementation is needed to further progress the PTs behavioral change and move them closer to PT buy-in.

Much less information was shared by the PTs to answer the second research question to provide recommendations to overcome identified challenges. These data were shown in one major theme, requires educating others about protocol, and one subtheme, motivation to change under the theme of PT buy-in. While few in number the recommendations provided important insight. The transition toward EBP is not a solo event involving just PT and patient. Many others can influence the outcome such as the medical community, general public, co-workers, administrators and insurance companies. The subtheme, motivation to change, further highlights the need to influence the PTs level of commitment in order to transition toward EBP.

Effective transition toward EBP for PTs will require altering the present continuing educational model. Further research is needed to explore which elements will effectively reach out to all concerned parties while providing motivation for PTs to change their clinical practice.

ACKNOWLEDGEMENTS

The journey to complete this dissertation has been longer and more arduous than I anticipated, but I am grateful for the growth that the process has produced. My faith sustained me through as I laid claim to Romans 5:3-4 “We can rejoice, too, when we run into problems and trials, for we know that they are good for us – they help us learn to endure. And endurance develops strength of character in us, and character strengthens our confident expectation of salvation.” I am even more grateful that I did not have to navigate this journey alone.

This is my chance to extend my heartfelt thanks to the many people who selflessly provided assistance. First, I want to thank my mother for instilling in me a fathomless depth for lifelong learning. Thank you to my sisters, Jean and Carol. Words cannot express how much your continual support helped me to keep going forward despite the many obstacles.

Special thanks are extended to my committee members. To Dr. Tracey Covassin, whose patience, humor, and guidance provided just the right type of encouragement I needed to keep going. To Dr. Marty Ewing, who introduced me to the wonderful world of qualitative detective work and taught me to dig deeper and strive harder than I thought was possible. To Dr. Tom Mackowiak, who helped unlock some of the mysteries of data analysis through his insight of word coding. To Dr. Jake Rowan, who shared a sympathetic ear during the journey.

Great shout of appreciation for all those who helped and supported me through the process. To Seneca Storm, Dani Lemus, and Debi Lampron, for the girls’ nights out to regain our sanity. To Matt Helm and the graduate student support groups that provided helpful insights. To Jenny Flemmer, Hunter Stemmer, Alison Albers, and Erin Reidman for transcription and editing assistance and Jon Heger for technical support.

TABLE OF CONTENTS

LIST OF TABLES…….. viii

LIST OF FIGURES…… ix

INTRODUCTION…… 1
Overview of the Problem…… 1
Significance of the Problem…… 4
Purpose of the Study……... 5

LITERTURE REVIEW……. 6
Introduction…… 6
Evidence-based Practice……. 7
Definition…… 7
Historical Perspective……. 8
Clinical Practice……. 10
Challenges to Implementation of Evidence-based Practice…… 13
Research Methods…….. 14
Clinician Skills…… 16
Work Environment ……. 18
Definition of Chronic Low Back Pain……..... 25
Neuroscience of Chronic Pain……..... 28
Prognosis of CLBP……. 30
Treatment for CLBP…… 31

METHODS……. 50
Research Design…….. 50
Participants……... 50
Participant Recruitment…….. 50
Procedure for Qualitative Study…….. 53
Demographic Interview…….. 53
Basic Information…… 54
Work Experience…….. 55
Estimate of CLBP patients seen in1 month…… 55
CLBP Treatment……. 56
Graded Activity Knowledge…….. 56
Work Environment…….. 56
Exposure to Research…….. 57
Graded Activity Treatment Protocol……... 57
Midway Interview…….. 61
Final Interview…… 62

Data Analysis…….. 63

RESULTS……..… 65
Final Interview…… 65
Summary of Participants……. 65
Definition of EBP…… 66
Challenges and recommendations for implementing EBP……. 66
PT buy-in……. 68
Commitment to Change…….. 69
Successful Implementation……. 72
Motivation to Change…….. 77
Lack of fit for individual patient……. 78
Lack of opportunity……. 79
Patient not responding well……. 80
Difficulty finding right candidate…….. 80
Administrative aspects of clinic…….. 81
Educating others about protocol……. 82

CONCLUSIONS……. 85
Work Experience……. 85
Gender……. 87
.
EBP model…….. 87
Challenges and recommendations for implementing EBP……. 89
PT buy-in……. 89
Commitment to change…….. 89
Successful implementation……. 93
Motivation to change……. 98
Lack of fit for individual patient……. 99
Lack of opportunity……. 99
Patient not responding well……. 100
Difficulty finding right candidate…….. 101
Administrative aspects of clinic…….. 103
Educating others about protocol……. 104
Medical community…… 105
Public perception…… 106
Insurance companies……... 107
Administrators…… 107
Co-workers……. 107
Advocacy…… 108
Limitations…….. 110
Discussion and future research……... 111

APPENDICES…… 117
Appendix A: Demographic interview guide……... 118

Appendix B: Midway Interview Guide……..…… 120
Appendix C: Final Interview Guide……... 121
Appendix D: Definition of terms…… 123
Appendix E: Informed consent letter……. 126
Appendix F: Human subjects (UCRIHS) approval form…… 129

REFERENCES…… 130

LIST OF TABLES

Table 1: Demographic Information on Study Participants……52

LIST OF FIGURES

Figure 1: EBP model (Sackett et al.,2000)……..……7

Figure 2: The fear-avoidance model of chronic pain (Asmundson, Norton, Vlaeyen,2000)…....27

Figure 3: Theme Diagram of Challenges and Recommendations for Implementing EBP……67

Figure 4: Major theme – ***PT buy-in***……...69

Figure 5: Major theme – ***Lack of fit for individual patient***.....79

Figure 6: Major theme – ***Administrative aspects of clinic***……..……..81

Figure 7: Major theme – ***Requires educating others***……82

INTRODUCTION

Overview of Problem

The past three decades of physical therapy literature illustrates that evidence-based practice has replaced the traditional emphasis of learning from the authorities (Bernhardsson & Larsson, 2013). This new benchmark has been defined as 'the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients' (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000). The physical therapy profession has joined with many other healthcare branches e.g., pharmacy, nursing, optometry, physical therapy, occupational therapy, etc. (Anthony, Rogers, & Farkas, 2003; Bennett & Bennett, 2000a; Driever, 2002; Ross & Davidson, 2006), in a concerted effort to integrate research literature with clinical expertise and the individual patient's perspectives (Jette et al., 2003).

Two significant changes for the physical therapy profession have been the transition of entry level education from the bachelors to masters to doctorate level and the marked increase in physical therapy research published (Salbach, Jaglal & Williams, 2013). In addition, the many continuing education courses listed online illustrate how each course now strives to emphasize how the information presented is evidence-based. With such significant changes in both entry level and continuing education, clinical practice must be transforming as well.

Unfortunately, clinical practice does not appear to be transitioning as quickly. Evidence from the literature shows that most physical therapists (PTs) base practice decisions on the information learned during entry-level education and personal experience rather than on evidence gathered from the research literature (Richardson &

Jerosch-Herold, 1998; Turner & Whitfield, 1997; Turner & Whitfield, 1999). Murray, Murray, MacKenzie, and Coleman (2005) examined the frequency of evidence-based practice at an outpatient facility that was affiliated with a teaching university. This study reported that PTs were using evidence-based treatment less than 50% of the time for treating Achilles tendinopathy and patellofemoral pain syndrome. The results of this study suggest that there is disparity between 'book knowledge' and 'real life' practice, of that business principles of profit and loss conflict with evidence-based practice. Perhaps the majority of physical therapy clinicians are just unwilling to change.

Jette et al. (2003) randomly sampled 1,000 PTs in the United States who were members of the American Physical Therapy Association (APTA) in July 2002. The study achieved a 48.8% return rate that showed positive attitudes and beliefs toward evidence-based practice. A high percentage of participants agreed that evidence-based practice is useful in everyday practice (82%), is necessary to practice (90%), improves quality of care (79%) and improves decision making (72%). Even more importantly, the survey reported that participants disagreed or strongly disagreed that using evidence-based practice placed unreasonable demands on them (61%) and noted that they should increase the use of evidence in their clinical practices (84%). The main limitations of this study are that only members of the APTA were surveyed and individuals that respond to the survey often do so because of their support for evidence-based practice. Even considering the study limitations, there are a fair number of PTs on board with the transition toward evidence-based practice (Jette et al., 2003).

Some of the potential hindrances expressed by clinicians included lack of time (Iles & Davidson, 2006; Jette et al., 2003), lack of access to easily understandable

summaries of evidence, and lack of skill to search the medical research literature (Iles & Davidson, 2006). Physical therapists with post-baccalaureate degrees noted greater ease utilizing online databases (Jette et al., 2003). These online databases provide the most assistance when the entire journal article (i.e. full text) is available (Fell & Burnham, 2004), but this access can be restricted to subscribers only (Maher, Sherrington, Elkins, Herbert, & Moseley, 2004). This additional cost to access the full text articles can be inhibiting for many PTs especially those working in smaller organizations or in rural settings (Maher et al., 2004).

Another challenge to utilizing evidence-based practice was the disparity between the research trial characteristics and the PTs own practice setting (Maher et al., 2004). Some PTs felt these differences were sufficient reason to dismiss the research findings (Maher et al., 2004), which can be wise if the patient has comorbidities that contraindicate the therapy (Sackett et al., 2000). However if the differences are less impactful, the PTs should be encouraged to use the findings with minor adjustments to accommodate patient's individual needs (Herbert, 2000; Glasziou & Irwig, 1995).

In order to improve the implementation of evidence-based research into clinical practice, all challenges need to be clearly identified. The most common response reported was a lack of time. This is a vague answer that cannot be resolved as none of us are capable of adding more time in our days nor can we relieve each other's patient load in this competitive market. Additionally, the lack of time response may represent that clinicians found the implementation process difficult to navigate. Perhaps clinicians found it difficult to remember challenges that they faced when they are questioned

retrospectively. This study will utilize a real time implementation to help capture any challenges that the therapists encounter along the way.

Significance of Problem

Failing to use evidence-based practice could result in poor clinical results for patients while increasing medical costs. This is especially evident in the treatment of patients suffering from chronic low back pain (CLBP). CLBP is recorded as one of the most common reasons for seeking health care (Hart, Deyo, & Cherkin, 1995), and is the most prevalent socioeconomic problem resulting in sickness absenteeism and reduction in work capacity leading to depression (Karjalainen, Malmivaara, Risto, Jauhiainen, & Koes, 2001). In addition, the direct medical costs for CLBP have been estimated at $8386 as compared to $3607 for the control group (Gore, Sadosky, Stacey, Tai, & Leslie, 2012). Despite the large volume of published research on the treatment and management of CLBP, the prognosis for these patients has not improved (Carey, Garrett, & Jackman, 2000). In fact, there is little consensus among medical specialties on either clinical evaluation (Cherkin, Deyo, Wheeler, & Ciol, 1995a) or management (Cherkin, Deyo, Wheeler, & Ciol, 1995b) of CLBP patients. It is possible that this lack of consensus reflects the difficulty clinicians encounter when attempting to implement evidence-based practice.

Therefore, this study provided clinicians with a real time implementation of an evidence-based protocol to treat CLBP patients and then qualitatively assess what challenges were encountered. The evidence-based protocol chosen was the graded activity. This has demonstrated good efficacy in the research literature (Smeets, Severens, Beelen, Vlaeyen, & Knottnerus, 2009; Hayden, van Tulder, Malmivaara, & Koes, 2005),

yet it has not been shown to be a treatment commonly selected by physical therapists (Battle, Cherkin, Dunn, Ciol, & Wheeler, 1994).

Purpose of the Study

The purpose of this research study was to provide PTs with training of an evidence-based research protocol, graded activity to treat CLBP patients and explore in real-time the PTs ability to implement the EBP protocol in outpatient physical therapy setting. The study focused on two main research questions (1)What challenges do the PTs encounter when implementing the evidence-based graded activity protocol for CLBP patients in the outpatient physical therapy setting?, and (2) What recommendations do the PTs have to overcome the identified challenges?

LITERATURE REVIEW

Introduction

This study strives to investigate the challenges that outpatient PTs encounter when implementing a pre-selected evidence-based treatment approach to address CLBP patients in their current practice. While the question appears simple, the process of discovering the complete answer is more complex. The answer requires unraveling four key concepts: evidence-based practice, definition of CLBP, prognosis for CLBP, and the treatment of CLBP. This literature review will explore each of these concepts.

Exploration into the first concept, evidence-based practice, requires a clear understanding of evidence-based practice, the historical review of medical care's transition to evidence-based practice, and clarification of the reaction of PTs to this change. The exploration for this first concept is clear. Understanding evidence-based practice is pivotal for answering the research questions. How do the next three concepts, (definition, prognosis of CLBP, and treatment of CLBP), contribute to this process? Extensive literature research into treatments for CLBP patients revealed treatments such as cognitive behavioral therapy and graded activity have shown effective results for the last 40 + years. Despite documentation of effective interventions, the number of CLBP patients continues to rise with consequent increase in financial burden. Perhaps this trend for CLBP patients is less related to inadequate interventions and more to the challenges PTs encounter when attempting to implement evidence-based treatment protocols into clinical practice.

Evidence-based Practice

Definition. The most common definition from the literature for evidence-based practice is "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). The implementation of evidence-based practice has been illustrated as a triangular process.

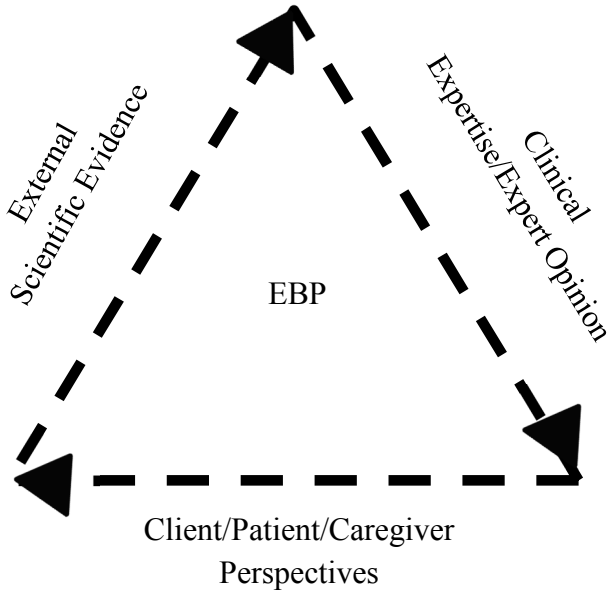

Figure 1: EBP model (Sackett et al., 2000)

Extracting scientific evidence from published literature is just the first step in the process. Next, the clinician interjects expert opinion into written evidence and applies it to their specific treatment setting and unique skill set (Sackett et al., 2000). Then the evidence must be molded to the individual patient's values and preferences (Sackett et al., 2000).

Thus, the process of implementing scientific evidence is not a simple 'cut and paste' action, but rather a complex integration of the written evidence, clinical expertise, and patient considerations.

Historical Perspective. The original push toward evidence-based medicine has been credited to the problem-based learning approach introduced at the McMaster University medical school in the 1980's (Bennett et al., 1987). The concept quickly disseminated to the various health professions leading to significant changes as educational methodology shifted from the traditional emphasis of authority-based learning to evidence-based format (Bury, 1996). The physical therapy profession is one healthcare profession that has undergone significant changes both educationally as well as clinically (Coates, 1990). Spiraling health care costs in the 1990's demand more prudent use of resources based on sound evidence ushering in the culture of accountability (Bury, 1996).

The healthcare professions including physical therapy have traditionally used evidence to formulate treatment decisions (Ritchie, 1999). It is the quality of evidence that has transitioned (Ritchie, 1999). As the demand for a higher quality of evidence for our clinical practice occurred, the entire profession grew and evolved to meet this need (Twomey, 1990). The early years of physical therapy from the 1940's to 1976 have been described as the era of dependency (Cane, 1985). The medical practitioner that referred the patient assumed responsibility for providing evidence of the treatment effectiveness. This referral pattern required physical therapists to act as directed by others outside their profession. This low level of evidence would be more appropriately labeled 'blind

faith'(Ritchie, 1999). Clinicians selected treatment based on the professional standing or authority of the instructor more than the evidence of the treatment effectiveness (Cane, 1985).

In 1977, the physical therapy profession moved into the era of intuition, or colloquially called the "Ah – ha" era (Cane, 1985). This transition was heralded by an assumption of both legal and ethical responsibility for the physical therapists to assess and treat patients. Unfortunately, the physical therapy profession failed to embrace a need to generate its own research. Therefore, treatment decisions were driven more by trial and error with many physical therapists clinging to traditional dogma (Cane, 1985). This level of evidence falls into the category of clinical expertise and opinion and more closely parallels evidence determined from a case study (Ritchie, 1999).

The acceleration of evidence-based practice in the 1990's ushered in the era of expert evaluation for the physical therapy profession (Twomey, 1990). The physical therapy profession joined the ranks of other health professions striving to demonstrate that their interventions were derived from scientific evidence. This shift confirmed that the physical therapy profession had now come of age (Ritchie, 1999).

This important transitory period was heralded by significant changes in published literature. Previous to this era, research on the effectiveness of physical therapy interventions was scarce and often lacked a substantiative level of evidence. While the volume of peer-reviewed publications continues to grow, the most significant change was the adoption of the randomized controlled trial as the gold standard to measure effectiveness of treatment interventions (Charlton, 1991; Sackett, Haynes & Tugwell,

1985). The volume of 'gold standard' research has grown enough to produce high quality resources of systematic reviews as evidenced by the Cochrane Library (Bennett & Bennett, 2000b).

The movement toward evidence-based practice produced marked changes in entry-level education for physical therapists. In the 1990's, bachelor degree programs transitioned to master level entry degrees. This was a more subtle transition as compared to the move from a master's level to a doctorate designation. The bachelor degree for physical therapists had traditionally been a robust and content dense bachelor degree. In addition, many PT students took 3 – 4 years to satisfactorily complete pre-requisites, so the transition of the additional time and added coursework was relatively seamless. The program changes from masters to the doctorate level proposed two fundamental changes: emphasis on differential diagnosis and teaching the scientific process for learning, implementing, and producing evidence-based research (Plack & Wong, 2002). Present evidence is unclear if the transition to the doctorate level has produced substantive difference from the Masters degree (Threlkeld, Jensen & Royeen, 1999)

Clinical Practice. The physical therapy profession has joined other health care professions to transition from authority-based to evidence-based education (Bury, 1996; Herbert, Maher, Moseley & Sherrington, 2001; Ritchie, 1999; Parker-Taillon, 2002; Wakefield, 2000). Despite this commitment for evidence-based practice, many PTs base their clinical decisions on anecdotal evidence and choose treatments with little scientific documentation (Newham, 1994; Turner & Whitfield, 1999).

Murray et al. (2005) examined a sports medicine outpatient physical therapy facility associated with a university to determine the prevalence of evidence-based treatment for the two most common maladies. The survey questioned 100 adults about their treatment for patello-femoral pain (PFPS) and Achilles tendinopathy, while observing and interviewing the practitioners for their management plans. The clinicians demonstrated the use of personal experience to treat 44% of the PFPS cases and 59% of the Achilles tendinopathy cases. Treatment driven by research evidence consisted of 24% for PFPS and 14% for Achilles tendinopathy. Practitioners utilized evidence-based medicine in fewer than 50% of the cases.

Murray et al. (2005) discussed four factors to explain this discrepancy. First, both the researchers and practitioners noted the significant lack of evidence in published literature to support some of the sports medicine treatments. This paucity of published evidence for some sports medicine treatments seemed even more significant when contrasted with other medical fields. McCrory (2001) revealed that some of the rarest conditions in cardiology have produced more published evidence for their treatment protocols than the experimental evidence to treat PFPS and Achilles tendinopathy.

A second factor identified by Murray et al. (2005) was that practitioners appeared to be unaware of current research literature. Several high quality experimental studies with randomization and controlled trial (RCT) were found to support some treatments, yet the practitioners did not utilize these treatments. Conversely, practitioners chose some of the evidence-based treatments, while admitting to being unaware of the supporting literature evidence. The practitioners were found to be aware of the research for only 42% of the modalities listed with evidence-based support.

Third, Murray et al. (2005) found PTs reported a greater reliance on personal experience than research evidence for treatment selection. Practitioners expressed their reliance on personal experience occurred when they were unfamiliar with evidence from the literature.

Fourth, practitioners reported that individual patient factors could overrule an evidence-based approach (Murray et al., 2005). For example, research evidence supports acupuncture treatment, but if the patient expressed a fear of needles, acupuncture would not be offered. Occasionally, the practitioner selected a treatment that was clearly found to be ineffective with research citing the potential for placebo effect or to allay the patient's fears that nothing was being done for them.

While Murray and colleagues (2005) provided insightful information, the methodology of reviewing this sports medicine facility retrospectively introduces an important limitation. Retrospective examination on an issue may provide less clear explanations than real-time observations.

Another potential reason for clinicians to not select an evidence-based treatment is that clinicians could be unwilling to change. Jette et al. (2003) examined the beliefs, attitudes, knowledge, and behaviors of the American Physical Therapy Association (APTA) physical therapists toward evidence-based practice. Results revealed that APTA PT members professed overall positive attitudes and beliefs about evidence-based practice. Specifically, the majority agreed or strongly agreed that evidence-based practice is necessary (90%), research literature helps with treatment (82%), the use of evidence-based practice improves quality of patient care (79%), and evidence is useful for decision making (72%). In addition, a strong majority of the practitioners indicated an agreement

or strong agreement (84%) that they need to increase the use of evidence in their daily practice. Even more importantly, a majority responded in agreement or strong agreement that they are interested in learning or improving the skills required for the application of evidence-based practice (85%). The results of this study show positive support for the new treatment philosophy of evidence-based practice.

Caution is needed when considering the Jette and colleagues (2003) study. An important limitation is that the survey contacted only members of the APTA. The APTA annual report from 2012 reported that 54, 308 PTs were members (www.APTA.org, 2012). The United States Department of Labor lists the total number of licensed PTs in the United States in the year 2012 at 191,460 (www.bls.gov, 2012). These numbers show that only 28% of licensed physical therapists are members of the APTA. Therefore, all licensed PTs should be surveyed to determine a more accurate assessment of the physical therapy profession.

Challenges to Implementation of Evidence-based Practice

While the support and desire to provide evidence-based practice aids in the implementation process, it does not eliminate all the potential barriers or challenges. This next section will focus on the literature that has investigated potential barriers and challenges to the implementation of evidence-based practice into the clinical setting. Several challenges emerge and can be categorized into three areas: research methods, clinicians' skills, and work environment considerations.

Research Methods. The article by Grimmer, Bialocerkowski, Kumar, and Milanese (2004) presents some of the research methodological concerns which can make implementation challenging. PTs have been encouraged to evaluate the "level of evidence" of the study to guide clinical decisions (Scherer & Smith, 2002).Scientific studies which randomly assign participants into an experimental group or control group have been listed as the highest level of evidence as this design assures that the only expected difference between the control and experimental groups is the outcome variable being studied. Conversely, case reports or papers sharing expert opinion do not provide the same assurance of what has influence the outcome variable so these studies are categorized at the lowest level of evidence (Sackett et al., 2000). Some authors support that PTs only read and utilize RCTs when searching the literature while disregarding lower levels of evidence (Maher et al., 2004). However there are challenges with utilizing only the "gold standard" RCTs as some of the study designs led to findings that are difficult to generalize into clinical practice (Bithell, 2000; Gibson & Martin, 2003; Koes & Hoving, 1998). Some RCT studies showed insufficient consideration of the study sample composition, whether the treatment intervention could be clinically acceptable, or whether the best measurement outcomes were selected (Koes & Hoving, 1998; Lloyd-Smith, 1997; Walker-Dilks, 2001). The inherent variability in patients as well as patient-therapist interactions present in physical therapy may further complicate the applicability of RCTs (Bithell, 2000; Difabio, R, 1999). Last, the assignment of the "gold standard" to RCT can deflate the contributions from qualitative research (Sackett et al., 2000).

Just as the RCT is held up as the "gold standard", the ability to "blind" participants and researchers to group allocation or to measurement can be assessed up to

40% of the total quality score (Law, Stewart, Pollock, Letts, Bosch, & Westmorland, 1998; van der Wouden & MacAuley, 1998). This "blinding" criterion is difficult to do in physical therapy research, especially in the areas of neurological or pediatric which would artificially deflate the quality of these studies. Another area in which research and clinical practice conflicts for physical therapy is that most physical therapists choose a range of treatment approaches and techniques (Grimmer, 2001) while experimental therapy research selects only one intervention to simplify the research question and to minimize confounding variables (Bennett & Bennett, 2000; de Vet et al., 1997; Lloyd-Smith, 1997). These single research interventions make comparison to usual therapy practice difficult (Bennett & Bennett, 2000; Bithell, 2000; Grimmer, Bowman, & Roper, 2000).

The article by Maher et al. (2004) focused on the challenges that PTs experienced trying to access or interpret the research evidence. The first concern presented was the area of publication bias. The Cochrane Central Register of Controlled Trials lists several physical therapy related RCTs are completed, but are not published (Maher et al., 2004). Medical research trials with non-significant results are less likely to be published (Stern & Simes, 1997) or are published with greater delay (Hopewell, Clarke, Stewart, & Tierney, 2003; Scherer & Langenberg, 2003; Stern & Simes, 1997) than research with significant results. The odds of publishing have been estimated as 2.4 times greater if the study results are statistically significant (Egger, Juni, Bartlett, Holenstein, & Sterne, 2003). This bias would be eliminated if all RCTs were published in a timely manner regardless of the outcomes and one suggestion to aid with this would be a mandatory registration of all clinical trials (Maher et al., 2004).

This article by Maher et al. (2004), also commented on the challenge of finding a research study that matches the PT's practice. When some PTs encounter this difficulty, they may discard the study results. Unless the patient possesses characteristics that contradict the intervention, it is recommended that the PTs take the results and adjust with their clinical experience to meet their patient's individual needs (Glasziou & Irwig, 1995; Herbert, 2000a). Finding research relevant to one's practice is especially challenging for PTs treating pediatrics or occupational health where few RCTs have been conducted (Maher et al., 2004).

Then Maher et al. (2004) examined the issue of labelling a research project by the terms, "effective" or ineffective." A more accurate weighing of the evidence requires understanding the size of the treatment effect (Herbert, 2000a; Herbert, 2000b). In addition, Maher et al. (2004) noted the simple labels of "effective" and "ineffective" could lead to contradiction of results of similar interventions from studies with different statistical power. The researchers recommended that the PT adjust the average effect size in order to estimate the likely effect for their individual patient. This process can prove difficult if the PT lacks clinical experience with a particular patient group or with the knowledge of prognostic factors, but could improve with practice.

Clinician Skills. Fell and Burnham (2004) explored factors influencing clinician skills to access and interpret research and emphasized that the best way to encourage evidence-based practice in healthcare is to improve the ability of professionals to identify, locate, and retrieve research articles (Farmer & Richardson, 1997). Many healthcare providers report an increasing use of the internet to access evidence-based

information (Capel, 1998; Sackett et al., 2000). Jette et al. (2003) sampled a group of PTs and reported that 89% have access to databases and internet at home and only 65% have access at work. PT program educators who received training on how to access evidence-based information on the internet expressed increased willingness to teach these skills (Leipzig et al., 2003), and to integrate evidence-based skills into their program curriculum (Forrest & Miller, 2001).

Another barrier discussed was the "culture of practice which emphasizes 'routine' patient care" (Newman, Papadopoulos, & Sigsworth, 1998). Healthcare providers have reported being unaware that a guideline exists or that they lack the skill to incorporate the information into clinical practice (Berenholtz & Pronovost, 2003). Sumison (1997) recommended that clinicians must critically evaluate their own individual practice. In a more recent publication, de Vera Barredo (2005) again employs PTs to routinely question their habituated and traditional practices while seeking evidence to support clinical decision making. Failure to utilize critical self-assessment during evaluation and treatment of patients may lead to ineffective interventions (de Vera Barredo, 2005; O'Brien, 2001). One suggestion to address these challenges is real-time decision making (McGinn, Selez, & Korenstein, 2002) and would require wireless internet access and a device that can be used at bedside such as a laptop computer or PDA.

The article by Portney (2004), explored potential teaching strategies to prepare both student and professional PTs to consistently provide evidence-based care for their patients. While the data demonstrates that evidence-based skills can be learned (Hatala & Guyatt, 2002), especially in the areas of accessing literature, critical appraisal, and

decision making (Davidson, Duerson, Romrell, Pauly, & Watson, 2004; Green & Ellis, 1997; Smith et al., 2000), there is a lack of data to show this teaching has resulted in long-term alterations in clinical practice or patient results (Norman & Shannon, 1998). While some physical therapy programs have addressed this issue by restructuring the old 'research' coursework into a class that expands the focus for all aspects of evidence-based practice, this article suggests that evidence-based skills need to be incorporated across the curriculum (Portney, 2004). Some programs introduce the concepts of evidence-based early in the curriculum in a specific course but then integrate the skills across several courses at increasing levels of complexity framed into a specific patient question or clinical scenario (Fetters, Wagenaar, Slavin, Dalton, Ellis, & Starr, 2002).

Work Environment. The development of skill to search and acquire research literature will be wasted if affordable access is not available. While most PTs rely on web-based search engines, few are available to individuals free of charge unless the PT is granted access by a larger teaching facility or hospital (Maher et al., 2004). In addition, each of these web databases does not provide universal coverage of all journals or some are offered for only a limited time frame (Bohannon, 1999; Maher, Moseley, Sherrington, & Herbert. 2001; Wakiji, 1997). While searching several databases would broaden the PTs' search, this is a very time-consuming process for a busy clinician (Maher et al., 2004). Some evidence reports that articles available in the full-text version are more likely to be utilized in decisions for patient care (Wentz, 2002). Most PT journals provide full-text version for recent editions and only a small number of these can be accessed for free (Maher et al., 2004). The cost to access full-text articles could be prohibitive for PTs (Maher et al., 2004).

Some evidence reports that articles available in the full-text version are more likely to be utilized in decisions for patient care (Wentz, 2002). Clinicians who are affiliated with an educational institution report improved ability to access full text articles at no charge (Fell & Burnham, 2004). This advantage of being affiliated with an educational institution is most noted when students transition into the work world. If their employer is not affiliated with an educational institution, their access to full text articles can be significantly affected (Fell & Burnham, 2004). Some clinicians can access full text articles through their professional association or employer (Fell & Burnham, 2004). Another potential source noted is the Open Access publication, in which the author holds the copyright instead of the journal and can grant access without charge (Fell & Burnham, 2004). Directories of Open Access titles are available at http://www.doaj.org/ljbs?cpid=20, Pubmed Central (http://www.pubmedcentral.nih.gov/), and BioMedCentral (http://www.biomedcentral.com/). While some cost may be involved in accessing and downloading full text articles, the end result will be improved health care delivery for all patients (McKenna, Ashton, & Kenney, 2004).

The most reported challenge expressed by clinicians was lack of time (Barnard & Wiles, 2001; Herbert, Sherrington, Maher, & Moseley, 2001; Jette et al., 2003; Kamwendo, 2002; Parker-Taillon, 2002; Scherer & Smith, 2002). Clinicians noted the growing emphasis on health care productivity encroached on their time to search, read, and implement evidence-based information into daily clinical practice (Barnard & Wiles, 2001; Berenholtz & Pronovost, 2003; Jette et al., 2003; Kamwendo, 2002; Maher, Sherrington, Elkins, Herbert & Moseley, 2004; Newman, Papadopoulos & Sigsworth, 1998; Pomeroy, Talls, & Stitt, 2003).

In addition to lack of time, clinicians report experiencing resistance to implementing changes in practice (Jette et al., 2003; Metcalfe et al., 2001). Several noted resistance from physicians and peers (Barnard & Wiles, 2001; Closs & Lewin, 1998; Connolly, Lupinnaci, & Bush, 2001; Metcalfe et al., 2001; Pomeroy, Talls, & Stitt, 2003). Some noted reluctance of administration to support practice changes, especially if facility financials could be affected (Barnard & Wiles, 2001; Closs & Lewin, 1998; Connolly, Lupinnaci, & Bush, 2001; Jette et al., 2003). Evidence-based practice does not necessarily result in less expense (Sackett et al., 1996).

One important barrier of EBP implementation that was not clearly identified in the literature was behavioral change. Perhaps one reason that the lack of time is the most commonly reported barrier for clinicians is that some clinicians are actually struggling with trying something new. The process of implementing a new technique into the clinical setting will require the clinician to undergo a behavioral change. One of the most widely accepted frameworks for understanding behavioral change is the Transtheoretical Model (Prochaska & Diclemente, 1982). This next section will provide a description of the model expounding on the four components (1) stages of change, (2) processes of change, (3) decisional balance, and (4) self-efficacy.

Prochaska & Diclemente (1982) proposed the Transtheoretical Model to explain and predict successful change that could produce long-term adherence of a new behavior. People were described to move through five consecutive stages (1) precontemplation, (2) contemplation, (3) preparation, (4) action, and (5) maintenance. Precontemplation denotes that an individual is unwilling, unaware, or uninformed about changing a

particular behavior. Some people may be defensive as the positive aspects do not outweigh the negative. These individuals are not willing to assume ownership and will be unresponsive to interventions strategies.

Contemplation illustrates a willingness to seek out information as the individual considers the possibility of a change. While contemplators will assess the options and weigh the pros and cons, they are not prepared to act. These individuals are just at the "I might" stage. The attitudinal shift that will prepare the person to act progresses them to the next stage of preparation. These individuals will organize, set goals, and prioritize to avoid potential failure. The preparation stage represents a state of readiness for change. When the person transitions toward overt behavioral modification, then this is identified as the action stage. The individual actively tries the behavior. The final stage, maintenance, produces a changed lifestyle that holds up long-term.

Individuals will progress through the stages at their own rate. This progress can be either forward or backward direction. When a person moves backward in the changes this is known as relapse. Forward progression to the next stage requires the person to complete specific tasks. The precontemplator must accept that a change is needed. The contemplator actively decides to change and plans to act. During the preparation stage, the individual develops a specific plan of action while resolving uncertainties toward the new behavior.

The next component of the Transtheorectical Model, processes of change, includes any strategies and interventions produced by the individual to help alter their thinking, feeling, or behavior in such a way to sustain progress through the five stages.

Prochaska, Norcross, and DiClemente (1994) identified these processes of changes as consciousness raising, social liberation, dramatic relief, environmental reevaluation, self-reevaluation, self-liberation, counterconditioning, stimulus control, helping relationships, and reinforcement management. When the individual is seeking information during the precontemplation and contemplation stages, consciousness raising can assist with this task. Social liberation stimulates forward movement from precontemplation to action by asserting that the lifestyle change is available and accepted by society. Progress from contemplation through preparation can be influenced by dramatic relief, environmental reevaluation, and self-reevaluation. Dramatic relief involves intense emotional experiences related to the behavioral change and is often done through the use of role-playing. When the individual examines how the behavior will affect their physical and social environment, this is known as environmental reevaluation. Self-reevaluation provides a more emotional and cognitive assessment of values related to the behavior.

One process of change that moves the individual into the preparation stage is self-liberation. This process is when the individual makes the commitment to change and embraces the new belief. In the preparation stage, dramatic relief, environmental reevaluation, and self-reevaluation can also be used along with self-liberation. The final move into the action and maintenance stages are advanced with the counterconditioning, stimulus control, helping relationships, and reinforcement management. The process of counterconditioning is when the individual selects an alternative behavior in place of the problem behavior. When the individual makes changes to their environment in order to either reduce problem behavior triggers or improve the chance of the new behavior occurring, this process is known as stimulus control. Helping relationships involves

utilizing others to support behavioral changes. The last process of change is reinforcement management which outlines the alterations the individual needs to control or maintain the behavior. One example of a reinforcement management would be rewarding oneself when the new behavior occurs. Movement through the stages of changes is aided by these ten processes of change.

Before the adoption of a new behavior, an individual will weigh the positive (pros) aspects against the negative (cons) ramifications. The variance between the pros and cons has been identified as the decisional balance and has been shown to help understand the individual's motivation to progress (Janis & Mann, 1977). In the initial precontemplation stage, the cons of the behavior will outnumber the pros. As the individual progresses through the stages the pros increase in number until the pros will eventually outnumber the cons. This crossover from cons to pros can occur during the contemplation, preparation, or action stage. By the action and maintenance stages, the pros remain high in number and the cons will continue to recede in importance.

The last component of the transtheoretical model, self-efficacy, describes the level of confidence the individual has to perform, change, and maintain the particular behavior over time. Bandura (1977) proposed that successful change resulted for an increased level of confidence that an individual displays when coping with various temptations without relapsing. The successful progression through the five stages of change shows that self-efficacy must increase as the temptation recedes.

The barrier of behavioral change can produce a significant disruption for the PTs attempting EBP implementation in two ways. First, PTs unwilling to undergo a

behavioral change will fail to implement the specific EBP introduced (Prochaska & DiClemente, 1982). Second, this failure to implement the EBP technique deprives the PTs of the opportunity to interact with the EBP in a natural environment which will reduce the PTs' ability to learn the new technique (Vygotsky, 1978). Support for the first point was given above with the explanation of the Transtheorectical Model. The second point is supported by the Situated Learning Theory which will be explained in the following section.

Situated learning theory denotes that knowledge is integral within the context in which it is used and cannot be separated from the activity, context, or culture of that situation (Lave & Wenger, 1991). The context and culture of the situation has been defined as the "community of practice" where the less experienced individuals learn from those with more experience (Lave & Wenger, 1991). Collins, Brown, and Newman (1987) described this partnership as a "cognitive apprenticeship" where learning occurs through practice, input from the masters, and self-instruction rather than direct learning. The interaction with others can stimulate the "cognitive apprentice" to take action (Rogoff, 1990). The "community of practice" allows the learner to gain motivational support, share ideas with experienced individuals, engage in debates, and expand exposure to various learning strategies (Resnick, 1989).

When the PT commits to trying to implement EBP into their clinical practice, the PT will learn the EBP in a way different than just reading about the technique in a journal or hearing a presentation at a continuing educational seminar. Situated learning theory would identify the PT as the "cognitive apprentice" who will develop an understanding of

the EBP technique by practicing in their natural clinical setting (Collins, Brown, & Newman, 1987). The PTs interact in this "community of practice" with others by sharing ideas during the implementation process (Lave & Wenger, 1991). This active learning environment contrasts with the passive experience of the continuing education class and supports the importance of the PT needing to commit to try the EBP. Without this commitment to try the EBP, the PT will not have the opportunity to gain the knowledge that will occur when interacting with the new information in their natural setting.

Definition of Chronic Low Back Pain

The most common definition of CLBP emphasizes the amount of time that the pain has been present. Generally, the designation of chronic is given when pain has been present for more than three months (Critchley, Ratcliffe, Noonan, Jones, & Hurley, 2007; Leeuw et al., 2008; Smeets et al., 2006; van der Roer, van Tulder, Barendse, Knol, van Mechelen & de Vet, 2008) or six months (de Jong et al., 2005; Kole-Snijders et al., 1999; Nicholas, Wilson, & Goyen, 1991). The emphasis on the amount of time that the pain is present fails to address the patients with frequent reoccurrences. In addition, by waiting for three months to elapse, the PT could be missing some important intervention techniques that could prevent the patient from slipping into the chronicity abyss. Therefore, a more definitive definition of chronic pain is needed.

In order to fully understand chronic pain, one must start with an explanation of acute pain. The traditional definition is an unpleasant sensory and emotional experience which follows actual or potential tissue damage (Merskey & Bogduk, 1994). There are key words to understanding acute pain. They are adaptive, transient, and protective.

Adaptive entails that the body has the ability to change to fit the new environment (www.dictionary.com, 2014). The acute pain is a signal for the autonomic processes involved in healing to be activated. Next, acute pain is transient. Pain is like an alarm system to alert the brain to address a threat. Once the threat has been addressed the alarm will turn off. Last, acute pain plays a protective role for the body. Without this noxious alarm system, some of us would push our bodies past the point of mechanical failure. For example, when we strain our back lifting the heavy suitcase from the trunk of the car, the noxious acute pain alerts us to the potential or actual tissue injury. This alarm reminds us to be more cautious in the future when lifting the suitcases from the car trunk in order to avoid new injury.

The definition of chronic pain is also best explained with three descriptors. First, chronic pain is maladaptive (Philips, 1987). The noxious alarm system no longer provides helpful input for the patient's present environment. In fact, this pain is effectively disrupting many aspects of the individual's functioning. Second, chronic pain persists (Philips, 1987). Pain perception is persisting well past tissue healing times. In fact, the pain intensity is increasing even though threat of tissue damage no longer exists. Lastly and perhaps the most significant is the evidence of neuroplastic changes in patients with chronic pain (Bingel & Tracey, 2008).

One explanation for why some individual low back patients transition from acute to chronic pain is illustrated by the fear-avoidance model of chronic pain (See Figure 2). Lethem, Slade, Troup, and Bentley (1983) proposed that the key element in the amount of fear that the person will experience with an injury. If the amount of fear is low, the

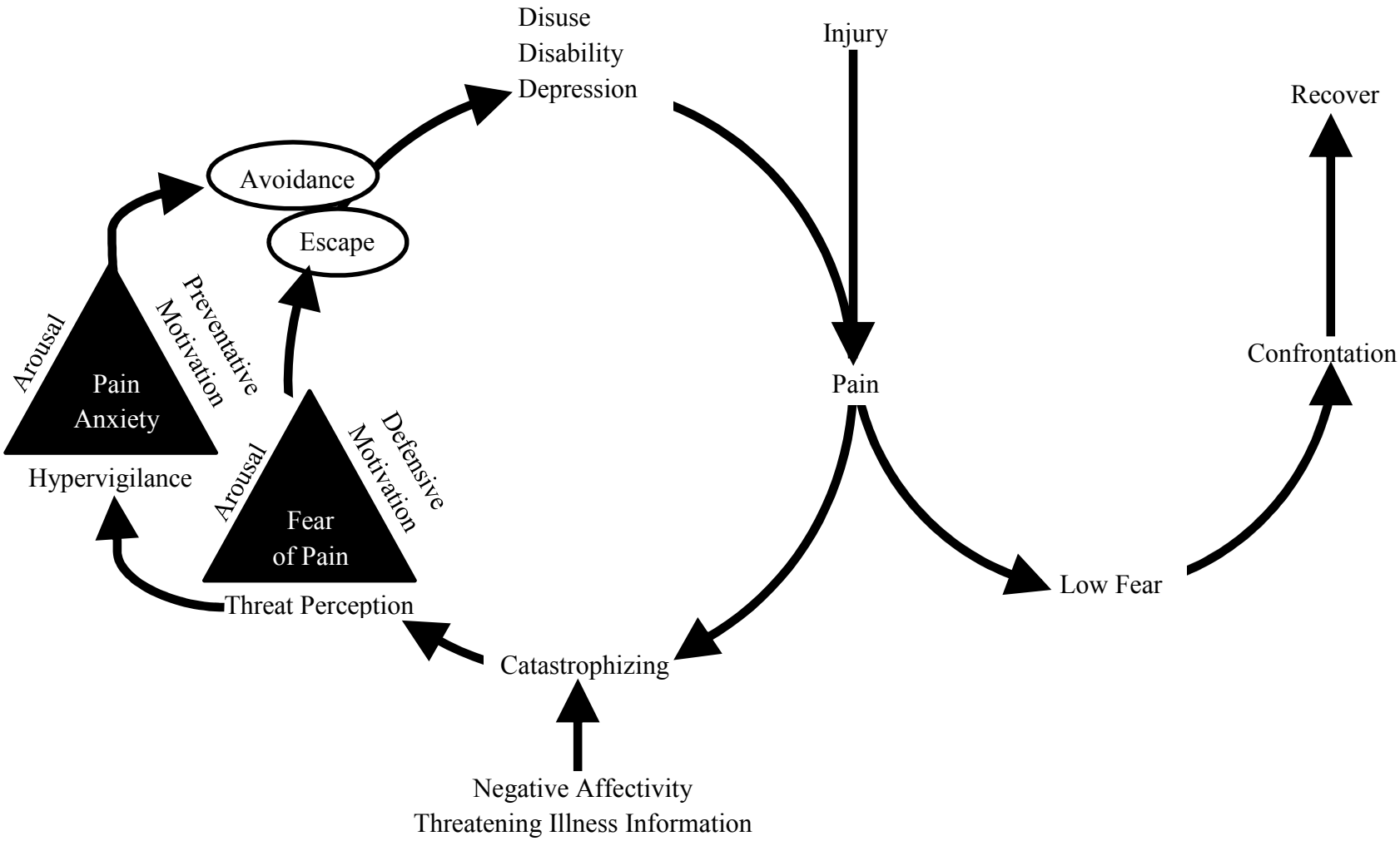

Figure 2: The fear-avoidance model of chronic pain. (Asmundson, Norton & Vlaeyen, 2004)

person will be able to confront their pain and progress toward recovery. If the person experiences higher levels of fear that can produce catastrophizing behaviors, then they will move toward chronicity. Asmundson, Norton, and Vlaeyen (2004) expanded the original model after the stage of catastrophization and proposed that the individual will escape from activity that appears fearful as well as avoid movement that produced anxiety. The result of these behaviors leads to disuse, disability and depression which will maintain their high level of fear in relation to their pain perpetuating the chronic cycle to continue. This next section will clarify the neuroplastic changes which occur to the neurological system when pain has transitioned toward chronicity.

Neuroscience of Chronic Pain. Neuroplastic changes are occurring that result in both central and peripheral sensitization. First, the changes that result in central sensitization include the destruction of the interneurons in the dorsal horn as a result of high levels of amino acids produced with the persistent firing of nociceptive C-fibers (Woolf, 2007). If the toxic environment persists, the interneuron may not be able to regenerate (Woolf, 2007). Loss of interneurons produces a reduced ability to modulate signals of danger and ultimately pain. In addition, persistent firing of nociceptive neurons can produce an increase in the number of action potentials generated by both the motor neurons and interneurons (Latremoliere & Woolf, 2009). This phenomenon has been called action potential windup and will increase the level of alert communicated to the nervous system (Latremoliere & Woolf, 2009). Another central mechanism that is disrupted with persistent firing of nociceptors is the descending modulation. The brain produces endogenous chemicals such as opioids, encephalins, endorphins, and serotonin

which effectively modulate pain perception. In chronic pain states the release of these modulating chemicals is found to be reduced (ter Riet, de Craen, de Boer, & Kessels, 1998) and the central system becomes more sensitized.

Next is peripheral sensitization which occurs mainly due to factors which strengthen the neural synapse. Several changes in the distribution and ratio of ion channels contribute to this synaptic enhancement. During an injury or disease state, myelin on the peripheral nerves can be removed by means of mechanical force, immune-based disease state (Louw et al., 2012), or by inflammatory substances released at the time of injury (Miyamoto et al., 2006). New ion channels will insert in these demyelinated nerve areas (Devor, 2005; Devor, 2006). The resultant increase in ion channels distribution will increase the peripheral sensitivity. In addition, the ratio of each type of ion channel has been found to change due to the current state of the organism (Devor, 2005; Devor, 2006). When the system has been under stress for a period of time, the number of ion channels that respond to stress chemicals will increase in number (Devor, 2005; Devor 2006). This increase in the number of stress ion channels will increase the body's sensitivity to any stress imposed on the system.

The common acceptance of chronic pain being identified simply by the amount of elapsed time could be one of the challenges with implementing the appropriate evidence-based treatment protocol. The vague concept of elapsed time may hamper the ability of the treating therapist to correctly categorize this CLBP patient; therefore, making selection of the best treatment approach difficult. Perhaps evidence-based implementation of a CLBP treatment in the clinical setting first requires utilizing the expanded definition

of chronic pain that identifies the ongoing neuroplastic changes (Louw & Puentedura, 2013; Moseley, 2003).

Prognosis for CLBP

The frequently quoted phrase that 80%-90% of acute low back pain episodes improves in 6 to 8 weeks may be misleading (van Tulder, Koes, & Bouter, 1997). This improvement is often interpreted to mean that the majority of acute low back injuries were fully resolved. This view changes when investigating the rate of relapse that occurs after the first low back injury. Van den Hoogen, Koes, and van Eijk (1998) reported that 295 out of 389 (76%) of the low back pain patients being treated at the primary care level experienced a relapse within the first year after the initial injury. The median duration of the relapse measured three weeks (van den Hoogen, Koes, & van Eijk, 1998). In addition, the American Academy of Pain Management (2003) reported that 57% of all adult Americans expressed that they experienced recurrent or chronic pain in the past year. Within this group of Americans, 62% reported being in pain for more than one year, and 40% noted that they were in constant pain. A recent study by Wasiak, Kim, and Pransky (2006) demonstrated that individuals with recurrent low back pain had substantially higher total medical and indemnity costs, and longer duration of work disability than those without recurrence.

The potential magnitude of the problem grows even more when the aging of America is considered. Presently, Americans over the age of 65 account for 12.4% of the total population (United.States.Census.Bureau, 2010). By the year 2030, this percentage is projected to increase to 57%. This projected growth in the American population is

significant because individuals over the age of 50 years of age are twice as likely to be diagnosed with chronic pain (Gatchel, 2004).

This rising number of CLBP patients in industrialized nations exerts a significant strain on the health care system due to associated costs (Dagenais, Caro & Haldeman, 2008; Linton, 1998). While a search of the literature reveals that clinicians and researchers understand the gravity of this dilemma, there is poor consensus both within and among specialties on the most effective management of low back pain (Cherkin, Deyo, Wheeler, & Ciol, 1995a). This lack of consensus could be related to the challenges clinicians face when trying to implement an evidence-based treatment protocol.

Treatment for CLBP

The literature presents several treatment options for addressing CLBP patients with varying levels of evidence. Two treatment protocols that have occurred in the literature frequently over the past 40 years with the highest level of supportive evidence are cognitive behavioral therapy (CBT) and the operant approach called graded activity. The CBT intervention consisted of identifying patients' cognitive and affective responses to pain; learning relaxation, imagery, and coping strategies to address pain; and working toward individual behavioral goals (Meichenbaum & Turk, 1976). Treatment sessions were highly structured and were conducted in a group format consisting of 5-10 patients (Meichenbaum & Turk, 1976). The frequency of the sessions varied from one to two times per week for 8-10 weeks in duration (Meichenbaum & Turk, 1976). Research demonstrated strong evidence of efficacy for CBT treatment in restoring function and mood and in reducing pain and disability-related behavior (Newton-John, Spence, &

Schotte, 1995; Nicholas, Wilson, & Goyen, 1992; Turner, 1982). Gatchel and Rollings (2008) asserted that CBT is an effective component in the overall treatment of CLBP; however, CBT must be combined with an active intervention to address physical deconditioning symptoms.

The early operant conditioning approach consisted of comprehensive inpatient multidisciplinary care (Fordyce, 1976a). Proponents of operant conditioning expressed a preference of providing treatment in a rehabilitation setting emphasizing physical activity rather than choosing a psychiatric setting and the associated emotional implications (Anderson, Cole, Gullickson, Hudgens, & Roberts, 1977). The inpatient operant care demonstrated favorable outcomes in several research studies (Anderson et al., 1977; Cairns, Thomas, Mooney, & Pace, 1976; Seres & Newman, 1976). Unfortunately, the programs required a significant time commitment for patients and their family as well as a significant medical cost.

The introduction of graded activity into the outpatient physical therapy setting reduced this medical cost while still demonstrating effectiveness. Lindstrom et al. (1992), examined the effectiveness of the graded activity protocol on patients with subacute low back pain. The participants included 103 blue-collar workers at the Volvo Company of Goteborg, Sweden. This group consisted of individuals from 13 different countries who had been on the sick list for 6 weeks due to report of LBP. Examination by an orthopedic surgeon ensured selection of participants with non-specific mechanical LBP. Those selected were randomly assigned to graded activity treatment (n=51) or a control group (n=52). The graded activity group underwent functional capacity evaluation (FCE), work-place assessment, back school education, and a graded activity intervention. The

graded activity consisted of an individual submaximal, gradually increased exercise program coupled with operant-conditioning behavioral instruction that was based on the results of the FCE and work-site assessment. The control group received traditional care that included rest, analgesics, and physical therapy. The graded activity group had an average sick leave of 12.1 weeks while the control group had an average of 19.6 weeks of sick leave at the time of the two year follow-up. Fewer than 50% of the graded activity groups used more than 5 visits of physical therapy before returning to work. Four participants in the control group and one in the graded activity group were give permanent disability pensions. This studied concluded that the participants in the graded activity group showed significantly less sick leave with ability of the workers to return to occupational function. The graded activity program can be run with minimal equipment and required fewer therapy visits presenting a more cost-effective intervention for subacute low back injured workers. One limitation of this study is that the traditional care received by the control group was unclear.

Staal et al. (2004) also assessed the effectiveness of the graded activity protocol as compared with usual care on injured workers with LBP. This study was a single blind, randomized, controlled trial examining airline employees for a major Dutch airline who reported partial or full absence from work due to nonspecific LBP for a minimum of 4 weeks. These airline employees were randomly assigned to a graded activity treatment group (n=67) or usual physical therapy care at a separate clinic facility (n=67). The graded activity consisted of four exercise components: 1) aerobic conditioning, 2) strengthening for large muscle groups, 3) core stabilization, and 4) individually chosen tasks that the participant noted could produce fear or anxiety. The first three visits

allowed the participant to cease the exercise when they noted pain. This provided the individual's baseline. Then, final goals were selected and a quota was determined for each subsequent visit. Operant conditioning behavioral interventions were infused throughout the exercise visits such as reassuring the participant that their pain did not mean that their tissues would be harmed. The PTs were instructed to focus on the participants' functional improvement and not the pain complaints.

The usual care group in the Staal et al. (2004) study consisted of advice from the occupational physician and was not allowed to receive PT at the same location as the graded activity group. At 50 days post randomization, the graded activity group was noted to have a median of 58 days of absence from work compared to 87 days with the usual care group. The graded activity group showed some increase in functional status and pain level at 3 and 6 month follow-up, but this was not statistically significant. While the graded activity group may have returned to work sooner, the study notes that many other factors can influence return to work such as compensation, legal issues, and workplace culture.

Smeets et al. (2009) also examined the efficacy of graded activity treatment but with a focus on determining cost-effectiveness. This study compared an active physical therapy intervention (APT) that consisted of 10 weeks of aerobic training and muscle strengthening of back extensors against a graded activity plus problem solving training (GAP) for the same time frame, and a combination intervention of APT with GAP. A total of 172 CLBP were randomly assigned to one of the three treatment protocols or a waiting list (which served as a control group). All the treatment groups demonstrated improvement in disability and quality of life, but there was no statistically significant

difference between the combined group and the single treatment groups. The combined treatment approach was not the most cost-effective choice for treating CLBP patients. Rather both the single treatment groups of APT and GAP showed greater reduction in disability than the combined treatment or control as measured with the Roland Disability Questionnaire of clinical relevance even after the 1 year follow up appointment. This article supports the effectiveness of GAP and APT for treating CLBP patients and shows that using the technique in the outpatient physical therapy setting also provides a cost-effective intervention.

The rise in publication of systematic reviews has been concurrent with the emphasis on evidence-based practice in medicine. Systematic reviews attempt to answer a particular research question after an extensive review and summation of the current literature. While these reviews are considered the strongest level of evidence for medical interventions or the "gold standard" (Sackett et al. 1996), readers need to be cautious in accepting conclusions without clearly understanding the specific research questions being addressed.

The systematic review by Macedo et al. (2010) contrasted graded activity with graded exposure for treatment of persistent non-specific low back pain. The review examined 15 RCTs and concluded that graded activity appears to be slightly more effective than a minimal intervention while not being more effective than other forms of exercise. Graded exposure was found to be as effective as minimal treatment or graded activity. When a busy clinician retrieves this systematic review, the quick response would be to continue with their usual exercise prescription because graded activity was not found to be more effective than other forms of exercise. Examining the details of each of

the research articles reviewed might provide additional insight. This next section will summarize each of the individual articles.

The first article by Nicholas, Wilson, and Goyen (1991) examined 58 patients with chronic low back pain for more than 6 months. All of the participants received the six weekly sessions of physical therapy intervention that consisted of educational information, exercises, and written handouts. The regimen covered basic back anatomy and back care instructions with land and aquatic based exercises for back strengthening as well as advice on proper eating. In addition, the approximately 10 participants were randomly assigned to four treatment and two control conditions. The treatment conditions included cognitive training with or without relaxation training and behavioral treatment with or without relaxation training. The cognitive treatment was based on the work of Rybstein-Blincik (1979), Turk, Meichenbaum, and Genest (1983), and Turner (1982).Several researchers have suggested that the behavioral treatment could also be identified as the graded activity protocol (Fordyce, 1976a; Turk, Meichenbaum & Genest, 1983; Turner, 1982). The control conditions were attention-control visits with a psychologist for discussion and the no-attention control who received only the usual course of physical therapy. The participants were measured pre and post-treatment as well as at 6 months and 12 months following the end of treatment. Outcome measures included the pain rating chart, state-trait anxiety inventory, pain beliefs questionnaire, coping strategy questionnaire, sickness impact profile for self and other, medication intake, expectation rating scale, and physical therapist evaluation rating scale.

Nicholas, Wilson, and Goyen (1991) concluded that combined treatment produced more significant improvement as compared to single treatment of just the physical therapy. The graded activity intervention, showed greater improvements than CBT initially, but not at the 6 and 12 month follow-up times. The combination treatment provided psychological treatment with the physical therapy. One important limitation for this study was that each group had ten or fewer participants.

Another study done by Nicholas, Wilson, and Goyen (1992) examined how a combination of a cognitive-behavioral group treatment performed in comparison to a non-psychological treatment. This study tested 20 patients who reported history of CLBP for 6 months or more. Both groups received the same physical therapy just as described in the previous article by these same authors. The cognitive-behavioral treatment combined the group conditions as described above with the addition of progressive muscle relaxation training of three sessions of listening to 30 minute audiotapes. The attention-control group met with a psychologist for five sessions for general discussions about the problems of living with CLBP. The outcome measures included pain rating chart, Beck Depression Index, pain beliefs questionnaire, coping strategy questionnaire, sickness impact profile, medication intake, pain self-efficacy questionnaire, expectation rating scale, and physical therapist evaluation rating scale. Measurements were assessed pre- and post-treatment as well as at a 6 month follow-up visit.

This second study by Nicholas, Wilson, and Goyen (1992), reported that the combination of the cognitive-behavioral treatment group showed significantly more improvement as compared to the attention-controlled physical therapy only group at post-

treatment for the functional impairment, active coping strategies, medication use, and self-efficacy beliefs. At the 6 month follow-up, the combined treatment group showed significant improvement for active coping strategies and self-efficacy beliefs. This study also had only ten participants in each group presenting a similar limitation to the previous study.

The next study reviewed in this systematic review was an article by Vlaeyen, de Jong, Geilen, Heuts, and van Breukelen (2002). This study selected six participants with nonspecific CLBP for longer than 6 months who reported significant fear of movement/(re)injury as assessed by the Tampa Scale for Kinesiophobia (TSK). The participants were randomly assigned to one of two interventions. In the first intervention, participants received exposure in vivo followed by graded activity. In the second intervention, the order or the treatments were reversed. The exposure in vivo intervention consisted of treating the participant about the fear-avoidance model in accordance with the individual's symptoms, beliefs, and behaviors. Then the participant undergoes a series of individually tailored tasks while being asked to predict potential harm that could occur with each situation. Each task is modelled by the physical therapist and then the participant is encouraged to try the task until their anxiety levels are reduced. The graded activity intervention was based on the operant treatment principles outlined by Fordyce (1976a). The participants were assessed using a visual analogue for pain, TSK, and pain catastrophizing scale pre- and post-treatment as well as at a 1 year follow-up. This study concluded that the exposure intervention produced greater reduction of fear of movement/(re) injury, fear of pain, and pain catastrophizing as compared to the graded activity regardless of the order that the interventions were introduced. This study also has

the limitation of testing only a small number of participants. In addition, having the participants undergo both treatments could have confounded some of the results.

The next study authored by Streenstra, Anema, Bongers, de Vet, Knol, and van Mechelen (2005), examined the effectiveness of the graded activity protocol in the occupational setting as compared to usual care. The participants included workers who had been sick listed from their job for more than eight weeks with no plans to return in the next week with the diagnosis of nonspecific low back pain. These workers were randomly assigned to usual care or the usual care with the addition of the graded activity protocol. Usual care was only described as being in line with the Dutch outpatient guidelines and was provided by multiple facilities. The graded activity was also provided by over 16 different facilities by 47 PTs who were trained by a team of PTs specialized in the graded activity protocol based on Staal et al. (2004) study. The outcome measures included a report of a lasting return to work, the total number of sick days, Roland-Morris disability questionnaire, and visual analogue for pain which were recorded pre- and post-treatment, and at a 26 week follow-up visit.

Streenstra et al. (2005) presented that the addition of the graded activity protocol for these workers delayed return to work with the median time for return to work at 139 days as compared with the usual care group at 111 days. In addition, the graded activity group did not show significant improvements in pain or functional status. This study demonstrated numerous limitations. First of all, only 65% of the workers placed in the graded activity protocol complied with the prescribed treatment. The authors stated that the low compliance could reflect low motivation of the individuals who were anticipating

usual care. In addition, the study utilized 16 different facilities using 47 different PTs, so the ability of each these clinicians to adequately explain and implement the graded activity could affect the worker's compliance level.

The article by de Jong et al. (2005) used a replicated single-case experimental design to contrast the effects of the educational portion from the exposure section of the intervention to address fear of movement/(re)injury in CLBP patients. The study recruited six participants who demonstrated substantial fear of movement/(re)injury as assessed by the Tampa Scale for Kinesiophobia (score > 39) with nonspecific low back pain for at least 6 months. All of the six participants started the study with a three week no-treatment baseline period where they recorded their answers for the Tampa Scale of Kinesiophobia, the Pain Anxiety Symptom Scale 20, the Pain Catastrophizing Scale, and a visual analog scale each evening and sent their results to the researcher the following day. Then all the participants underwent one education session followed by another 3 week no-treatment session. Next, the participants were randomly assigned to 24 hours of graded exposure in vivo with behavioral experiment spread over 6 weeks or 32 hours of graded activity protocol spread over 8 weeks. The outcome measures included the items recorded during the no-treatment baseline as well as the Pain Vigilance and Awareness Questionnaire, the Roland Disability Questionnaire, and daily activity for 1 week using a uniaxial accelerometer and were assessed pre- and post-intervention and at a 6 month follow-up.

The de Jong et al. (2005) article concluded the single education session produced significant short-term decreases in fear of movement/(re)injury, pain catastrophizing, and fear of pain. These variables showed further reduction when followed by graded exposure

in vivo, but no further reduction was noted when followed by the graded activity protocol. In addition, this study noted that patients with CLBP with pain-related fear require an intervention that is developed specifically for each individual's personal attitudes, and concerns. The main limitation of this study is the low number of participants.

An additional article reviewed in the Macedo et al. (2010) systematic review was a comparison of high-intensity versus low-intensity back schools in an occupational setting (Heymans, de Vet, Bongers, Knol, Koes & van Mechelen, 2006). This study randomly assigned 299 workers who were sick listed from work for more than 3 weeks due to nonspecific low back pain to one of three conditions: high-intensity back school, low-intensity back school, or usual care. Usual care followed the Dutch guidelines for the occupational health management of low back pain which was encouragement to continue with normal activities as able. If the individual exceeded 12 weeks of sick leave then a referral for back school or rehabilitation was done. The low-intensity back school included four group sessions for 4 weeks. The participants received 30 minutes of education and 90 minutes of exercise. The high-intensity back school consisted of twice a week visits for 8 weeks of a graded activity protocol based on the principles of Vlaeyen et al. (1995). Outcome measures included total days of sick leave to RTW, visual analogue scale for pain, Roland-Morris disability questionnaire, Tampa scale of kinesiophobia, and perceived patient recovery and were assessed at baseline, 3 month, and 6 month follow-up.

Heymans et al. (2006) concluded that the low-intensity back school participants returned to work faster at the 6 month follow-up with more significant improvement in functional disability and reduction of kinesiophobia at the 6 month follow-up as compared to the high-intensity back school or usual care groups. One strength of this study is the large number of participants, while one limitation is that the descriptions of the back school groups were not explained with sufficient detail. In addition, it was unclear what parameters the study was using to identify each group by the descriptors of high-intensity and low-intensity. The graded activity protocol was designated as the high-intensity intervention when this technique begins the first three visits allowing the patient to perform only as many repetitions as they choose. Allowing the patient to dictate the repetitions does not appear to be a high-intensity treatment.

The next article by Critchley, Ratcliffe, Noonan, Jones and Hurley (2007) focused on the cost-effectiveness of three types of physical therapy interventions. A total of 212 participants with low back pain for more than 3 months were randomly assigned usual care, spinal stabilization, and pain management program. The usual PT care included joint mobilization, joint manipulations, and massage coupled with exercises and back-care advice. The spinal stabilization group consisted of individual muscle training for the transverse abdominus and multifidus followed by group exercises that challenged spinal stabilization. The pain management program was presented as a combination of back pain education and group exercises using the cognitive-behavioral approach to reduce fear of movement and reinjury. As this article was included in the systematic review, it is assumed that the pain management program was the graded activity protocol but the description is not clear. Outcome measures included Roland-Morris Disability

questionnaire, numerical analog pain scale, Euro quality of life questionnaire; days off due to back pain, global measure of patient satisfaction, and health utility in quality-adjusted life years and were assessed pre- and post- as well as 6 and 12 month follow-up. In addition, direct medical costs were recorded for 6 months.

Critchley et al. (2007) concluded that all three physical therapy interventions resulted in improvement in pain, health-related quality of life, time off work, and health service utilization for a population of moderately disabled individuals with chronic low back pain. All the interventions produced positive outcomes, but the pain management program (graded activity) presented as the most cost-effective intervention. The large number of participants was gathered from an inner city location with several individuals who were socioeconomically deprived providing a strong sample that would allow better generalizability. The pain management program intervention noted higher attrition compared to the other interventions although this was not shown to be significant.

The article, which was authored by Woods and Asmundson (2008) compared graded in vivo exposure to graded activity protocol. This study selected 88 participants from 151 potential recruits according to selection criteria, but only 44 finished the study. The majority of drop outs occurred early in the study with a slightly higher number of drop outs from the exposure group. The participants were CLBP patients who scored higher than 38 on the Tampa Scale for Kinesiophobia and were randomly assigned to one of three groups: graded in vivo exposure, graded activity, or wait-list control. The graded exposure in vivo provided education to participants about the cognitive-behavioral view on fear-avoidance followed by graded exposure techniques. The Photograph Series of

Daily Activities (PHODA) were used to identify fearful activities. The next sessions consisted of exposing the participants to those activities.

A study by Woods and Asmundson (2008) used several outcome measures and were assessed pre- and post-intervention as well as a 4 week follow-up. The measures included Pain Disability Index, Hospital Anxiety and Depression Scale, McGill Pain Questionnaire, Pain Self-Efficacy Questionnaire, Tampa Scale for Kinesiophobia, Fear Avoidance Belief Questionnaire, Pain Anxiety Symptom Scale, Pain Catastrophising Scale, and Work Alliance Inventory. Woods and Asmundson concluded that graded exposure in vivo showed significant improvement when compared to both the wait-list and graded activity. One important limitation with this study is the high drop-out rate of 44 participants with 21 in the graded exposure group. The authors suggested that having a physical therapist as well as a psychologist provide the graded exposure might reduce some of the drop out related to patient expectations.

The next article by Pengel, Refshauge, Maher, Nicholas, Herbert, and McNair (2007) compared the effect of graded activity, advice, or a combination of both. A total of 259 participants with low back pain for greater than 6 weeks and less than 3 months were randomly assigned to four different groups: graded activity with advice, graded activity with sham advice, sham exercise and advice, or sham exercise and sham advice. All participants received 12 visits of exercise or sham exercise and 3 advice or sham advice visits over a 6 week period. The graded activity was based on the program used by Lindstrom et al. (1992). The group labelled as sham exercise actually received two different modality treatments of pulsed ultrasound and pulsed short-wave diathermy that

had working display lights but the machines did not provide output. The three advice sessions were based on the program by Indahl, Velund, &Reikeraas (1995) and were done by a PT. During sham advice the participants were encouraged to talk about their low back pain or any other problems. While the PTs listened empathetically, no advice about their low back pain was shared. The outcome measures included pain rating scale, patient specific functional scale, global perceived effect of treatment, Roland-Morris disability questionnaire, and depression anxiety stress scale and was assessed pre-treatment, 6 weeks, 3 months, and 12 months, follow-up.

Pengel, Refshauge, Maher, Nicholas, Herbert, and McNair (2007) concluded that both the graded activity and advice presented as more effective interventions that the sham exercise and sham advice groups at the 6 week follow-up especially for the treatment that combined the graded activity and advice. At the 12 month follow-up, only the participant-reported function showed slight improvement in effectiveness for the exercise and advice groups compared to the sham interventions. While this study has the limitation of being unable to blind the care providers, it did assess a large sample of subacute low back pain patients.

Another article that examined the effects of graded activity for occupational injured workers was authored by Leeuw et al. (2008) who compared graded activity with exposure in vivo. This study randomly assigned 85 CLBP patients with complaints of non-specific back pain for more than 3 months to two groups. The first group received 26 sessions of graded activity. The second group underwent 16 sessions of graded hierarchy of fear-eliciting activities by the use of Photograph Series of Daily Activities (PHODA).

The outcome measures consisted of Quebec back pain disability scale, patient specific complaints, photograph series of daily activities, pain catastrophizing scale, tracked daily activity, and visual analogue scale for pain. Outcome measures were assessed at two intervals prior to starting treatment, post-treatment, 6 months follow-up, and 12 months follow-up. Leeuw et al. (2008) concluded that the exposure and the graded activity groups showed equal effectiveness in improving functional disability and main complaints at post-treatment and at the six-month follow-up.

Finally, van de Roer et al. (2008) selected 114 patients with non-specific low back pain lasting more than 12 weeks who were randomly assigned to two different groups. One group underwent intensive group training protocol exercise therapy, back school, and operant conditioning behavioral principles for 10 individual sessions and 20 group sessions. The other group received usual care as outlined by the Dutch guidelines for low back pain. The mean number of treatment sessions in the usual care was 13. Outcome measures included Roland Morris disability questionnaire, pain intensity, perceived recovery and sick leave taken at 6, 13, 26, and 52 weeks.

Van de Roer et al. (2008) reported that the first group undergoing the intensive training showed greater reduction in pain intensity, coping and self-efficacy. In addition, 45% of the participants in this intensive training group noted greater improvement as compared to 32% of the participants who received usual care. However, these differences were no longer statistically significant at the one year follow-up. This study noted that it was unclear if the intensive training sessions were done adequately by the PTs.

After summarizing these 14 articles that examined graded activity treatment, two important topics need to be discussed. First, the operant conditioning protocol of graded activity was initially proposed to address CLBP. Several researchers tested the technique on patients with subacute symptoms (Heymans et al., 2006; Lindstrom et al., 1992; Pengel et al., 2007; Staal et al., 2004; Steenstra et al., 2006). This move toward early interventions was based on the evidence that early active intervention reduced sickness absenteeism of workers (Linton, Hellsing, & Andersson, 1993). While the attempt may have been to provide earlier intervention, the selection criteria focused on the duration of low back pain symptoms.

It is this selection criterion of pain duration that leads to the second issue. One reported predictor for acute low back pain patients moving toward chronicity was the presence of fear-avoidance beliefs (Fritz, George, & Delitto, 2001; Klenerman, Slade, Stanley, Pennie, Reilly, Atchison, Troup, & Rose, 1995; Picavet, Vlaeyen, & Schouten, 2002; Sieben, Vlaeyen, Tuerlinckx, & Portegijs, 2002). Using only duration of pain symptoms to select participants fails to consider this important predictor of fear-avoidance beliefs. The use of the fear-avoidance belief questionnaire (FABQ) or the Tampa Scale of Kinesiophobia (TSK) has been shown to be reliable tools for identifying patients with pain-related fear. Yet only 3 out of the 14 articles used the TSK score as part of the patient selection criteria. While the graded activity protocol has been shown to effectively reduce patient's fear-avoidance beliefs (Leeuw et al., 2008; Woods & Asmundson, 2008), it does not mean that the graded activity protocol is the best treatment choice for all patients with CLBP. In fact, graded activity was not found to be effective

for patients with low fear-avoidance behaviors in the study by George, Fritz, Bialosky, and Donald (2003).

The limitations of this systematic review need to be highlighted one more time. Clinicians have reported that they mainly read the article summary and the conclusions due to their lack of time and occasional difficulty in understanding the specific details of the research articles (McColl, Smith, White & Field, 1998; Retsas, 2000). In addition, systematic reviews are heralded as the highest level of scientific evidence. For busy clinicians wishing to maximize their time, they will more likely select a systematic review when searching the research literature. The clinician may decide that the graded activity protocol is not an effective intervention for treating CLBP.

The responsibility for erroneous conclusions belongs equally to the researchers as well as the clinicians. The researchers were overreaching with their conclusive remarks and the clinicians failed to dig deep enough. It is these very behaviors that can result in distrust in both parties, which makes effectively implementing evidence-based practice that much more challenging. Haines and Jones (1994) referred to this distrust at the "cultural divide" and could hinder effective implementation of evidence-based research into clinical practice.

While research literature provides consistent evidence that graded activity is an efficacious treatment for CLBP, it is not a commonly practiced protocol in outpatient physical therapy settings. Haldeman and Dagenais (2008) proposed that the selection of CLBP treatment approaches in the clinical setting occurred more through masterful marketing rather than scientific evidence. Linton (1998) and Muncey (2000) also documented that common clinical practice was often disconnected from the scientific

evidence. Silagy (1998) noted that some clinicians were reluctant to implement new or revised theory into clinical practice.

Battle et al. (1994) surveyed PTs to assess treatment preferences for patients with low back pain in the state of Washington. Responses were obtained from 293 (74%) of the therapists contacted and 186 therapists worked in a setting, which treated patients with back pain. The survey revealed that 37% of the visits were to treat CLBP. The McKenzie method was reported as the most popular approach. Treatment preferences included education in proper body mechanics for activities of daily living and stretching exercises followed by aerobic and strengthening exercises. The selection of spinal mobilization or traction occurred more frequently by practitioners in the private practice outpatient setting as compared to hospital or HMO practices. No mention of graded activity treatment protocol is noted in this survey. This could be related to the specific questions asked.

Clinical practice guidelines for treatment of the low back provided an additional list of conservative care (Chou et al., 2007). A moderate level of evidence was found for acupuncture, exercise therapy, massage therapy, Viniyoga-style yoga, cognitive behavioral therapy, spinal manipulation, and intensive interdisciplinary rehabilitation. The exercises therapy did not clarify what type or intensity of exercise was included. No mention of the graded activity protocol was made. Therefore, the graded activity protocol was selected for this research project as it demonstrated moderate evidence of efficacy for treating CLBP patients, yet it is not listed as common practice in the outpatient setting.

METHODS

Research Design

This research was a qualitative study that utilized a grounded-theory approach to explore the implementation of evidence-based research into clinical practice. The main questions included (1) What challenges do the PTs encounter when implementing the evidence-based graded activity protocol for CLBP patients in the outpatient physical therapy setting?, and (2) What recommendations do the PTs have to overcome the identified challenges?

Participants

Prior to any data collection, approval from the Michigan State University's Institutional Review Board was obtained. This study chose to recruit PTs from three categories of work experience. For ease in recording the data, the three groups were identified as group 1, group 2, and group 3. Group 1 consisted of PTs who have graduated from a physical therapy program in the past 5 years or less. Group 2 included PTs who have graduated more than 5 years and up to 15 years. Group 3 represented PTs who have graduated from a physical therapy program more than 15 years ago. The initial goal was to recruit a total of 15 PTs to assure gathering of robust information. Each PT was found to be duly licensed and in good standing to practice physical therapy in the states of North Dakota, South Dakota, Montana, and Minnesota with an internet license verification.

Participant Recruitment

The initial goal was to recruit a total of 15 PTs, 5 PTs per group. Several of the outpatient facilities employed multiple PTs, so when one PT volunteered this created a

snowball effect and often additional PTs would volunteer. In the initial round a total of 21 PTs volunteered; with 8 PTs in group 1, 7 PTs in group 2, and 6 PTs in group 3. Four participants dropped out of the study. Three of the participants in group 1 changed jobs and did not want to continue with the study. The fourth participant was in group 2 and reported that she did not have the time to try the graded activity technique. This left a total of 17 PTs which exceeded the initial target number.

When 8 of the remaining 17 PTs reported an inability to implement the graded activity protocol on a patient four months after the training workshop, 11 additional PTs were recruited to assure robust data. During the recruitment of further PTs, the researcher also decided to schedule second interviews even though participants had not started a CLBP patient. This step helped in three important ways. First, the second interview helped to encourage the PTs to continue to try to implement the graded activity protocol. Second, several of the PTs needed clarification about what constitutes an appropriate candidate to treat especially remembering to use the Fear-avoidance Belief Questionnaire on all patients to accurately screen for fear and anxiety issues. Third the second interview began to undercover some prospective challenges. The researcher recruited an additional 11 PTs with 3 PTs in group 1, 2 PTs in group 2, and 6 PTs in group 3. This brought the total number of PTs in this study to 28 (See Table 1).

Table 1: Demographic Information on Study Participants

Pseudonym	PT degree	Years since graduation	Work setting	Knowledge of graded activity
Dan	DPT	3	Private outpatient	Heard not used
Dave	DPT	3	Private outpatient	Heard not used
Dillon	DPT	1	Hospital outpatient	No
Darla	DPT	4	Hospital outpatient	No
Dean	DPT	4	Hospital outpatient	Yes
Doug	DPT	3	Hospital in & outpatient	Heard not used
Donna	DPT	4	Hospital in & outpatient	No
Dawn	DPT	4	Hospital in & outpatient	No
Jeff	Masters	13	Private outpatient	Heard not used
Jim	Masters	12	Private outpatient	No
Julie	Masters	10	Private outpatient	Read not used
Jennifer	DPT	5	Private outpatient	No
Justin	DPT	10	Private outpatient	Heard not used
Janet	DPT	7	Private outpatient	No
Jacob	Masters	13	Physician owned specializing in spine care	Read not used
Jason	Masters	13	Hospital in & outpatient	No
Ron	Masters	16	Hospital outpatient	No
Rick	Masters	23	Hospital outpatient	No
Reginald	BS	27	Hospital outpatient	Read not used
Ryan	BS;TransDPT	30	Physician owned specializing in spine care	No
Rebecca	BS	33	Physician owned specializing in spine care	No
Roger	BS	21	Physician owned specializing in spine care	No
Rachel	Masters;TransDPT	16	Hospital outpatient	Heard not used
Raymond	Masters	17	Private outpatient	yes
Robert	BS	18	Private outpatient	Heard not used
Russell	BS;TransDPT	24	Hospital in & outpatient	Read some use
Ralph	Masters	17	Private outpatient	No
Ross	BS	29	Private outpatient	Heard not sure

Procedure for Qualitative Study

The investigator sent out an email requesting volunteers from all licensed PTs in North Dakota and PTs employed at facilities that supervise student PT students at the University of Mary from the states of North Dakota, South Dakota, Montana, and Minnesota to volunteer to participate in the qualitative interview process. Further convenience sampling to recruit PTs was done by having the participants recruit colleagues who might be interested in participating in the study. When additional recruitment was needed, the investigator contacted previous University of Mary graduates by email, phone, or in person. The investigator verified that each volunteer was duly licensed and in good standing as a PT in each perspective state through internet verification. The purpose and protocol for the research study was presented to each volunteer during the explanation of the informed consent form. The participant signed the consent form and the investigator scheduled the meeting for the first interview.

Demographic Interview. The majority of the initial interviews were completed in person. Several of the midway and final interviews were conducted by Skype or phone due to travel complications. The first interview was completed in the fall and the last one was finished the next spring. The interviews conducted in person were completed in an environment with minimal background noise and privacy, such as a treatment room or conference space. The purpose of the study was reviewed with each participant. The investigator utilized a semi-structured interview guide (Appendix A) of short open-ended questions to gather educational background, work experience, attitudes, and experiences about evidence-based treatment protocols. The majority of the initial interviews were conducted in person unless distance or weather prevented this.

The PTs were reminded that there were no right or wrong answers to the questions and that confidentiality of the conversation would be maintained. Permission was obtained to record the interview using a Sony recorder. The shortest interview took eight minutes and 54 seconds while the longest took 47 minutes and 49 seconds.

The decision to conduct an interview to obtain demographic information from the PTs was three fold. First, the interview process allowed the investigator to pose clarification questions immediately minimizing the need for time-consuming follow up. Second, the interview process provided the PT an active voice at the start of the study process rather than waiting months for the first interview. Third, the interview process increased the time of engagement between the investigator and PT, which can help improve rapport. Lincoln and Guba (1985) reported that rapport might improve credibility of the study. The training session for learning the graded activity protocol was usually completed on the same day as the first interview due to the long drives to each facility. The training session and interviews were completed on different days for one of the facilities due to reduced driving distance.

Basic Information. The first question assessed educational training: Where did you attend college and describe what degrees you have achieved? Group 1 consisted of 6 male and 5 female PTs who all had graduated from with a doctorate of physical therapy. Group 2 consisted of 5 male and 4 female PTs with 4 graduating with a doctorate and 5 graduating with a Masters of physical therapy degree. The last group 3 represented 10 male and 2 female PTs with 5 graduating with a Masters and 7 graduating with a bachelor degree in physical therapy. Two of the PTs in group 3 with a bachelor degree in physical therapy reported completing a transitional DPT degree (See Table 1).

Work Experience. The next two questions asked about work experience, "How many years of clinical experience do you have?" and "Describe your areas of clinical expertise." The participants in Group 1 reported 1 – 4 years of work experience with a mean of 2 years of experience. All participants reported clinical experience in general outpatient orthopedics. Additional training or expertise included the following: participant 101 – sports medicine and certifications in strength and conditioning (CSCS) as well as sound-assisted soft tissue work; participant 102 – previous PTA and lymphedema certification; participant 103 – sports medicine and some inpatient care; participant 105 – women's health; participant 106 – training through Evidence in Motion; participant 108 – occupational medicine; and participant 110 – vestibular & pediatrics. Additional training or expertise for group 2 included: participant 201 – women's health; participant 204 – Orthopedic Certified Specialist through the American Physical Therapy Association (OCS); participant 206 – vestibular and clinical instructor; participant 207 – chronic pain, women and men's health; participant; participant 208 – chronic pain; and participant 209 – wound care. The additional training or expertise for group 3 included: participant 301 – chronic spine pain; participant 303 – sports and industrial medicine; participant 305 – spine care; participant 306 – spine care and CSCS; participant 307 – ATC; participant 308 – OCS and CSCS; participant 309 – wound care; participant 310 – rural practice; participant 311 – temporomandibular joint disorders; and participant 312 – sportsmedicine, foot orthotics and McKenzie approach.

Estimate of CLBP patients seen in 1 month. This was a clarification question for the PT's work environment. Participants gave a range of answer from low of 1 to 3 CLBP patients per month to as high as 20 plus. When the three high numbers of 10, 12 and 20

are removed, the average answer was that the PT saw 5.2 CLBP per month. The high numbers were reported by one PT who specialized in treating chronic spine patients, while the other two were PTs who worked in an outpatient hospital setting.

*CLBP treatment***.** The next question asked, "Describe your typical treatment approach for chronic low back pain?" The most common treatment reported for CLBP patients included mobilization and exercise, particularly spinal stabilization. This was reported by 10 out of 32 participants. Five of the PTs reported that their treatment care is directed by the back classification system while four of the PTs direct their back care by the McKenzie approach. Five PTs noted that they use modalities to control pain while six PTs chose education to address the patient's pain. Only two PTs used a graded or quota based exercise approach. Two PTs reported using specialty equipment for spinal unloading for their patients and both of these PTs specialized in chronic spine care.

Graded Activity Knowledge. Participants were asked, "Are you familiar with the graded activity protocol for treating CLBP patients?" The most common response across all three groups was that they were not familiar with the graded activity protocol with a total of 14 (50%) negative responses. Only four PTs (14%) reported familiarity with the technique with only two (7%) reporting to have tried using it in the clinic. Eleven PTs (39%) noted that they had heard or read about the technique but had not used it. One PT had read about the technique and tried it some in the clinic but it was not used routinely.

Work Environment. The next interview question asked the PTs to describe their present work environment. Four categories of work places were identified with the following distribution of PTs: hospital outpatient – 10, private outpatient – 14, rural hospital treating both in- and outpatients – 5, and physician owned outpatient clinics – 3.

While all of the PTs treated patients, 10 participants also had administrative duties due to a supervisory role or ownership of a private clinic.

Exposure to Research. This question asked the PT, "What exposure to research did you have during your college studies?" The participants in group 1 used words such as "extensive" and "highly saturated" to answer this question. All participants reported a required research project for degree completion. Six completed a group research project while three did a case study. Group 2 reported similar descriptive comments such as "we were exposed to a lot of different research throughout the curriculum," and "pretty extensive." Group 2 participants also completed a research project for their physical therapy degree at both the doctorate and masters level. Six participants reported completing a group research project with one doing a case study. One participant worked as a research assistant for a few years and was involved in several research projects. The answers for group 3 participants showed more variability. This variability is two-fold. Some did have more research exposure during their initial PT schooling when they received their bachelor degree. Others have completed a post graduate education that required a research project. Three participants noted minimal to little exposure to research while two participants were involved in a clinical research project. For the others, four completed a group research project, two did case studies, and one completed a literature review.

Graded Activity Treatment Protocol. The investigator provided a free educational workshop at each outpatient facility on the graded activity protocol for treating CLBP patients that has volunteered to participate in the study. The presentation was given to each participant individually or as an in-service over the lunch hour when

multiple PTs had volunteered for the study. These lunch in-service presentations were offered to all interested medical staff rather than to just research participants. The graded activity protocol was implemented just by the PTs who volunteered for the research study. Two of the PTs used PTAs or ATCs to treat their CLBP patients who had received the same training as the PTs.

Staal and associates (2004) provided the procedural guidelines for the graded activity protocol selected for implementation. The PTs first selected exercises to address four areas: aerobic, core stabilization, lower extremity strength, and individually tailored exercises to simulate and practice problematic tasks at work of activities of daily living. The aerobic conditioning consisted of stationary bike or treadmill work at 60-80% max HR for over 12 minutes. Some CLBP patients may begin at times lower than 12 minutes or lower intensity due to poor conditioning and fear behaviors. The PT addressed this on an individual basis. In addition, the PTs selected 4 to 6 exercises for both core stabilization and lower extremity strengthening according to their preference.

The task-related activity addressed specific daily or work-related activities that the patient reports difficulty or inability to perform due to CLBP. These could have included basic activities of daily living (ADLs) such as standing up from a seated position, bending over to put on socks and shoes, or vacuuming. The tasks could have been work-related such as stocking light items on a shelf or kneeling to repair equipment. The exercise chosen depended on the availability of equipment and space in each therapy clinic.

During the first three therapy sessions, the CLBP patients were instructed to perform each selected exercise to their limits of pain. For example, the patient was

instructed that a warm-up on a stationary bike might be for 5 – 10 minutes. The PT instructed the patient to only do as much as they were able, and then recorded the time for that visit. This process aided in building a safe supportive environment for the patient. The PT monitored that the patient did not overdo on the second and third visit, which could significantly flare up their pain level. The results of these first three sessions were averaged to calculate each participant's baseline for their quota-based program. Then the PT worked with the patient to set a goal for each selected exercise. For example, the patient completed the following times on the bike for aerobic conditioning, first day 5 minutes, second day 6 minutes, and third day 7 minutes. The average was 5+6+7=18/3=6 minutes. So, for visit number 4, the patient would complete 6 minutes for aerobic conditioning. This process was repeated for each exercise to establish the baseline.

Calculating the baseline value was important, because now the patient will no longer be allowed to stop the exercise due to their pain complaints. Rather the patient was asked to commit to attend each visit and complete all prescribed exercises at predetermined quota levels regardless of how they felt. This marked a transition where the introduction of appropriate graded exercises should influence a decrease in the competing pain behaviors.

At the start of the fourth visit, the PT and the patient agreed on the final goal for each specific exercise. For example, the baseline aerobic fitness was calculated at 6 minutes. The PT and patient decided that 30 minutes would be a reasonable goal for the final visit. Once the goal was selected, the graded increment for the next several visits could be calculated. The gradient increase for the exercises depended on the number of scheduled PT visits. If the patient was seen for 9 more sessions, then the goal of 30

minutes was divided by 9 sessions (30/9=3.3 minutes). The graded quota for aerobic exercise would be increased by 3 or 4 minutes each subsequent visit.

During every session with these patients, the PT needed to emphasize three key educational principles. First, pain does hurt, but this does not mean that it harms. Second, exercise and the physical activity prescribed for you is recommended and safe, despite sensations of pain. Third, our primary goal is the improvement of physical function and not pain relief. In addition, the PT team will precede each visit with a proper warm-up as well as observing the CLBP patients to assure proper technique and body mechanics are maintained throughout the session. The CLBP patients would be stopped if the patients appear to be in physical distress.

Each PT team was discouraged from the use of any passive modalities, such as ultrasound, hot packs, or electrical stimulation. The use of modalities could be seen by the patient as confirming that their pain is driven by tissue pathology. The PT team could instruct the CLBP patients how to use ice or heat independently at home as this encourages self-management of pain. Some PTs performed manual therapy with the graded activity. Manual therapy has been reported to significantly improve pain, functional disability, and general health of patients with CLBP than the general exercise therapy group and remained stable at 1-year follow-up (Aure, Nilsen, & Vasseljen, 2003).

The primary goal of the graded activity program was not to improve the aerobic endurance, muscle strength, or any other aspect of physical fitness. The main purpose was to inform the disabled CLBP patients that it is safe to move and to be physically active despite his or her pain. Therefore, the therapists focused on the CLBP patients' functional improvements rather than their pain. When a quota of exercise was

successfully achieved, the treating therapist was encouraged to verbally praise the participant. This provided positive feedback for a well behavior while effectively minimizing feedback for illness behavior.

One modification of the graded activity protocol as described by Staal and associates (2004) was using a team approach for treatment. The PT performed the initial evaluation, but subsequent visits of the graded exercise would be a team approach of a PT and a PTA or an ATC. This team of professionals worked together to select specific exercises, create treatment goals, and establish graded quota increments. The PTA or ATC physically supervised the majority of the treatment sessions, conferring with the PT when needed. Any data or results of the graded activity protocol used on the CLBP patients were not used in the research study.

None of the PTs contacted the investigator for questions regarding the graded activity protocol implementation process. Some clarifications were discussed during the second interviews. The two most common discussions included clarification that the frequency and duration of the program was not rigid and could be adjusted according to the patient's needs and the need to use either the Fear-Avoidance Belief Questionnaire (FABQ) or the Pain Anxiety Symptom Scale 20 question format (PASS-20) to correctly identify patients that have been shown to benefit from the graded activity protocol. Many PTs were just selecting patients due to length of time that their low back pain was present or if previous treatments had been unsuccessful.

Midway Interview. The original plan for the study was to conduct the midway interview four weeks after the PT had started to treat their first CLBP patient with the graded activity protocol. This changed for two reasons. First, some of the PTs just forgot

to contact the researcher when a patient was started, so when contact was made the PT had already completed both of their CLBP patients so the midway interview was changed to a final interview. Second, several PTs reported not having suitable candidates on their schedule even two months after the training session. These PTs were encouraged to schedule a second interview in order to explore this challenge. Due to inclement weather and long driving distances, the midway interviews were not conducted in person. Initially, the interviews were done by Skype, but this was changed to speaker phone due to the poor sound quality of Skype. The second interview (Appendix B) consisted of semi-structured open-ended questions to assess how the implementation process was proceeding. This was expanded to address the unique situation of the PTs who reported a lack of appropriate CLBP patients. Additional training and resources were offered at this stage to assist PTs in finding appropriate CLBP patients.

The PTs were reminded of the purpose of the study and their right to voluntarily withdraw from the study. Each PT was assured that there is no right or wrong answers to the questions and that confidentiality of the conversation would be maintained. Permission was obtained to record the interview using the Sony recorder.

Final Interview. The final interview was supposed to occur after the PT had treated two CLBP patients with the graded activity protocol. This process changed for the same reasons as the midway interview. First, the PT did not always contact the researcher when the two patients were completed. This required intermittent email and phone calls to schedule the final interviews. In addition, a few of the PTs did not implement the graded activity protocol on any patients even after clarifications and suggestions were discussed during the second interview. The final interview guide (Appendix C) consisted

of semi-structured open-ended questions to explore how the implementation process proceeded for each participant and to discern the two research questions. The PTs were reminded of the purpose of the study and their right to voluntarily withdraw from the study. Each was assured that there was no right or wrong answers to the questions and that confidentiality of the conversation would be maintained. Permission was obtained to record the interview using the Sony recorder.

Data Analysis

The interview guides are designed to gather appropriate demographic information to adequately describe the PTs as well as to answer the two research questions (1). What challenges do the PTs encounter when implementing the evidence-based graded activity protocol for CLBP in the outpatient physical therapy setting?, and (2). What recommendations do the PTs have to overcome the identified challenges? The first question was answered by the information gathered from questions number 7 – 9 on the initial demographic interview guide and questions number 1 – 4 on the final interview guide. The second question was answered with final interview guide questions number 5 – 7.

The data analysis employed strategies to ensure trustworthiness as described in Guba's Model (Guba, 1981), The first strategy employed was member checking. Prior to the interview process, I spent time getting to know each participant in order to build basic rapport. This was done during the telephone and in-person discussions that occurred while recruiting the participants. During the interview process, I periodically restated or summarized information for the purpose of assessing accuracy. After the completion of the initial interview that included the participants' demographic information, I verified

the accuracy of each participants educational and employment experiences by checking graduation records and questioning co-workers.

The next strategy employed to ensure trustworthiness was investigator triangulation. Two other investigators and I read the interview transcripts line by line for open coding. Then open coding was organized into groups of similar responses to formulate a theme. This provided a greater depth to the analysis of the collected data by having additional experts examine the material. Allowing multiple investigators to search the data improved the chances that all aspects of the phenomena were correctly identified. All investigators compared and contrasted their individual findings and negotiated on the final common themes, the ranking of higher and lower order for the themes as well as the organization of the data into the appointed themes. This reduced the individual bias of the primary investigator by utilizing this check and balance technique.

The last strategy employed addressed the transferability aspect of trustworthiness. In order to establish transferability with a convenience sample, there was be a balanced selection of PTs of three levels of work experience representing individuals who graduated with a bachelor, masters, or doctorate level.

RESULTS

The purpose of this study focused on the following research questions: (1) What challenges do the PTs encounter when implementing the evidence-based graded activity protocol for CLBP patients in the outpatient physical therapy setting? and (2) What recommendations do the PTs have to overcome the identified challenges? In order to clearly explain the results, answering just these two questions would not be sufficient. The final interview consisted of seven questions (see Appendix C). Each question was analyzed line by line to search for code words. Then the code words are reviewed for emerging themes and organized into higher and low order themes. This chapter details the data analysis of each of these questions and then summarizes how the information answered the two key research questions.

Final Interview

Summary of Participants. This project recruited a total of 32 participants. Three participants from the early career group left their present employment and did not respond to follow-up requests. One participant from mid-career group voluntarily withdrew within the first month of the study due to time constraints. Seven of the 28 PTs never implemented the graded activity protocol on a patient by the time of the final interview despite attempts to encourage implementation at the time of the midway interview. Two PTs reported that they implemented the graded activity protocol, but when the researcher examined the specific details of the treatment provided, it did not follow the graded activity protocol enough to qualify as a successful implementation. This means that a total of nine out of the 28 participants (32%) did not successfully implement the graded activity protocol. Final interviews were completed on all 28

participants even if the PT had not implemented the protocol. Data analysis was conducted on these 28 final interviews (See Table 1).

Definition of EBP. The first question of the final interview asked, "What does EBP mean to you?" The definition of EBP, which was given during the workshop training states "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). All the participants were able to provide a good definition of EBP and did not reveal any other significant information.

Challenges and recommendations for implementing EBP. Three questions from the final interview were found to illicit the most information to answer this study's main research questions. Those questions were (1) "Describe your experience in implementing the graded activity treatment protocol for your CLBP patients," (2) "Describe any challenges you encountered while using the new graded activity approach with your CLBP patients," and (3) "List some suggestions to overcome the challenges that you encountered." The analysis of these three questions revealed four major themes. Figures have been created to assist in visualization of the themes, subthemes and lower order themes. Note that the major themes are in round cornered boxes with titles in ***bold italics.*** The subthemes are in round cornered boxes with titles in *italics.* Lower order themes do not have boxes and are in plain text. PT recommendations to overcome the challenges are underlined. (see Figure 3).

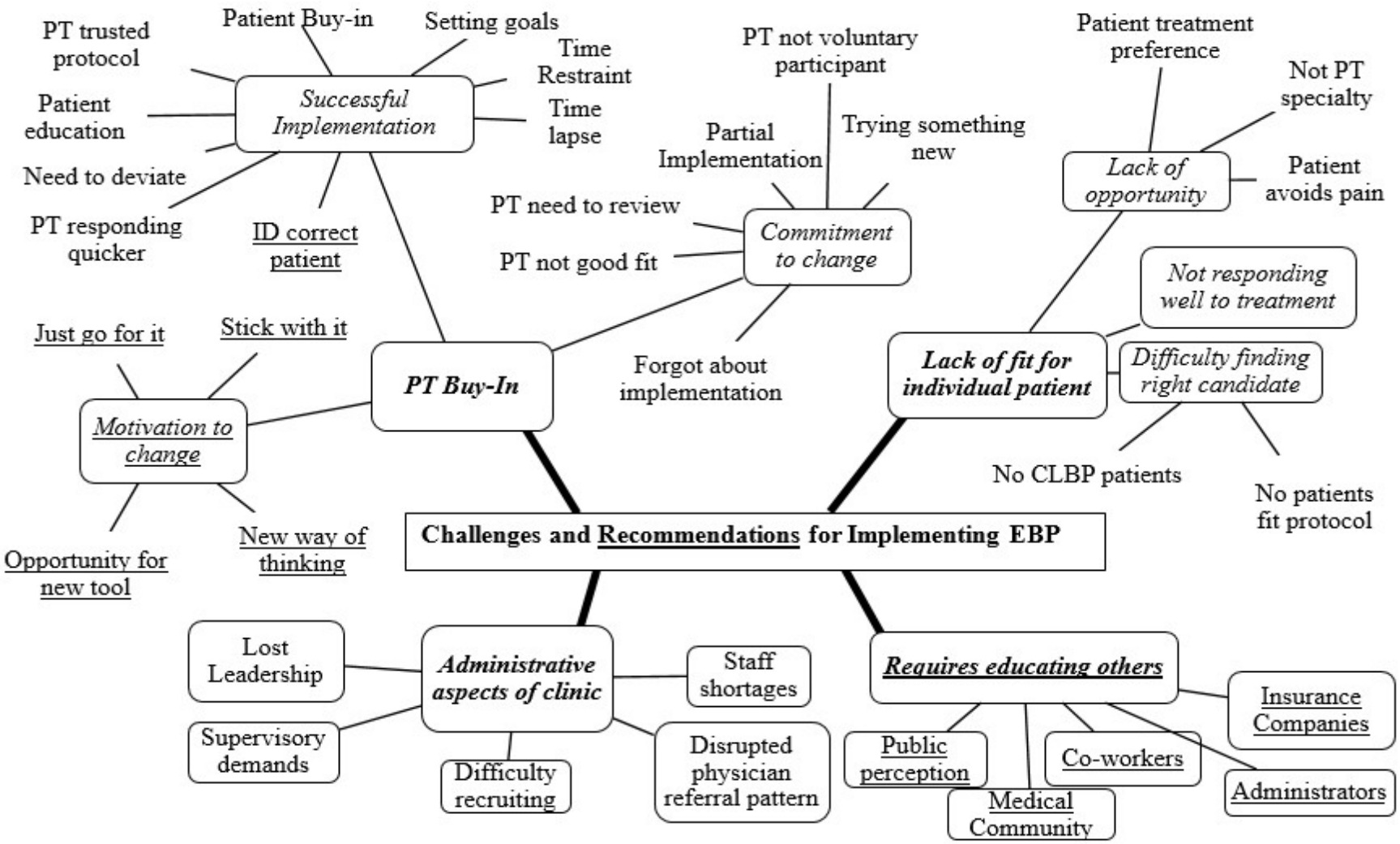

Figure 3: Theme Diagram of Challenges and Recommendations for Implementing EBP

The first theme, ***PT buy-in,*** revealed the greatest volume of comments from the PTs regarding the need for the PT to buy-in to the EBP protocol of graded activity in order for there to be a successful implementation. The second theme, ***lack of fit for individual patient,*** was related to the PTs' difficulty with finding an appropriate patient for the implementation of the graded activity protocol. The third theme, ***administrative aspects of the clinic,*** introduced various clinical elements that created challenges to the implementation process. The fourth theme, ***educating others about protocol,*** reported that the PT and the patient are not the only individuals who need to be educated about this new EBP. This next section will present each of these themes with subsequent subthemes and participants' remarks.

PT buy-in. This first theme was significant for 19 out of the 28 PTs (67.9%) and included PTs from early, mid and late career groups (see Figure 4).This theme produced the largest volume of participants' comments for this research project. The resounding message from the participants is that the PT must buy-in to the EBP in order for there to be successful implementation. The three subthemes for ***PT buy-in*** included (1) *commitment to change,* (2) *successful implementation*, and (3) *motivation to change.*

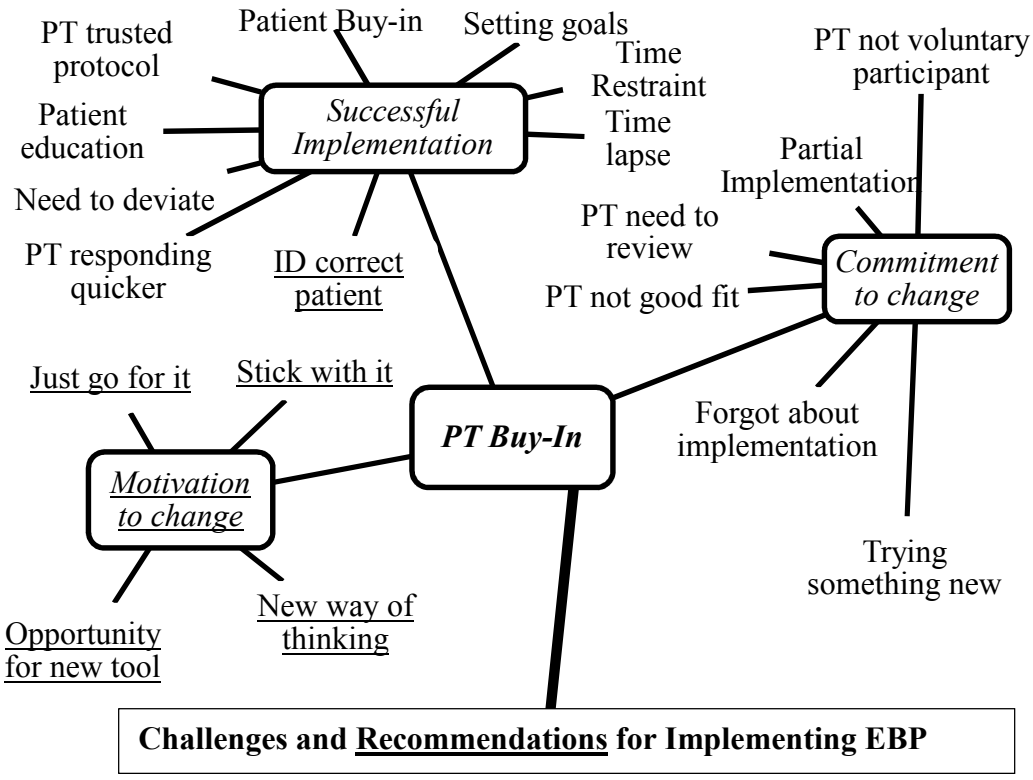

Figure 4: Major theme – ***PT buy-in***

Commitment to change. The comments for this subtheme revealed that PT buy-in occurred when the PT was committed to change. Several lower order themes revealed the challenge of commitment for the PT, namely (1) forgot about research implementation, (2) PT needed to review protocol, (3) trying something new, (4) partial implementation, (5) PT not good fit for project, and (6) PT not voluntary participant. First order themes either produced or disrupted the *commitment to change*. Janet remarked that she forgot about the EBP protocol which meant that she was not committed to change, "Those first couple of weeks were so crazy, were so busy and that it was out of sight, out of mind, and I forgot." The comments of three other PTs noted that there was a need for them to

review the protocol. Dillon said, “Right away, I could tell that I just needed to do a better job of progressing patients and making it more objective than I had been doing.” Dean shared, “I think the challenge is myself. I was not, I think it was just not having confidence in the process. And not continually reviewing the process myself.” Jason stated, “I probably did not follow that as well as I should have, because I just kind of made an average, and then just increased it each time, and progressed, and graded.” Doug noted, “I think you just have to practice a little bit with it…” Dean stated, “I think having regular conversation …and doing regular checks you know because I don’t think I was doing enough checks.”

Five other PTs felt that commitment to change requires being able to try something new. Jennifer summarized this well, “I think the biggest challenge is just trying to get over yourself and get out of your rut and trying something different in a different capacity than you would.” Reginald commented that he was not willing to try something new,

> “It took options away from me. I’m not shy about using modalities. I believe there is a place for modalities…there is no question I rely on my experience now, my professional judgement…because quite frankly – and how do I want to say this, you’ve almost got to sell me on this approach too, right?”

Without a willingness to try something new, then Reginald would not be willing to commit to change and as he states so clearly, he has not bought into the EBP protocol of graded activity.

Two of the late career PTs commented on how they selected parts of the protocol resulting in partial implementation,

> "And, again with this, exercise background, I wanted to see how he would, would do with that and, so we did, you know, teach some of the graded activity. So we did, did learn that. He understood quickly of what he could not, could, or could not do. So that is kind of interesting to see how he did." (Ron)

> "You know, it's something that we kind of generally do a little bit that are or that I was doing prior to your presentation from the standpoint of, as symptoms allow, kind of thing…I, the part that I integrated was, you know, actually counting, you know, the repetitions, and actually giving them the goal average that type of thing, after they, you know, accomplished it, so then they had a number set to their tolerance versus, you know to regular tolerance." (Rachel)

The workshop training for the graded activity protocol recommended the use of a screening tool such as the FABQ to determine if the CLBP patient has fear and anxiety about physical movement. This was an important recommendation as the literature noted that a CLBP patient with low fear and anxiety would not benefit from the graded activity protocol. There were seven PTs that did not use the FABQ consistently to screen their CLBP patients prior to implementation of the graded activity protocol, and these PTs expressed differing reasons for this action. Three of the PTs from mid- and late-career groups chose to not use the FABQ. Roger shared, "No, not really, more of the same techniques that I always do for just history, and measurement assessment, strength, and stuff like that." Two PTs from the mid-career group reported inconsistent use of the screening tool. Jeff noted, "Occasionally [use the FABQ], probably something to make a little bit more a part of our protocol." One early career PT reported that the FABQ was not a form used by the facility. Dillon stated, "I, no one in my clinic uses the FABQ." Another early career PT admitted that it was just a mistake. Dave said:

> "I didn't use the FABQ, in that case I should have probably after, and actually it's hard after, probably half way through the eval, I probably should have pulled that out, because I noticed you could tell those things."

The PTs who chose to implement the EBP partially reflect that their ***buy-in*** to the graded activity is not complete.

The last two comments for this subtheme, *commitment to change*, discussed how the two PTs were not willingly involved with the project. Rick expressed concern that he was not a good fit for the research project, "So, I have not been the perfect candidate for this project." Darla expressed, "I was somewhat recruited…I think he just kind of grabbed us thinking that we would be willing participants." Darla and Rick were co-workers at a large outpatient facility where another co-worker had volunteered them for the project on the day of the workshop. Neither Darla nor Rick demonstrated a *commitment to change* or ***PT buy-in.***

Successful implementation. The second subtheme involved those issues that are pivotal for successful implementation. Nine lower order themes for successful implementation emerged, (1) patient buy-in, (2) patient responding quicker than expected, (3) PT trusted protocol, (4) need to deviate, (5) patient education, (6) setting appropriate goals, (7) tough time frames,(8) time lapse from training, and (9) identify correct patient. The first lower order theme of patient buy-in was reported by ten PTs. Rachel summarized this well,

> "Getting them [patients] to buy-in to exercise and finding the right level, it's not so much the graded protocol and giving them empowerment. That's not the challenge. It's just getting the clients to buy-in. And it's difficult to, you know, like I said once something becomes their everyday norm. It's getting them to think, so, hey this isn't the norm. I'm getting them to switch."

Dan mentioned, "Hardest thing is compliance and follow through with a home exercise program," and "I think it's difficult for them to grasp that. They want it [their pain] to go away. That's not fixing my problem, so then they won't even come in." Jim noted that

some patients request modalities which have been shown to be counterproductive for the CLBP patients. He found it challenging to alter this mindset.

> "They turn into the type of patient that, um, the philosophy is not working for. Either they drop off, um, immediately, um, they've had a history of modalities and they avidly request modalities…So that's the hard part too is getting them to be compliant with that thought process that, um, you know this may produce pain but we got to push through that and continue on to somewhat structured regimen."

Jason expressed that patient buy-in requires overcoming patient misinformation,

> "The biggest thing is this um, one it is, it is how to really get the patient on board with it. Their biggest thing is, I hurt and the doctor said you are going to get rid of my pain. So how is exercising going to get rid of my pain and that is just, well really I am doing all the work. What are you going to do for me? They want things not specific to the protocol. Those are the challenges we face in therapy all together."

Roger shared that patient buy-in requires instilling patient trust,

> "I think probably just getting the patient to believe that education I'm giving then or the techniques we're using can be helpful but they may not be instantaneous. Kind of trust it will develop and in, like the first instance, I think she has some hesitation on what we're doing. But by the end of it, when things start to work out, she was fully on board."

Ralph felt patient buy-in could not occur without altering patient expectations,

> "So when you get some folks in there, you know, familiar with what you do, they expect the same thing, you know? That's probably the hardest part."

Russell stated that without buy-in the patient will just stop coming to therapy,

> "The problems that I had implementing would go back to the patients either stopping the program too soon, getting another treatment instituted by physician, and some other behavioral things."

These ten PTs shared that the process of patient buy-in involved overcoming patient misinformation, facilitating patient understanding, altering patient expectations, or instilling patient trust. Without patient buy-in, successful implementation of the EBP of graded activity could not occur. Raymond summarized this sentiment well,

> "I think the biggest challenge, I think we talked about this the last time, it is just getting patient buy-in. You know, so many of these patients, you just got to convince them that, hey, what you're doing isn't right or you wouldn't be here. I have the information to help you, let me help you and let's get you more physically active."

The second lower order theme, patient responded quicker than expected, was shared by five PTs. Three PTs noted the patients improved sooner than the two times per week for eight week duration as reported in the literature. Dave said, "One of them, um, unfortunately got better quicker than the parameters we had set for that, the duration of the study." Jennifer shared, "My patient seemed to do very well with it. They progressed and again, like a lot faster than I would have anticipated prior to this." Dillon noted that finishing the eight week protocol in a shorter period of time was related to early patient buy in,

> "The biggest thing was getting them to ah, buy in early on and kind of investing in the beginning so to speak and then um, making sure that ah, don't carry it on longer than it has to be done. So don't worry about it finishing out a certain set period of time.

Dillon felt that this is important information to know as sticking too rigidly to the protocol duration may not be helpful.,

> "That was the hard thing about the first patient is they, I think they got fatigued a bit and were ready to be done so, I didn't do that the last two or three people."

Jennifer expressed that the improvement she noted was in the patient's attitude, "They were like holy cow, and so they were kind of pumped about that, so it was actually fun because they came back with a better attitude." Rebecca's comments summarized her response to the patients' unexpected progress,

> "It was absolutely, incredibly magic to watch things evolve with her…and the

> progression of them was, I just thought somehow that they weren't going to progress that fast. I learned that and remember saying this is a lot for some of my patients…that was really a pleasant surprise to see how that went."

The third lower order theme for the subtheme *successful implementation* was PT trusted research protocol**.** The PTs shared how the new graded activity protocol contrasted with their previous approach for treating CLBP patients and improved their ability to trust the new technique. Dillon described how the new technique allowed him to push the patient,

> "I think it just allowed me to be, to push a little bit harder as far as here is what we did last time and here is what we need to do today, like is what we're, you know, you need to be able to do this today and this is part of your goals. So, I think maybe, ah, it had me push patients a little bit harder and not necessarily adjust that treatment based on response, um, as much as I might have previously done."

Julie also noted the ability to progress the patient more, but she credited the structure of the new protocol as well as the ability to treat the patient functionally.

> "Yeah, more structure and I'm just more um, maybe more strict or more maybe pushing them a little harder than I was…and like I said before, it helps me treat them a little more functionally instead of maybe being, um, too passive when they're not work comp…"

Jennifer reported that the graded activity protocol was a more aggressive approach, "It was a little bit, um, more aggressive as far as the initiation of exercise which was good." Ryan expressed an increased confidence in the protocol as he observed how the CLBP patients responded,

> "I felt more confident in pushing exercise and moving away from modalities…I had that sense of confidence there that it was okay because of the program…but it wasn't me. It's the program. And so, with that I felt more confident pushing the exercise."

The next lower order theme, need to deviate from protocol, explained if the PTs altered a part of the instructed graded activity protocol. The types and reasons for the deviations varied as noted with participants comments below:

> "As far as the reps and sets every once in a while little bit we did have to deviate, um, just because some of them could do more than the allotted, either right away we could do a little quicker than the program allotted." (Dave)

> "There was a deviation with the protocol with the gentleman that I did at the end, not throughout the session, but at the end, we did some dry needling." (Jennifer)

> "It was the time frames. Yes, just the time frames. More of the time frame that when I saw her each visit – because we're – we see her for an hour. On the first visit on the evaluation we see her for half hours after that." (Roger)

Another lower order theme for *successful implementation* included patient education. Dawn shared,

> "I guess kind of giving the patients a heads up you know that, we may not be directly addressing that pain of yours. We know it's been something that's been ongoing for years. There's been multiple ways of trying to fix the pain directly…Not the fact that we're completely ignoring it …but wanting to just introduce function."

Ralph added, "Well, I would say that, you know, probably the biggest thing would be is, the hardest part for me was convincing patients that they need to really come in two to three times a week."

The sixth lower order themes for *successful implementation* was setting appropriate goals and time restraints. Dillon shared about goal setting,

> "The collaborative goals, those are just super important and honestly on that first visit, if it takes me an extra ten minutes to figure out what specific things they want to do, I don't care, I am going to do it because if they don't know what they are pursuing in therapy then, I just don't think that that's appropriate at all."

The seventh, and eighth lower order themes addressed the challenge of time. Janet mentioned,

> "I think the criteria for myself was what kind of held me back, because I felt like the time frame was tough…our schedule…it got crazy here with schedules and most of my appointments were half hour and it was kind of one of those things that was my goal to get through the day…"

Rick noted, "By the time I started seeing some back patients again, quite a bit of time had elapsed and this was not that close to the front of my mind."

The final lower order theme was a recommendation for *successful implementation.* These PTs felt that the implementation process would be aided by being able to identify the appropriate patients. Raymond said, "I think the biggest one [suggestion] is really be on your toes to identify who's appropriate for this because I feel like not enough therapists are doing this type of regimen." Russell shared, "I guess the big thing was when, you know, a person comes in with back or neck pain to be able to identify them right from the get-go by implementing that Fear-Avoidance Beliefs Questionnaire."

Motivation to change. This third subtheme provided a recommendation to overcome the previously presented challenge of *commitment to change* and consisted of four lower order themes (1) just go for it, (2) opportunity for new tool, (3) graded activity is new way of thinking, and (4) stick with it. Dawn stated that the PTs should just go for it,

> "I would just say…go for it…give the patients a heads up. We may not be directly addressing that pain of yours. We know it's been something that's been ongoing for years. There's been multiple ways of trying to fix the pain directly, but…let's focus on functionally speaking…the protocol…it's very simple to follow."

Julie saw graded activity as a new tool,

> "Just that, you know it's an opportunity. It doesn't cost anything and it's an opportunity to try something new with your patients and just help get a functional outcome with chronic back pain patients. It's just another tool for the tool box, so

always you know it's always good to have another tool…"

Ryan felt the felt the new protocol provided a new way of thinking, "I think I would say it's just a different way of looking at it [patients' pain]. It [graded activity] is not that difficult." Robert provided words of encouragement for the PTs,

> "Decide that you're going to do it and just, just stick with it and not, I think that's, like I said one part of my, one of the big struggles I have is, is falling back into the way you've seen things work in the past and not following this and not following the protocol the way it's designed. Because I think it's solid."

In summary a total of 19 out of 28 PTs (67.9%) contributed to the first theme of ***PT buy-in*** which consisted of three subthemes. The first subtheme, *commitment to change,* shared the five lower order themes (1) forgot about research implementation, (2) PT needed to review protocol, (3) trying something new, (4) partial implementation, and (5) PT not voluntary participant. The second subtheme, *motivation to change,* gave encouraging words as a recommendation to overcome the challenge of *commitment to change.* The last subtheme, *successful implementation*, consisted of seven lower order themes (1) patient buy-in, (2) patient responded quicker than expected, (3) PT trusted protocol, (4) need to deviate, (5) patient education, (6) setting appropriate goals, (7) time restraints, and (8) identify correct patients.

Lack of fit for individual patient*.* This second theme, ***lack of fit for individual patient,*** was significant for 13 out of the 28 PTs (46.4%) and included PTs from early, mid, and late career stages (see Figure 4). This theme consisted of three subthemes, namely, (1) *lack of opportunity* and (2) *patient not responding well*, and (3) *difficulty finding right candid ate.* Each subtheme will be discussed in the following sections (See

Figure 5).

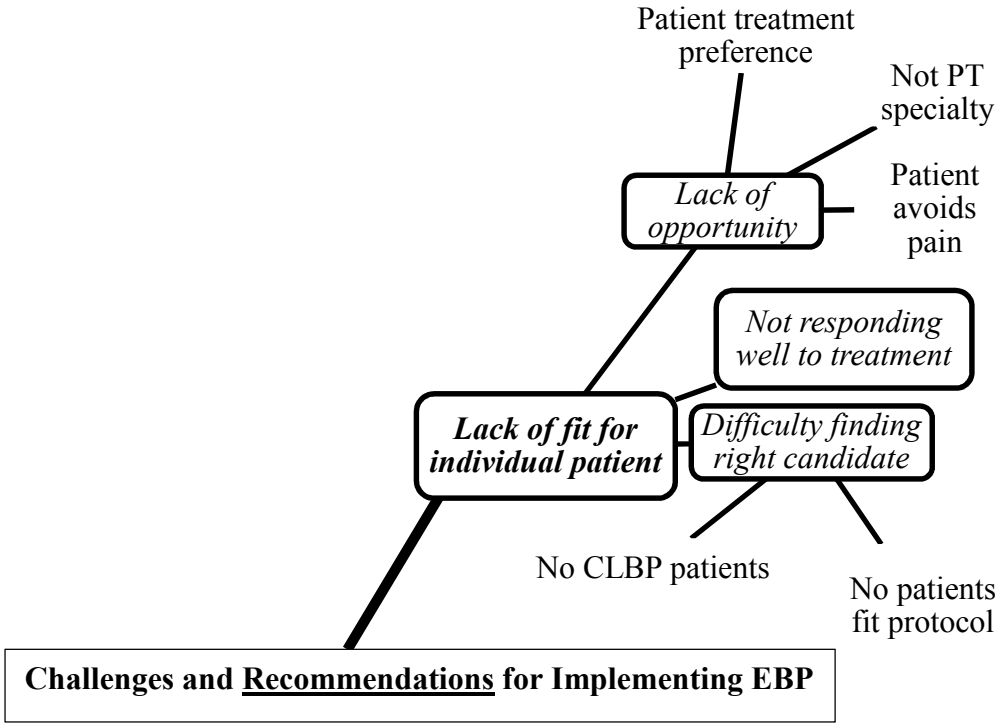

Figure 5: Major theme – ***Lack of fit for individual patient***

Lack of opportunity. This subtheme, *lack of opportunity,* illustrated the experiences that disrupted the PTs ability to implement the graded activity protocol as noted by the three lower order themes (1) not PT specialty, (2) patient avoids pain, and (3) patient treatment preference.

Darla explained that treating CLBP patients was not her specialty at her facility, "We all kind of have our own niche here it seems." The next lower order themes involved PTs who saw CLBP patients, but noted objectives from the patients. Reginald reported that his CLBP patients avoided pain, "They're not doing it [exercise] because when they do it, it hurts… they're avoiding the pain." Jim shared that the CLBP patients had other treatment preferences, "…They've had a history of modalities and they avidly request

modalities. So it puts me in a kind of dilemma, because they reported they've had success in the past and so they've come expecting them." These PTs encountered various challenges that led to *lack of opportunity.*

Patient not responding well. This subtheme, *patient not responding well,* emerged from two PTs who described how their CLBP patients did not respond well to the graded activity protocol. Dan shared, "So we implemented it but there seems to be, you know, we would do a few treatments and things go wrong, then we would throw one exercise in that just set her back." Jim noted, "She would tell me, 'This ifshurting my shoulder. This is hurting my leg. This is hurting my foot,' you know."

*Difficulty finding right candidat**e.*** This last subtheme, *difficulty finding right candidtate,* was noteworthy because only early and mid – career PTs commented on this theme with no comments from the late career PTs. The two lower order themes included (1) no CLBP patients and (2) no patient fit protocol. Four PTs noted that they did not see any CLBP patients. Darla shared,

> "I tend to get back pain in that realm, um, but nothing from a chronic standpoint and you know, um, I do see back patients in general but most of what I have seen as of late has been more thoracic and cervical spine related issues."

Dillon stated, "First thing was just finding out a patient that it might be applicable to…don't get many low back patients." Donna said, "It's kind of been challenging. I haven't had a lot of low back patients ever since we talked to you last…or the ones that I have, I have tried to start one and then they just kind of fell off the grid or they stopped coming in." Five other PTs expressed that no patients fit the protocol.

> "The difficulty was that I really didn't have any patients to fit the uh, you know, the definition for the program. So, I guess, yeah, that was my difficulty was finding a patient that really fit that set." (Jeff)

Jennifer stated, "There were again not ideal patients as far as, you know they had a lot of co-morbidities." Jacob echoed their thoughts, "It [CLBP patient] just didn't seem to fit what we were looking for [implement graded activity]. Janet shared, "It was more just kind of getting all those criteria in for that one person I think was hard to try to classify."

These subthemes of *lack of opportunity, patient not responding well,* and *difficulty finding right candidate* comprised the second theme of ***lack of fit for individual patient.***

Administrative aspects of clinic. The third theme, ***administrative aspects of clinic*** was mentioned by two out of 28 PTs (7.1%) and arose from five subthemes (1) *lost leadership*, (2) *supervisory demands*, (3) *disrupted physician referral pattern*, (4) *staff shortages*, and (5) *difficulty recruiting new staff* (see Figure 6).

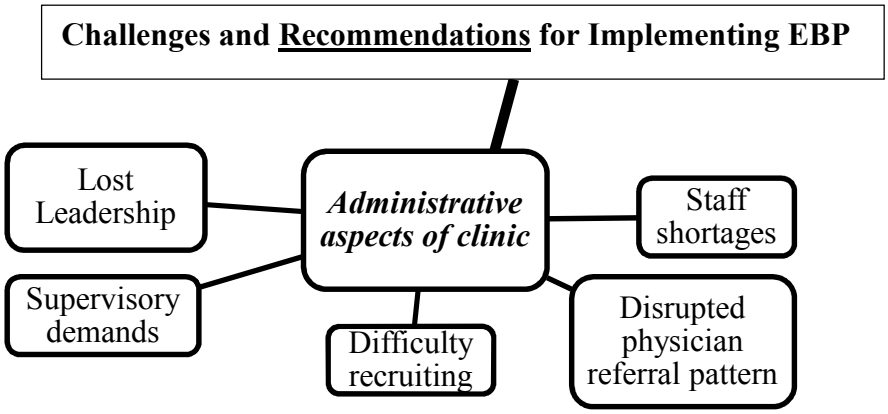

Figure 6: Major theme – ***Administrative aspects of clinic***

Darla's comment formed the first subtheme of *lost leadership*, "That co-worker has left us and he was kind of the head." Justin was the manager of a private outpatient setting who had noted *supervisory demands,* "It's been very difficult. My part is different, being the manager of the clinic as well, changing the computer systems which took a huge chunk of my time and other things going on. I get pull away from patient care." Justin also reported that the number of CLBP patient referrals was reduced when, "the pain management person, cracked down on her to keep referrals in house." In addition, staff shortages led to increased patient load on the PTs disrupting their ability to try something new, "we are short-handed for this area and then to try to get people in but the schedule is very difficult right now" (Justin). The last subtheme showed that staff shortages was especially difficult for this facility due to specific town conditions, "trying to get someone to move to our area with the high cost of living and crime rates" (Justin).

Educating others about protocol. Seven out of the 28 PTs (25%) shared recommendations for overcoming challenges that produced this final theme and consisted of six themes: *medical community, public perception, insurance companies, administrators, co-workers,* and *advocacy* (See Figure 7).

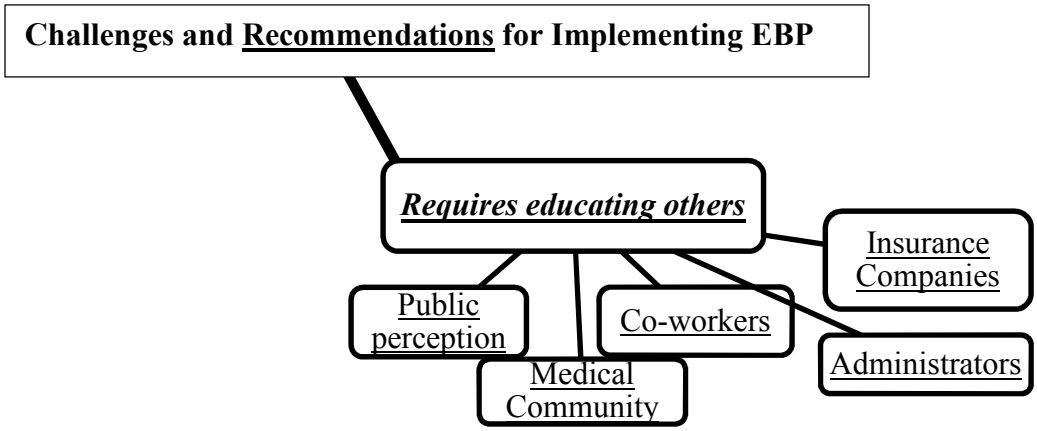

Figure 7: Major theme – ***Requires educating others***

Jeff felt that the *medical community* needed education, "I think it is more as like you said, raising awareness even from … the other medical community [such as] the physicians, physician assistants, and nurse practitioners…[We need them to] recognize what is going on with these patients and then make the proper referral for a graded exercise program." Jim shared that the public perception of PTs is not clear from that of chiropractors,

> "I would like to be able to somehow separate ourselves from the chiropractic part of spine care, because, and that's the tricky part is, you know, we're doing so many things that they do now that they only do but yet we don't want to be lumped in with what they do because we have conflicting beliefs on what, why we're doing something and what we're trying, and what the spine does. And I think there's, I don't know. I wish we could distance ourselves from that a little bit but yet still get the message across that, you know, everything that you're getting there, you can get with us or you're going to get so much more. Um, I think that's the big challenge in this area because this town seems to be a huge lover of chiropractic here."

Dan felt that his immediate community preconceptions hampered his ability to implement EBP,

> "This town is very old school kind of place…very blue collar, ah, chiropractors, um, pain, there's a pain doctor here, so everybody that has back pain just goes to the pain doctor and gets an injection or a pain stimulator or medications, um, it's

> just old school, it's you don't exercise to get better, you take a pill or you go to the doctor and I'm sick, you know."

Jeff supported the need to education to the general public, "How do we communicate the message to the general public?" Justin talked about education for the insurance companies that provide payment for patient care, "I think one thing is the insurance companies need to be a little more open to new treatments." Jason shared his responsibility to educate hospital administrators, "…I need to educate the people above me to have that same important understanding that if we don't stay current…" Russell noted that educating co-workers helped the process,

> "You know if a person has problems with their front desk scheduling, for instance, or whatever, making sure that everybody on board gets with it and I think it really helped having you here to talk to all the therapists so that when somebody else jumped in they basically were, when they filled in for me anyway they were, they knew what to do."

The following statement by Jason summarized this theme well,

> "…I think we need to advocate for ourselves. I am going to flat out say it. I think we are too laid back. I think we're too meek and mild mannered. You look at the chiropractic association, they are almost arrogant and pushy and I'll tell you what, sometimes you have to be like that. And, we need to be more like that, because if we don't, we're not going to get the things we want for the patients."

These four themes (1) ***PT buy-in,*** (2) ***lack of fit for individual patient,*** (3) ***administrative aspects of clinic,*** and (4) ***educating others about protocol*** confirmed that the PTs did encounter challenges and provided some useful recommendations when implementing the EBP of graded activity for their CLBP patients in the outpatient physical therapy setting.

CONCLUSIONS

The purpose of this study focused on the following research questions: (1) What challenges do the PTs encounter when implementing the evidence-based graded activity protocol for CLBP patients in the outpatient physical therapy setting? and (2) What recommendations do the PTs have to overcome the identified challenges? This study educated 32 PTs working in outpatient physical therapy settings in North Dakota, South Dakota, Minnesota, and Montana on the evidence-based protocol of graded activity to treat CLBP patients. The purpose of the workshop training was to encourage the PTs to implement this EBP protocol while the researcher conducted interviews to qualitatively explore the PTs' thoughts, opinions, and perceptions in real time on the challenges encountered while implementing the EBP technique. The results of the study produced four main themes (1) ***PT buy-in***, (2) ***lack of fit of individual patient***, (3) ***administrative aspects of clinic***, and (4) ***educating others about protocol***. This final chapter will discuss how existing literature compares and contrasts with this study design and the emergent themes. In addition, limitations of the study will be presented with final conclusive comments on the two research questions and how this study can impact the physical therapy profession.

Work Experience. One demographic consideration for this study involves the participant groupings by years of work experience. The progression of the entry level physical therapy degree to the doctorate level was to provide an emphasis on differential diagnosis and the scientific process for learning, implementing and producing evidence-based research (Plack & Wong, 2002). Most physical therapists (PTs) base practice decisions on the information learned during entry-level education and personal

experience rather than on evidence gathered from the research literature (Richardson & Jerosch-Herold, 1998; Turner & Whitfield, 1997; Turner & Whitfield, 1999). These statements bring up the possibility that entry level college studies that include education on evidence-based implementation would then produce PTs more likely to implement the evidence-based technique. While conversely, the PTs with entry level bachelor degrees which did not emphasize evidence-based practice, might have more difficulty implementing the evidence-based technique.

This study found the inability to implement the technique was not unique to one work experience group. There were PTs with doctorate, masters and bachelor entry level degrees that did not implement the evidence-based technique. In addition, of the 12 PTs in the most experienced group, eight of them successfully implemented the instructed technique showing 67% implementation rate. This high percentage of success for group three should be viewed with caution. Those PTs that volunteer for a research study may not be representative of all PTs with more than 15 years of experience. These PTs may be individuals who are more interested in research and are more willing to seek out opportunities involving evidence-based practice.

In addition, data analysis revealed that the emergence of themes was not influenced by the divergent entry-level of PT education. Each major theme was commented on by PTs from all three groups, except for the subtheme, *difficulty finding right candidate.* This subtheme emerged only from comments by PTs from early- and mid-career which would be the PTs with doctorate or masters entry-level physical therapist education.

Gender. Another demographic factor that bears discussion is gender. During the recruitment process, gender was not considered. The emphasis was on selecting an equal representation from all three work experience groups. The profession of physical therapy is reported to have 74% female licensed PTs (www.APTA.org), yet this study concluded with 20 males (71.4%) and eight females (28.6%). Potential reasons for this difference could be the selection of orthopedic outpatient setting. Male PTs are more likely to be in a managerial position or to own a private practice than a female PT (Rozier, Raymond, Goldstein, & Hamilton, 1998). In this study, five male PTs were private practice owners and five male PTs were in a managerial position. Only one female PT was in a managerial position and no female PTs owned a private practice. Therefore, the selection of using an outpatient physical therapy setting may have biased the gender ratio.

When considering the gender of the PTs that did not successfully implement the graded activity, there were three females and six males. The numbers seem to suggest that gender may have influenced the outcome. This changes when viewed by percentages showing 38% female PTs and 30% male PTs who did not implement the technique showing that no gender difference is present with the ability to implement the technique.

EBP model. The real time study design was selected in order to avoid missing information that could be forgotten over time when the data are gathered retrospectively like many of the studies from the literature. This alteration created an important change in the EBP model. EBP has been illustrated as a triangular process (1) searching the literature for scientific evidence, (2) combining expert clinical opinion with written evidence, and (3) molding the technique to the individual patient's needs (Jette et al., 2003). This study did not allow for the PT to use all three steps of the model, as the

researcher completed the literature search for evidence on the graded activity protocol to treat CLBP patients and presented the information in the workshop training. While this research design does not fully represent the EBP model, it does mirror another real life experience for the clinician. The workshop training is similar to some of the continuing education courses that a PT might attend. Typically, these continuing education classes share literature evidence about the particular techniques being presented. Then the clinician may implement the new protocol in accordance with their clinical expertise and patient preference.

Exploration of the literature revealed multiple challenges that PTs noted when attempting to move toward EBP. This information could be categorized into three areas: (1) research methods, (2) clinicians' skills, and (3) work environment. A significant volume of literature from each of these categorizes focused on the quality of the scientific research and the clinicians' ability to access and appropriately interpret the research. While these are critical issues when addressing challenges for the implementation to EBP, these topics do not pertain to this study design. Instead the use of a workshop training session eliminated the need for the individual PT to access, search, and interpret the literature for evidence to support the new technique of graded activity. This study design narrowed the focus to the factors involved in the implementation of the graded activity protocol for CLBP patients. This narrowed focus requires a closer look at the word implementation. Implementation is defined as the process of putting a decision or plan into effect (Google.com, 2015). In order to adequately discuss how the PTs put a plan into action, it will be important to examine two key areas: education and behavioral change. This discussion of education and behavioral change encompasses not just the

actions of the PT, but must also include other important social elements such as the patient, co-workers, administration, physicians, other health practitioners, and the general public. This next section will discuss how the results answered these research questions and then compare them against the challenges presented in previous literature.

Challenges and recommendations for implementing EBP. Data analysis produced four main themes (1) ***PT buy-in,*** (2) ***lack of fit for individual patient,*** (3) ***administrative aspects of clinic,*** and (4) ***educating others about protocol.***

PT buy-in. This theme consisted of three subthemes *commitment to change* and *successful implementation,* and *motivation to change*. The first two subthemes identify EBP implementation challenges while the last subtheme presents a recommendation to overcome the challenge of *commitment to change.*

*Commitment to change.*The first subtheme, *commitment to change,* consisted of several lower order themes that influenced the PTs ability to *commit to change* and experience ***PT buy-in***. The first lower order theme, forgot about implementation, involved a facility that was experiencing staff shortages and a sudden increase in patient referrals. Janet reported, "Those first couple of weeks were so crazy, were so busy, that it was out of sight, out of mind, and I forgot." At initial glance, the forgetful PT appears to be more affected by the clinical conditions rather than her level of commitment to change. This view changes when compared with her co-worker's comments who also volunteered for the research project. Jennifer stated, "…So for me, if it's out of sight, it's out of mind, so I found it was really crucial for me to put that flow sheet, that first thing of the flow sheet in the chart and immediately as soon as I saw that patient when I would

type in their note, and that just helped me kind of remember that on the first session and not put it off for another session…" Before comparing the comments from these two PTs, it is important to note that Jennifer's final interview was conducted 3 months prior to Janet's and the answers were not shared with each other. Jennifer could not have known what Janet shared and vice versa. Both PTs were implementing the graded activity protocol in the same clinical conditions of staff shortages and increase patient load, but the statements show an important difference in their commitment to change.

This difference in level of commitment to change reflects back to the one important barrier that was not presented in the literature when addressing barriers for EBP implementation, behavioral change. The difference in these two PT's behavioral change can be best understood by referring to the most highly recognized and commonly used theory of behavioral change, the Transtheorectical Model (Prochaska & Velicer, 1997). The central organizing theme of TTM is the stages of change that a person will progress through: Precontemplation, Contemplation, Preparation, Action, and Maintenance (Prochaska & Velicer, 1997). Janet's statement reflects a 'precontemplation' stage in which she was not intending to make a change in the near future (Prochaska & Velicer, 1997). In contrast, Jennifer exhibited behavior consistent with the 'preparation' stage showing she had a plan of action (placing the flow sheet in the chart) with the intention to take action in the immediate future. This higher stage of behavior change displayed by Jennifer did result in her moving toward 'action' stage when she implemented the graded activity protocol. This demonstrates that Jennifer possessed a *commitment to change* that improves her ***PT buy-in.*** When Janet 'forgot to implement' the protocol, there was not a *commitment to change* and hence very little ***PT***

buy-in. Janet needs an intervention to match her precontemplation stage such as Jennifer's recommendation to place the flow sheet in her patient's chart in order to motivate her to overcome the challenge of 'out of sight, out of mind.'

The next lower order theme, trying something new, also related to the TTM of behavior change. Reginald shared, "…there is no question, I rely on my experience now, my professional judgment…because quite frankly, and how do I want to say this, you've almost got to sell me on this approach too." Reginald's statement falls into the 'precontemplation' as he does not intend to change in the near future. He understood that his lack of *commitment to change* resulted in a lack of ***PT buy-in*** for the protocol of graded activity. Reginald felt strongly about his preferred treatment intervention for patients' pain, "It [graded activity] took options away from me. I'm not shy about using modalities. I believe there is a place for modalities…" While the key element for Janet was increasing her awareness through the reminder of the flow sheet, Reginald needs to be educated that the use of modalities could reinforce the patient's overt pain behaviors (Staal et al., 2004). Graded activity encourages the PT to ignore overt pain behaviors such as moaning or limping while encouraging well behaviors such as increasing exercise in order to improve the patient's functional ability (Staal et al., 2004).

The lower order theme of partial implementation also involved a challenge of trying something new. Rachel selected the part of the protocol that was most familiar. This is different than when the PTs deviated from protocol in response to their individual patient needs. By picking a part of the protocol, Rachel displayed less *commitment to change* which produced less ***PT buy-in***. One significant element that seven PTs did not

implement was the use of the FABQ to screen CLBP patients at the start of treatment. The workshop training emphasized the use of the FABQ because graded activity was not shown to be effective for CLBP patients with low fear and anxiety. Just like Rachel, Roger shared that he had chosen to continue with his usual practice approach rather than trying something new showing reduced *commitment to change* and less ***PT buy-in.*** Dillon noted that no one in his facility used the FABQ. This comment reflected that the use of the FABQ for him was influenced by the standard practice at his facility. Perhaps a consensus-driven group dynamic known as 'group think' has reduced Dillon's motivation to change his assessment practices (Janis, 1972). An intervention to improve use of the FABQ at Dillon's facility would need to address the whole group rather than the individual.

The lower order theme of need to review and practice provided recommendations to overcome the challenge of trying something new. Doug understood that he would need to practice the new technique. The word 'practice' implies that both time and effort will be required for this process which shows *commitment to change* as well as ***PT buy-in.*** Dean suggested that periodic checks would provide the feedback to improve his implementation performance. The feedback from reviewing can provide motivation which will increase *commitment to change* and ***PT buy-in.***

The last two lower order themes for *commitment to change* were PT not good fit for project and PT not voluntary participant. Rick and Darla demonstrated that the *commitment to change* is a process that can vary depending on the challenges encountered. When Rick and Darla initially agreed to their co-workers request, they

signed an informed consent form, completed the initial interview, and attended the workshop. In order for them to implement the graded activity, they would need to exert additional effort such as described in the lower order theme of trying something new. This presented a greater challenge than their level of *commitment to change* and they did not successfully implement the graded activity showing less ***PT buy-in.***

Successful implementation. Examination of the lower order themes in this second subtheme requires discussion about the educational process. The PTs were provided an onsite workshop education at the start of the research project to learn about the EBP of graded activity during the lunch hour. The workshop training was offered to all the employers of each facility and not just the research volunteers. The structure of the workshop allowed the PTs to immediately take the concepts of graded activity and practice them in their respective clinical settings. One of the factors that could be influenced by this learning process in the natural setting is whether the PT will trust the protocol. When the PT visualizes how the principles unfold in the practice setting with a real patient, resulting in improved trust in the new concept. As the PT learns to use the graded activity protocol and grows to trust the protocol, this improves the chance of *successful implementation* which will increase the ***PT buy-in.*** Several PTs noted that their patients responded quicker than expected. This showed that the PTs were receiving favorable feedback when they implemented the graded activity into their clinical practice. This positive feedback can further support PT trust in the protocol as they witness *successful implementation* and then contribute to ***PT buy-in.*** Conversely, those PTs that did not practice the graded activity by implementing it into their clinical practice will be unlikely to trust the concepts just based on the education provided in the workshop. As

the PTs did not practice the technique with a CLBP patient, they will not experience *successful implementation* and are unlikely to have ***PT buy-in.***

This process of learning that occurs when people interact and cooperate with other people in the natural work environment has been described as the situated learning model (Vygotsky, 1978). Lave and Wenger (1991) described the learning environment as a "community of practice." Collins, Brown and Newman (1987) identified the learner as a "cognitive apprentice." The apprentice uses imitation and practice of cooperative, authentic activity to increase knowledge (Brown, Collins, & Duguid, 1989). This knowledge is connected to the manner in which the apprentice acquired the information (Billett, 1996). The daily experiences of life allow the learner to assemble cognitive schema continuously as interpreted through the mind and body, the task, and the cultural setting (Butterworth, 1992). The PT is viewed as the "cognitive apprentice" and their work environment is the "community of practice." When the PT implements the graded activity concepts into practice, there is the potential for the PT to learn to trust the protocol. In addition, when the PT observes the patient responding quicker to the technique than expected, there is positive feedback to further increase the PTs' trust in the protocol. Both of these factors then contribute to the ***PT buy-in.***

Another lower order theme, need to deviate, described the times that the PT provided treatment not listed in the graded activity protocol. Jennifer used her clinical expertise to address the patient's individual need which allowed the protocol to continue toward *successful implementation.* Some PTs will abandon the new approach altogether, rather than deviate from the protocol (Maher et al., 2004). It is recommended that PTs

adjust the protocol with their clinical experience in order to meet the individual patient's needs (Herbert, 2000a; Glasziou, 1995). This process is reflected in the triangular representation of EBP that included scientific research, clinician expertise, and patient perspective.

The lower order theme, setting appropriate goals, is an important element for the *successful implementation* of graded activity protocol. While understanding the direction for therapy is relevant for all patients, it is especially important for CLBP patients with high fear and anxiety about their pain. The fear and anxiety produces avoidance behaviors of potentially pain evoking activities such as exercise. This will quickly derail a physical therapy intervention. Graded activity is designed to shift the CLBP patients' attention from their pain toward their function. With the graded activity protocol, the first three visits instruct the patient to perform only as many repetitions of each exercise that they choose according to their pain. These three days build a safe environment for the patient by allowing them to select the amount of activity while determining their individual tolerance for activity. The PT actively observes the patient to be sure that they do not attempt to do too much such as doubling the number of repetitions each visit or too little such as refusing to complete one of the exercises. At the completion of the third visit, the repetitions from the three days of exercises are averaged to establish the patient's baseline.

Next the PT and the patient set the final goals for each individual exercise that the patient should achieve at the completion of the program. When the goals have been set, the quota for increasing each exercise is calculated for each subsequent visit. The PT

educates the patient that they must agree to complete a set quota increase of walking on each subsequent visit despite how they feel. The PT assures the patient that the quota to increase their exercises is safe and that the PT will be present each visit to observe that patient performs each exercise correctly. The PT will need to educate the patient that sensation of increased pain is due to nerve sensitivity and not new tissue damage. The PT must demonstrate to the patient how each quota of exercise brings the patient closer to the final goals in order to shift the patient's attention from their pain to function. Without this attentional shift, CLBP patients with high FABQ scores will focus on their fear and anxiety reducing their compliance with the graded activity program. Hence, PTs who set appropriate goals for their CLBP patients will achieve *successful implementation* showing improved ***PT buy-in.***

The lower order theme, patient education, is another issue especially important for *successful implementation* of the graded activity protocol. This treatment addresses pain differently from most common physical therapy interventions. The CLBP patient with high fear and anxiety will find the different approach of graded activity challenging. When they experience increased pain during exercise, their fear that further injury is occurring is reinforced. One study conducted by Moseley (2003) supported the need for pain physiology education for CLBP. These CLBP patients showed improved pain (numeric rating scale) and disability (Roland Morris Disability Questionnaire) scores. The CLBP that received individualized education sessions versus a group lecture demonstrated greater reduction in both pain and disability, which was maintained at 12 months. Further support was noted in a study by Ryan, Gray, Newton, and Granat (2010), who showed that pain biology education resulted in reduction in pain with improvement

in pain self-efficacy scores as compared to the combination of group exercise and pain biology sessions.

While patient education on chronic pain does improve the chances for *successful implementation,* education is not sufficient to ensure the lower order theme of patient buy-in. In order to achieve patient buy-in, one must also consider several other elements. Patient buy-in involved a combination approach of education to overcome patient misinformation and to facilitate patient understanding as well as interventions to alter patient expectations, and instill patient trust.

The lower order theme of tough time frames disrupted both *successful implementation* and ***PT buy-in.*** The graded activity protocol consisted of exercises for core stabilization, lower extremity strengthening, aerobic conditioning, and select tasks that the patient reported as fearful or problematic (Asmundson, Norton, & Vlaeyen, 2004). Fitting the program into a half hour slot would be difficult especially as the patient's exercise quotas increased with each visit. While lack of time was noted as the most reported challenge for implementation of EBP, this included the time needed to search and read the research literature (Barnard & Wiles, 2001; Herbert, Sherrington, Maher, & Moseley, 2001; Jette et al., 2003; Kamwendo, 2002; Parker-Taillon, 2002; Scherer & Smith, 2002). The present research project completed the literature search and review for the PTs, which does appear to have assisted the majority of participants as time restraints was not the most frequently reported challenge. Despite the help with the literature search, time restraints can still present a challenge for some of the PTs when attempting to implement the graded activity protocol.

The last lower order theme, identify correct patient, provided a recommendation to improve the PTs' ability for *successful implementation* and ***PT buy-in.*** Raymond felt that the initial identification of CLBP patients that would benefit from the graded activity protocol was an important challenge for PTs attempting to move toward EBP. Russell was more specific with his recommendation by pointing out the use of the FABQ outcome measure. The inconsistent use of the FABQ occurred with seven out of the 28 PTs which was discussed previously in the partial implementation subtheme showing a reduced *commitment to change* and ***PT buy-in.*** In addition, not using the FABQ will have significant impact on the *successful implementation* of the graded activity protocol. The study by George et al. (2003) showed that participants with lower FABQ scores had increase of disability ratings with the graded activity protocol. The educational message to confront pain could be distracting for patients who are already "confronters" (Little, Griffin, & Kelly, 1998; Little et al., 2001). George et al.,(2003) suggested another reason is that the graded activity may under estimate the optimal level of exercise for these "confronters". The PTs who do attempt to implement the graded activity protocol without screening the CLBP patient with the FABQ first may include some of these "confronters". When the patient does not respond well to the graded activity protocol, this could provide negative feedback that graded activity is not efficacious and potentially reduce the ***PT buy-in***.

Motivation to change. This last subtheme for ***PT buy-in*** was a recommendation to assist PTs with the previously discussed challenge of *commitment to change.* The theory of planned behavior presented that a person's intention was the most important variable in predicting behavior change (Godin & Kok, 1996). This theory suggests that

the individual's personal motivation could alter their behavior (Godin & Kok, 1996). Julie presented the graded activity protocol as "an opportunity" and "another tool in the tool box" as positive information to shape other PTs opinion and support a behavioral change.

Lack of fit for individual patient. This second theme comprised three subthemes, *lack of opportunity, patient not responding well,* and *difficulty finding right candidate,* that challenged the PTs when implementing the graded activity protocol.

Lack of opportunity. This first subtheme emerged from three lower order themes that highlighted some of the challenges. Darla shared that the low back patients were diverted to two other co-workers who were developing a spine program. While patients are assigned according to PT specialty area, it is interesting to note that during the nine month research project, Darla did not request that some CLBP patients be place on her schedule. Darla was noted previously as the PT who was not a voluntary participant in the study, so her *lack of opportunity* to implement may have been more a reduced *commitment to change.*

The second lower order theme, patient avoids pain, reflects that when this PT tried to implement the graded activity, their patient demonstrated avoidance behaviors in response to the exercises. The workshop training presented the fear-avoidance model explaining that patients with higher FABQ scores will display avoidance behaviors due to feelings of fear and anxiety (Vlaeyen & Linton, 2000; Asmundson et al., 2004). The graded activity protocol is designed to educate the patient that the quota of exercise chosen for them is safe despite their pain complaints. If the patient avoids the exercise,

this will only perpetuate the chronic pain cycle (Asmundson et al., 2004). While the PT saw this as the graded activity being a ***lack of fit for the individual patient,*** it may be more related to his unwillingness to *commit to change* his present treatment philosophy.

The last lower order theme for *lack of opportunity* was patient treatment preference. Jim reported resistance from his CLBP patients when attempting to introduce the new graded activity protocol. In this case the CLBP patients have received modalities with past physical therapy appointments and express that a desire to have them again. The workshop training requests that the PTs refrain from using passive modalities as this may lead the patient to think that there is tissue injury rather than sensitization of the nervous system. Jim allowing the patient to dissuade him mirrors Reginald's decision to allow his patients to avoid the exercises. What Jim sees as ***lack of fit for individual patient*** could be a concern as to how the patient will react if their treatment preference is countered with the new graded activity approach. The patient may choose to stop coming to therapy and the clinic loses a paying client. Jim would need to have sufficient ***PT buy-in*** of the graded activity protocol in order to risk the loss of a patient.

Patient not responding well. When the patient reported an increase in pain with the exercises, Dan interpreted this as the treatment going wrong. This reaction shows that Dan is still guided more by the biomedical rather than the biopsychosocial pain model. Clinicians influenced by the biomedical model, assume that pain correlates with tissue damage and all pain means more damage is occurring (Louw & Puentedura, 2013). The biopsychosocial model presents that pain is a multidimensional expression of physical, psychological, and social aspects (Gatchel, 2005). Strong evidence has shown that CLBP

is driven by psychological factors (Linton, 2000; Deyo & Diehl, 1988). The fear of pain and the subsequent pain avoidance behaviors were shown to be important psychological factors for CLBP patients (Fordyce, 1976; Lethem et al., 1983; Troup, 1988). This information demonstrated that the CLBP patient with high FABQ scores will report more pain when exercising, so the PT will need to educate the patient when this occurs. Dan felt that his patient's pain response meant that the treatment was not going well and so graded activity was seen to be a ***lack of fit for individual patient***. Dan would need a greater *commitment to change* his biomedical beliefs in order to have the ***PT buy-in*** to see that his patient was actually responding appropriately to the graded activity protocol.

Difficulty finding right candidate. Some PTs noted not seeing CLBP patients during the time of the research project. EBP cannot occur without a patient. When the issue of the lack of CLBP patients was presented, the PTs were given suggestions to seek out potential candidates including speaking to the front desk scheduling staff or contacting physician referral sources during the midway interview. Rick's comment reflected reluctance to assume the role of advocate that will be discussed more under the main theme of ***educating others about protocol.*** In addition, this could demonstrate a reduced level of *commitment to change* so he will not be willing to extend himself into an area that creates discomfort.

Having four PTs report not seeing any CLBP patients and another five PTs noting that the CLBP did not fit the protocol was an unexpected challenge. During the initial interview, participants shared the estimates of the number of CLBP patients they treat in one month. The answer ranged from the low side of 1 – 3 CLBP patients up to as high as

more than 20 CLBP patients. Even when the three high numbers were removed, the average was that each PT treated 5.2 CLBP patients per month. With these estimates it was anticipated that there would be sufficient CLBP patients for the PTs to see in the several months that the research project occurred. Jeff noted one area that could explain the *difficulty finding the right candidate,* "The difficulty was that I really didn't have any patients to fit the definition for the program. So, I guess, that was my difficulty was finding a patient that really fit the protocol." Jennifer added to this thought, "There were again not ideal patients as far as, you know, they had a lot of co-morbidities." Janet echoed, "It is more just kind of getting all those criteria in for that one person I think was hard to try to classify." These comments show that these PTs took an 'all or none' approach to implementation. If the CLBP patient did not fit the exact conditions for the protocol, then the PT did not attempt to implement the graded activity protocol. The study by Maher et al. (2004) reported that some PTs will discard the research results when they feel that the results do not match their perspective clinical practice. Unless the patient possesses characteristics that contradict the use of the intervention, it is recommended that the PTs take the results and adjust with their clinical experience to meet their patient's individual needs (Herbert, 2000a; Glasziou, 1995). These individual patient adjustments would require additional time and effort, so the treating PT would need a higher level of *commitment to change* as well as strong ***PT buy-in*** to overcome this challenge. The ***lack of fit for individual patient*** disrupted the implementation of the EBP graded activity for all the PTs whether it was related to *lack of opportunity, not responding well,* or *difficulty finding right candidate*.

Administrative aspects of clinic. This third theme consisted of five subthemes: *lost leadership, supervisory demands, disrupted physician referral pattern, staff shortages,* and *difficulty recruiting new staff.* The first subtheme, *lost leadership,* was the facility where the co-worker who left for another job position had been the individual who volunteered for the research project. On the day of the workshop training, he quickly recruited two other coworkers who had shared that they were not completely on board with the project. The loss of their co-worker's leadership further reduced their ***motivation to change*** and to proceed to *successful implementation.* Leadership support has been found to be closely linked with positive staff attitudes and beliefs about EBP implementation (Ploeg, Davies, Edwards, Gifford, & Miller, 2007). The presence of a 'peer opinion leader' who demonstrates the ability to implement the protocol can provide improved confidence for co-workers in the late stages of the implementation (Dopson & Fitzgerald, 2006). This study did not provide specific leadership requirements at the administrative or peer level which may have negatively affected the ability of the PTs to implement the EBP protocol. Therefore further studies need to be done to examine how the selection and training of leaders at both the administrative and peer level could influence the success of EBP implementation.

The second subtheme, *supervisory demands,* related to the PT's inability to see enough patients. The PT cannot implement the new technique when he is unable to see patients. In addition, his inability to attempt the implementation will reduce his chances of providing leadership to the other PTs who were participating in the study at his facility.

The third subtheme, *disrupted physician referral pattern,* led to a reduction in the amount of chronic patients being sent to this facility. This reduction in chronic patients made it more difficult for the PTs at this facility to implement the new protocol. Barnett, Vasileiou, Djemil, Brooks, and Young (2011) categorized this action as a political influence that needed intervention from regulatory bodies.

The fourth and fifth subthemes, *staff shortages* and *difficulty recruiting new staff,* will be discussed together as they are so closely related. When a facility experiences *staff shortages,* this can result in increased demand on the remaining staff members. The implementation of a new technique requires additional time that will not be available for staff members who are seeing additional patients due to *staff shortages.* The *difficulty recruiting new staff* will compound the issue of *staff shortages* increasing the daily demands on the present workers. Ploeg et al. (2007) noted that inadequate staffing presented as a significant challenge for EBP implementation and could result in negative staff attitude toward proposed changes. Barnett, Vaileiou, Djemil, Brooks, and Young (2011) supported that lack of adequate staff presented as a significant challenge for healthcare EBP implementation. Even a PT with strong *commitment to change* and ***PT buy-in*** for the graded activity protocol would find the pressures from *staff shortages* and *difficulty recruiting new staff* difficult obstacles to overcome. Therefore, each facility should examine staff levels before attempting to implement EBP.

Educating others about protocol. The last theme for challenges and recommendations for implementing EBP highlights that education is needed to multiple parties in addition to the PT and the patient in order for *successful implementation*. This

theme arose from six subthemes: *medical community, public perception, insurance companies, administrators, co-workers,* and *advocacy.*

Medical community. This first subtheme involved one of the PTs who reported a low number of appropriate CLBP patients coming into their facility. Having the *medical community* refer CLBP patients specifically for the graded activity protocol would help in two ways. First, it would immediately increase the number of CLBP patients for the PTs to try the protocol with. Second, this would show the CLBP patients that all of their medical professionals supported the graded activity protocol. The qualitative study by Barnett et al. (2011) found that lack of support of the medical community presented as a barrier for health care implementation. The authors identified the role of partnerships among health professionals as a major theme. The working relationship between participating groups provided both the starting point for implementation as well as the driving force for the process. Trust and mutual support were identified as prerequisites for cooperation among the groups.

Developing trust and mutual support between professional groups such as physicians and PTs could be challenging (Dopson & Fitgerald, 2006). These authors explained that the differences in training received by each medical professional resulted in unique knowledge bases as well as group attitudes that are embedded into their early education. If these 'group attitudes' go unchallenged, there is resistant for shared understanding between differing groups. This resistance can be heightened if there is differential power between the two medical professions. The more dominant professional group may resist a new idea simply because of unwillingness to share the power. While

reaching out to educate the *medical community* will be a challenging process (Dopson & Fitzgerald, 2006), the establishment of a cooperative partnership has been shown to improve *successful implementation* of EBP (Barnett et al., 2011). The PT will require a strong *commitment to change* as well as ***PT buy-in*** in order to withstand the rigors of this challenge.

Public perception. This second subtheme arose from the PTs' frustration that public perception of caring for CLBP was so different from this EBP technique of graded activity and resulted in patient resistance. These PTs' frustrations arose from the conflicting beliefs about caring for CLBP. The graded activity protocol required the patient to actively perform multiple exercises for several visits despite their pain complaints, while chiropractors performed spinal manipulations or pain doctors prescribed medications or procedures to address their pain. Back pain patients expect to have their pain 'fixed' by their doctor or therapist (Nachemson, 1992; Zusman, 1997). Some back pain patients are cautious about movement especially when this belief is reinforced by other medical professionals (Tarasuk & Eakin, 1994). While educating CLBP patients in an effort to improve patient buy-in for a new technique is challenging, this is compounded when the new technique conflicts with *public perception*. PTs will need to reach beyond the immediate walls of their facility and educate the general public. There is now strong evidence against bed rest for low back pain with the new recommendations to stay active and continue normal activities (Waddell, Feder & Lewis, 1997). These new guidelines are a significant change from the traditional treatment model, so education for the general public will be needed (Deyo, 1996) in order to overcome the challenge presented by *public perception.*

Insurance companies. This subtheme addressed an important concern that PTs have when trying new approaches, will the insurance company reimburse for these visits. This subtheme is actually very similar to *public perception.* The present guidelines for treating low back pain have shifted significantly from the traditional model (Deyo, 1996). The insurance companies will require the same educational updates as the general public to bring them on board.

Administrators. The fourth subtheme, *administrators,* highlighted the need to educate administrators about the EBP process. When discussing strategies for high-quality health care by narrowing the gap between research evidence and clinical practice, the spotlight is frequently placed on the individual practitioner (Haines et al., 2004). The administrators' role in improving the implementation into clinical practice has been presented in a negative context due to their priority for financial concerns (Dopson & Fitzgerald, 2006). Dopson and Fitzgerald, (2006) refuted this finding by showing projects which made the most progress had senior managerial support. Ploeg et al., (2007) reported that leadership support was closely linked with positive staff attitudes and beliefs about the implementation process. The key elements for administrative intervention included the provision of necessary staff and equipment resources as well as release time and replacement support (Ploeg et al., 2007). At some facilities, the administrator acts as the group 'champion' to lead the initiation of the implementation (Ploeg et al., 2007).

Co-workers. The fifth subtheme of *co-workers* was introduced by Russell,

who recognized that the implementation process was a team effort. He needed the front desk person to be able to identify potential CLBP patients and due to his supervisory demands, other therapists occasionally helped to treat his patients. Participants in the study by Ploeg et al. (2007) reported teamwork and collaboration as critical elements for implementation. Conversely, staff resistance was identified as a significant barrier. Dopson and Fitzgerald (2006) noted that co-workers who took on the role of 'peer opinion leader' provided strong leadership in the later stages of implementation. Barnett et al. (2011) supported these findings noting that people within the organization could be 'champions' of the process or a significant barrier. Educating *co-workers* would be a critical step in creating allies for *successful implementation* and improving the groups' collaborative ***PT buy-in***.

Advocacy. The last subtheme for the recommendation theme ***educating others about protocol*** was addressed by Jason who felt that PTs need to be educated about how to improve in their advocate role. Gibson (2005) echoed Jason's proposal and shared that the PT profession still faces an 'image gap' which requires that PTs accept their advocacy role with patients, insurers, legislators, other health care providers as well as the general public. Kelland et al. (2014) identified eight key attributes for successful advocacy which includes collaboration, communication, scholarly practice, management, professionalism, passion, perseverance, and humility.

This last theme, ***educating others about the protocol,*** illustrated that the implementation process was not an isolated event involving just the PT and the patient. Many other entities could influence the implementation process, so these PTs

recommended that education could provide a positive influence that would improve *successful implementation* of EBP.

In summary, four main themes were noted in this study. Three of the themes answered the first research question, "What challenges do the PTs encounter when implementing the evidence-based graded activity protocol for CLBP patientss in the outpatient physical therapy setting?" First, the challenge of ***PT buy-in*** was influenced by the PT's *commitment to change* and ability to achieve *successful implementation.* Second, the ***lack of fit for individual patient*** challenge resulted from patients *not responding well to treatment,* the PT noting *lack of opportunity* to try the technique, or when the PT experienced *difficulty finding right candidate.* Third, the challenging ***administrative aspects of clinic*** included *lost leadership, supervisory demands, disrupted physician referral pattern, staff shortages, and difficulty recruiting staff.* While these challenges were categorized into separate themes, it does not exclude interaction between the themes. For example, PTs with low *commitment to change* and poor ***PT buy-in*** for the graded activity protocol would be less likely to put any effort into overcoming the challenge of *difficulty finding right candidate.* Conversely, a PT with strong *commitment to change* and ***PT buy-in*** may not be able to overcome the added patient load as a result of *staff shortages* and *difficulty recruiting staff.*

The PTs' response to the second research question, "What recommendations do the PTs have to overcome the identified challenges?" produced a much different result than the first question. Either the PTs discussed another challenge, gave a short recommendation answer or they reported that they did not have any recommendations. It

is unclear if the PTs actually did not have recommendations or if they were just fatigued by the end of the interview. Data analysis of the answers for this question produced two main recommendations (1) *motivation to change* and (2) ***educating others about protocol.*** The first recommendation, *motivation to change,* recognized that EBP implementation required the PT to change their behavior. Without a commitment to change, the PT will not alter their usual clinical approach and will not transition to using the new EBP protocol of graded activity. A specific intervention is required for these PTs that will provide the motivation to move them toward a higher level of commitment to change. Presentation of the EBP information in the workshop was not sufficient to motivate PTs with low commitment to change.

The second recommendation, ***educating others about protocol,*** highlighted that the implementation process is not a solo event. Even if the PT is fully committed to try the new approach, successful implementation can be disrupted by other involved parties. This recommendation suggests that education aimed toward these involved parties should help the PT to successfully implement the new technique. Specifically, education will be needed to adjust *public perception* and gain support from the *medical community* in order to reduce opposing views that could reduce patient buy-in. Educating *co-workers* will improve collaborative team support while educating *administrators* and *insurance* companies will assist with leadership and resource needs for the project.

Limitations. Several limitations are noted with this study. This study only involved PTs employed in outpatient physical therapy setting in the Great Plains area. Three PTs withdrew from the study and several other PTs experienced difficulty

recruiting appropriate patients during the initial phase of the research project that led to a need to recruit further participants. These additional participants were gained by using convenience and snowball methods using previous association with the University of Mary. Other limitations involved the interview process. Participants may not be truthful with their answers. While transcribing early interviews, it was noted that the researcher did too much talking particularly in the form of teaching which could have biased answers. This was immediately corrected for future interviews.

In addition, this study eliminated the step for evidence-based practice that required the PTs to formulate their own research question, search and critically analyzed the research literature. Therefore, this study mainly investigated the challenges involved with the clinician and patient integration process. Lastly, the use of the graded activity protocol to treat CLBP patients could have presented an additional challenge related to the PTs' philosophy and understanding of chronic pain as well as their own comfort level in addressing psychosocial issues for the patient.

The next area of limitation involved the workshop training. This research used a short lecture style presentation provide over the PTs' lunch time which has been shown to not be as effective as a workshop that provides group interactions. The workshop did not select or train leaders at the administrative or peer level, nor was there any ongoing educational support for the PTs during the implementation process. It is also possible that the mainly male PTs may have preferred a male presenter.

Discussion and Future Research. The purpose of this study focused on the challenges PTs encounter when implementing the evidence-based graded activity for CLBP patients and the recommendations PTs have to overcome the identified challenges.

The PTs readily shared about challenges that were encountered with implementation. This information organized into three main themes (1) ***PT buy-in***, (2) ***lack of fit for individual patient,*** (3) ***administrative aspects of clinic***. The PTs were less forthcoming when questioned about potential recommendations to overcome challenges and this produced one main theme, ***educating others about protocol***, and one subtheme, *motivation to change.*

While this study confirmed that challenges arise when attempting to implement EBP into the outpatient physical therapy setting, the types of challenges did not mirror those reported in the literature. The challenge most reported in the literature was the lack of time (Barnard & Wiles, 2001; Herbert, Sherrington, Maher & Moseley, 2001; Jette et al., 2003; Kamwendo, 2002; Parker-Taillon, 2002; Scherer & Smith, 2002). Conversely, the lack of time was a lower order theme commented on by just a few participants in this study. This difference is partially due to the study's methodology. Participants did not need time to search, read and interpret the literature, which has been shown to be a challenging process in the literature.

The most reported challenge for this study was the theme ***PT buy-in***. This theme presented two key concepts as illustrated by the subthemes. The first subtheme, *commitment to change* highlighted that PTs must undergo a behavioral change in order for ***PT buy-in*** for the EBP. This means that simply attending an educational workshop during the lunch hour will not be sufficient to provide the *motivation to change.* In addition, those PTs who do attempt to implement with at least some *commitment to change* will be quickly derailed when a challenge arises. Another element of ***PT buy-in*** is

the second subtheme, *successful implementation.* These PTs noted that the active process of implementing the EBP helped to increase their ***PT buy-in.*** The action of implementing is a necessary part of learning as well as an influential factor in producing behavioral change in the PT.

The next theme, ***lack of fit of individual patient,*** showed the impact of when implementation does not occur. When PTs had *difficulty finding right candidate,* noted that their patient was *not responding well to treatment,* or encountered a *lack of opportunity* to try the EBP, it became less likely that they would experience a *successful implementation* in the future and thus not have a change in their clinical approach for these CLBP patients. The PTs negative experience with their initial attempts provided reinforcement for their resistance to change practice patterns.

The themes, ***administrative aspects of clinic*** and ***requires educating others about protocol,*** presented challenges that could disrupt even PTs with higher levels of *commitment to change.* The challenges noted in these themes introduce another important fact for EBP implementation. This process is a not a solo activity (Halladay & Bero, 2000; Dopson & Fitzgerald, 2006; Ploeg et al., 2007; Barnett et al., 2011). Even if the PT possesses high *commitment to change* and strong ***PT buy-in,*** the implementation can be hampered by co-workers, administrators, the referring physician, demanding patient load, or unwilling patient.

Increasing the implementation of EBP into clinical practice in the outpatient physical therapy will improve when continuing education addresses the two key factors that emerged in this study (1) implementation requires behavioral change and (2)

implementation is not a solo event. Further research is needed to see which additional elements would adequately address these factors.

One recommendation for future research would be to develop a continuing education event that encompasses four strategies (1) prepare environment by raising awareness, (2) choose and train leaders, (3) host an interactive educational workshop, and (4) provide implementation support for the next few months following the workshop. A multifaceted intervention has been shown to be more effective than single intervention (Grimshaw et al., 2001). The first step would consist of distributing educational information to all prospective parties such as PTs, associated medical community, patients, insurance companies, administrators, general public, etc. While this passive dissemination of information will not change behavior, it allows for low-cost way to raise awareness prior to the educational workshop (Grimshaw et al., 2001). Another part of the preparation would be the careful examination of the literature for the gathering of scientific evidence. The presence of evidence helped reduce resistance and opposition especially when the patient benefit was well illustrated (Barnett et al., 2011). Successful implementation of EBP is increased when the organization is prepared to receive the new information (Barnett et al., 2011).

The second step of recruiting and training leaders for the project has been shown to be crucial for successful implementation (Halladay & Bero, 2000; Dopson & Fitzgerald, 2006; Ploeg et al., 2007; Barnett et al., 2011). Ploeg et al., (2007) proposed a 'champion' as the key facilitator. The 'champion' is often an administrator who supports the vision and helps with the administrative resources such as staffing and equipment.

This leadership has been associated with positive staff attitudes and beliefs about the EBP implementation. Dopson & Fitzgerald, (2006) recommend an 'expert opinion leader' who can explain the evidence and effectively debate potential opposition. Another important part of the team is the 'peer opinion leader,' who has implemented the EBP into their clinical practice and can provide collegial support after the workshop presentation (Dopson & Fitzgerald, 2006). The 'peer opinion leader' can assist with improving team trust and support for the project (Barnett et al., 2011). In addition, practitioner behavior was influenced by peer opinion more than cost/benefit assessments (Ploeg et al., 2007).

Evidence shows that a single intervention such as a lecture or presentation is less likely to change behavior compared to an interactive workshop (O'Brien et al., 2001). Gieselman, Stark, and Farruggia (2000) noted that an interactive design based on the situated learning theory required more time and effort from both learner and instructors. Participants must assume more responsibility for their own learning, but with the benefit of fostering lifelong learning skills (Bereiter & Scardamalia, 1993).

The supportive environment that was built to plan and run the workshop must be maintained afterwards to aid the PTs as they attempt to implement the EBP. Barnett et al., (2011) noted that supportive partnerships lead to greater sustainability for the project. Dopson and Fitzgerald (2006) felt the 'peer opinion leader' provided strong support in the later stages of implementation. Feedback and reminders during the implementation have been shown to assist the clinicians' efforts (Mugford, Banfield, & O'Hanlon, 1991; Buntrinx et al., 1993).

This study confirmed that multiple challenges arose when implementing EBP into the outpatient physical therapy setting noted by three main themes, ***PT buy-in, lack of fit for individual patient,*** and ***administrative aspects of clinic.*** The recommendations shared by this group of PTs were the main theme of ***educating others about protocol*** and the subtheme of *motivation of change.* Further study is needed to investigate which interventions will effectively improve the PTs ability to implement EBP into their clinical practice.

APPENDICES

Appendix A: Demographic interview guide

1. Where did you attend college and describe what degrees you have achieved?

Undergraduate: _____

Graduate: _____

Education: Bachelors Masters DPT PhD

2. How many years of clinical experience do you have? _____

3. Describe areas of clinical expertise.

Manual Skills

Special Certifications

4. Describe your typical treatment approach for chronic low back pain.

Clarify manual work

Clarify exercise instruction

Address psychological/social aspects

How successful do you feel your treatment is for your patients?

If not successful, why?

5. Are you familiar with graded activity protocol for treating chronic low back pain?

Where did you learn this?

Have you used the protocol in the clinic?

How successful do you feel the protocol was for your patients?

6. Describe your present work environment.

Percentage of workday spent treating patients

Estimate of chronic low back pain patients seen in 1 month

7. What does evidence-based practice mean to you?

8. What exposure to research did you have during your college studies**?**

Undergraduate vs Graduate

Participant vs Researcher

Qualitative vs Quantitative

Group vs Single researcher

Case Study vs Experimental Study

Was there a research grant?

9. How do you use research in your clinical practice?

If involved in actual study, please describe.

Reading articles

Discussion Group about research articles

Attend conferences/workshops/seminars

Appendix B: Midway Interview Guide

1) What does evidence-based practice mean to you?

2) Describe your experience in implementing the graded activity treatment protocol for your chronic low back pain patients.

How do you describe the quality of your training?

How did your patients respond to this approach?

How did this approach differ from your previous treatment for CLBP?

Do you feel this approach is successful for your patients and why?

If not successful, why?

Did you have to deviate from the instructed protocol and why?

3) Was this process easy or difficult for you personally and why?

What about the team who assisted in the implementation?

What level of support did you receive from administration?

4) Are there any additional thoughts or comments that you would like to share?

Appendix C: Final Interview Guide

1) What does evidence-based practice mean to you?

2) Describe your experience in implementing the graded activity treatment protocol for your chronic low back pain patients.

How do you describe the quality of your training?

How did your patients respond to this approach?

How did this approach differ from your previous treatment for CLBP?

Do you feel this approach was successful for your patients and why?

If not successful, why?

Did you have to deviate from the instructed protocol and why?

3) Describe any challenges you encountered while using the new graded activity approach with your CLBP patients.

How did the presentation of the pre and post questionnaires go?

Describe how the goal setting process and your patients' responses?

Did the patient respond to your choice of exercises?

How did this protocol affect your patient schedule?

How much additional time was required?

How well did you understand the protocol during implementation?

If not well, give some suggestions in improve this understanding.

Did the implementation of this new protocol affect the interaction with your patients?

Would additional training have helped?

4) Was this process easy or difficult for you personally and why?

What about the team who assisted in the implementation?

What level of support did you receive from administration?

5) List some suggestions to overcome the challenges that you encountered.

Training?

Support?

Paperwork?

6**)** Would you continue to utilize the new graded activity protocol to treat CLBP? Why or Why not?

7) Are there any additional thoughts or comments that you would like to share?

Appendix D: Definition of terms

Acute pain: an unpleasant experience that serves an adaptive, transient, and protective role in warning the individual of actual or potential tissue damage by way of noxious stimuli.

Allodynia: pain that is caused by a stimulus that does not normally provoke pain. (Nagda & Bajwa, 2004) Physiologically, this occurs when the threshold of the peripheral nociceptor terminal is lowered or by the action of low-threshold myelinated A BETA fibers on altered central nervous system.

Certified Athletic Trainer (ATC): health care professional with a bachelors or masters college degree from an accredited athletic training education program and successful completion of a comprehensive examination administered by the Board of Certification (www.NATA.org, 2009). Additional state regulation or licensure requirements may need to be satisfied in order to practice in some states. Certified athletic trainers provide evaluation, preventative education and treatment for emergency, acute, and chronic medical conditions involving impairment, functional limitations, and disabilities (www.NATA.org, 2009).

Chronic pain: pain that persists after the wound or injury has healed and no longer provides a meaningful or defensive purpose. The function of the nervous systems becomes reorganized (neuroplasticity) with the potential for spontaneous and atopic nerve excitation (Nagda & Bajwa, 2004).

Common Clinical Practice: the physical therapy treatment used by each PT research participant prior to the time of the research intervention.

Disability: an alteration of an individual's capacity to meet personal, social, or occupational demands because of impairment (Guidelines to the Evaluation of Permanent Impairment – American Medical Association, 2000)

Evidence-based Practice: the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients (Sackett et al., 2000).

Hyperalgesia: magnitude of a normally painful stimulus is increased by the result of abnormal processing of the nociceptive input (Nagda & Bajwa, 2004).

Neurogenic pain: pain initiated or caused by a primary lesion or dysfunction, or by transitory pertubation in the peripheral or central nervous system (Nagda & Bajwa, 2004).

Neuropathic pain: pain initiated or caused by a primary lesion or dysfunction in the nervous system. Neuropathic pain syndromes can originate at any point or points along the somatosensory pathways, form the most distal nerve endings in the skin to the somotosensory cortex in the parietal lobe (Nagda & Bajwa, 2004)

Nociceptor: a receptor preferentially sensitive to a noxious stimulus or to a stimulus that would become noxious if prolonged (Nagda & Bajwa, 2004).

Noxious stimulus: a stimulus that is damaging to normal tissue.

Physical therapist (PT): health care professional with a clinical graduate college degree from a physical therapy accredited education program and successful completion of a national licensure examination. Additional state licensure tests may be needed in order to practice. PTs provide evaluation, assessment and treatment to promote mobility, restore function, and prevent disability (www.APTA.org, 2010).

Physical therapy assistant (PTA): health care technician who practices under the supervision of PTs by assisting with physical treatment procedures to improve mobility, relieve pain, and reduce disability caused by disease or injury. Most PTAs have an associate college degree from an accredited PTA program. Some states require additional licensure in order to practice (www.APTA.org, 2010).

Physical therapy team: consists of a licensed PT and one PTA or ATC treating one patient.

Appendix E: Informed consent letter

Informed Consent

Identifying Challenges for the Implementation of Evidence-based Research Protocol into the Outpatient Physical Therapy Setting

For questions regarding this study, Please contact:
Tracey Covassin, PhD, ATC
Michigan State University
308 W Circle Drive
East Lansing, MI 48824
Phone (517) 353-2010
Email: covassin@msu.edu

Or

Marge Taylor PT, ATC, JSCC
Instructor, Physical Therapy Department
University of Mary
7500 University Drive
Bismarck, North Dakota 58501
Phone (701) 425-6966
Email: mltaylor@umary.edu

For questions regarding your rights as a research participant, please contact:
Human Research Protection Program
Michigan State University
408 West Circle Drive
Room 207 Olds Hall
East Lansing, MI 48824
Phone (517) 355-2180
Email: irb@msu.edu

Purpose of Research:

The purpose of this study is to qualitatively assess the implementation of research evidence-based protocol of graded activity physical therapy for the treatment of chronic low back pain patients in outpatient orthopedic physical therapy setting.

What you will do:

You will be asked to complete three in-depth interviews. Each interview will be tape-recorded. The initial interview (45 minutes to 1 hour) will ask for demographic information to illustrate your work experience, understanding of evidence-based practice, and experience with research. Then you will be educated in a workshop featuring an evidence-based protocol of graded activity. You may then choose to treat two patients with chronic low back pain (CLBP) in your outpatient physical therapy setting. This technique utilizes exercises and manual therapy that each physical therapists uses commonly in their daily practice. The second interview (30 minutes) will be scheduled four weeks after beginning the treatment of the first CLBP to determine how the implementation of the evidence-based protocol is proceeding and to identify any challenges you have encountered thus far. The third and final interview (45 minutes to 1 hour) will be conducted when you have finished treating two CLBP patients with the evidence-based protocol of graded activity to determine how the implementation process

This consent form was approved by a Michigan State University Institutional Review Board.
Approved 06/18/2014 - valid through - 06/17/2015. This version supersedes all previous versions. IRB #13-361

progressed and to hear what challenges your encountered as well as your advice to overcome these challenges.

Potential Benefits:

Participation in this study will provide a learning experience of an evidence-based protocol for treating CLBP patients that demonstrates efficacy in the research literature. In addition, participants will provide personal insight into the challenges of implementing evidence-based protocol into the clinical setting that may be helpful for other physical therapists.

Potential Risks:

This study presents a minor risk of evoking uncomfortable emotions as the participant shares their personal information. The study will minimize this risk by conducting the interview in a private room and then identifying the interview transcript with a code to maintain confidentiality.

Privacy and Confidentiality:

Your participation in this study is completely voluntary. The only people who have access to your results are the researchers and HRPP. Your identity and information recorded during the study will remain confidential. Confidentiality will be protected by; (a) results of this study may be published or presented at professional meetings, but the identities of all research participants will remain anonymous; and (b) all data will be stored in a computer that is password protected, as well as all surveys, informed consent, and health history questionnaires will remain in an office under double lock and key for 3 years after the close of the study. Your privacy will be protected to the maximum extent allowable by law. You may also discontinue participation at any time without penalty. Your participation in this research project will not involve any additional costs to you or your health care insurer.

Disclaimer/Withdrawal:

If you are injured as a result of participation in this research project, Michigan State University will assist you in obtaining emergency care, if necessary. If you have insurance for medical care, your insurance carrier will be billed in the ordinary manner. As with any medical insurance, costs that are not covered or in excess of what are paid by your insurance, including deductibles, will be your responsibility. The University's policy is not to provide financial compensation for lost wages, disability, pain or discomfort, unless required by law to do so. This does not mean that you are giving up any legal rights you may have. You may contact *Dr. Tracey Covassin at 517-353-2010* with any questions or to report an injury.

This consent form was approved by a Michigan State University Institutional Review Board.
Approved 06/18/2014 - valid through - 06/17/2015. This version supersedes all previous versions. IRB #13-361

Costs and Compensation for being in the study:

You will not be compensated for your participation in this study and there will be no costs for you to participate.

Institutional Contacts:

If you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact the researcher Marge Taylor PT, ATC, JSCC (701) 425-6966 *or email at* mltaylor@umary.edu *or regular mail at* University of Mary, Department of Physical Therapy, 7500 University Drive, Bismarck, North Dakota 58501.

Please indicate if you agree to have your interview audio taped.

_____ Yes _____ No

Your signature below indicates your voluntary agreement to participate in this study.

I, _____, have read and agree to participate in this study as described above.
(Please Print Your Name)

_____ _____/_____/_____

Signature *Date*

This consent form was approved by a Michigan State University Institutional Review Board.
Approved 06/18/2014 - valid through - 06/17/2015. This version supersedes all previous versions. IRB #13-361

Appendix F: Human subjects (UCRIHS) approval form

MICHIGAN STATE
UNIVERSITY

Renewal Application Approval

June 18, 2014

To: Tracey Covassin
105 IM Sports Circle

Re: **IRB# 13-361** Category: EXPEDITED 6,7
Renewal Approval Date: June 18, 2014
Project Expiration Date: June 17, 2015

Title: Identifying Challenges for the Implementation of Evidence-based Research Protocol into the Outpatient Physical Therapy Setting

The Institutional Review Board has completed their review of your project. I am pleased to advise you that the renewal has been approved.

This approval includes increasing the sample size from eighteen (18) to forty-two (42).

The review by the committee has found that your renewal is consistent with the continued protection of the rights and welfare of human subjects, and meets the requirements of MSU's Federal Wide Assurance and the Federal Guidelines (45 CFR 46 and 21 CFR Part 50). The protection of human subjects in research is a partnership between the IRB and the investigators. We look forward to working with you as we both fulfill our responsibilities.

Renewals: IRB approval is valid until the expiration date listed above. If you are continuing your project, you must submit an Application for Renewal application at least one month before expiration. If the project is completed, please submit an Application for Permanent Closure.

Revisions: The IRB must review any changes in the project, prior to initiation of the change. Please submit an Application for Revision to have your changes reviewed. If changes are made at the time of renewal, please include an Application for Revision with the renewal application.

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to the human subjects, notify the IRB office promptly. Forms are available to report these issues.

Please use the IRB number listed above on any forms submitted which relate to this project, or on any correspondence with the IRB office.

Good luck in your research. If we can be of further assistance, please contact us at 517-355-2180 or via email at IRB@msu.edu. Thank you for your cooperation.

Sincerely,

Ashir Kumar, M.D.
BIRB Chair

c: Margaret Taylor

Office of Regulatory Affairs
Human Research Protection Programs

Biomedical & Health Institutional Review Board (BIRB)

Community Research Institutional Review Board (CRIRB)

Social Science Behavioral/Education Institutional Review Board (SIRB)

Olds Hall
408 West Circle Drive, #207
East Lansing, MI 48824
(517) 355-2180
Fax: (517) 432-4503
Email: irb@msu.edu
www.humanresearch.msu.edu

REFERENCES

REFERENCES

American Physical Therapy Association, Annual Report, *membership statistics*, 2012. http://www.apta.org/uploadedFiles/APTAorg/About_Us/Annual_Reports/AnnualReport_2012.pdf#search =%22Total membership 2012%22. (visited January 31, 2014).

Anderson, T., Cole, T., Gullickson, G., Hudgens, A., & Roberts, A. (1977). Behavior modification of chronic pain: a treatment program by a multidisciplinary team. *Clin Orthop Relat Res, 129*, 96-100.

Anema, J., Steenstra, I., Bongers, P., de Vet, H., Knol, D., Loisel, P., et al. (2007). Multidisciplinary rehabilitation for subacute low back pain: graded activity or workplace intervention or both? *Spine, 32*(3), 291-298.

Anthony, W., Rogers, E., & Farkas, M. (2003). Research on evidence-based practices: future directions in an era of recovery. *Community Mental Health Journal, 39*(2), 101-114.

Asmundson, G., Norton, G. R., & Allerdings, M. D. (1997). Fear and avoidance in dysfunctional chronic back pain patients. *Pain, 69*, 231-236.

Asmundson, G., Norton, G., & Vlaeyen, J. (2004). Fear-avoidance models of chronic pain: An overivew. In G. Asmundson, J. Vlaeyen & G. Crombex (Eds), *Understanding and treating fear of pain.* New York: Oxford University Press.

Asmundson, G., & Wright, K. (2004). Biopsychosocial Approaches to Pain. In T. Hadjistavropoulos & K. Craig (Eds.), *Pain: psychological perspectives*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Aure, O., Nilsen, J., & Vasseljen, O. (2003). Manual therapy and exercise therapy in patients with chronic low back pain: a randomized, controlled trial with 1-year follow-up. *Spine, 28*(6), 525-532.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84,* 191-215.

Barnard, S., & Wiles, R. (2001). Evidence-based physiotherapy: physiotherapists' attitudes and experiences in the Wessex area. *Physiotherapy, 87*(3), 115-124.

Barnett, J., Vasileiou, K., Djemil, F., Brooks, L., & Young, T. (2011). Understanding innovators' experiences of barriers and facilitators in implementation and diffusion of healthcare service innovations: a qualitative study. *BMC Health Services Research, 11*,342.

Battle, M., Cherkin, D., Dunn, R., Ciol, M., & Wheeler, K. (1994). Managing low back pain: attitudes and treatment preferences of physical therapists. *Physical Therapy, 74*(3), 219-226.

Bennett, S., & Bennett, J. (2000). The process of evidence-based practice in occupational therapy: Informing clinical decisions. *Australian Occupational Therapy Journal, 47*, 171 - 180

Bennett, J., Sackett, D., Haynes, R., Neufeld, V., Tugwell, P., & Roberts, R. (1987). A controlled trial of teaching critical appraisal of the clinical literature to medical students. *Journal of the American Medical Association* (257), 2451-2454.

Bennett, S., Tooth, L., McKenna, K., Rodger, S., Strong, S., Ziviani, J., et al. (2003). Perceptions of evidence-based practice: a survey of Australian occupational therapists. *Australian Occupational Therapy Journal, 50,* 13 - 22.

Bereiter, C. & Scardamalia, M. (1993). *Surpassing ourselves:An inquiry into the nature and implications of expertise.* Chicago, IL: Open Court.

Berenholtz, S., & Pronovost, P. (2003). Barriers to translating evidence into practice. *Current Opinion in Critical Care, 9,* 321-325.

Bernhardsson, S., & Larsson, M. (2013). Measuring evidence-based practice in physical therapy: Translation, adaptation, further development, validation, and reliability of a questionnaire. *Physical Therapy, 93*(6), 819-832.

Billett, S. (1996). Situated learning: Bridging sociocultural and cognitive theorizing. *Learning and Instruction.6*(3), 263-280.

Bingel U.,& Tracey, I. (2008). Imaging CNS modulation of pain in humans. *Physiology, 23,*371-380.

Bithell, C. (2000). Evidence-based physiotherapy: some thoughts on best evidence. *Physiotherapy, 86*, 58-60.

Bohannon, R. (1999). Core journals of physiotherapy. *Physiotherapy, 85,* 317-321.

Brown, J., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Buntrinx, F. Winkens, R., Grol, R. et al. (1993). Influencing diagnostic and preventative performance in ambulatory care by feedback and reminders. *Family Practice, 11,* 584-590.

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, May 2012 Edition*, Physical Therapists, on the Internet http://www.bls.gov/oes/current/oes291123.htm (visited *January 31, 2014*).

Bury, T. (1996). Evidence-based practice - Survival of the fittest. . *Physiotherapy 82*, 75 - 76

Butterworth, G, (Ed.), (1992). *Context and Cognition: Ways of learning and knowing.* New York: Havester Wheatsheaf.

Cairns, D., Thomas, L., Mooney, T., & Pace, J. (1976). A comprehensive treatment approach to chronic low back pain. *Pain, 2*, 301-308.

Campbell, J. (1995). Pain: the fifth vital sign. Presidential address*, American Pain Society,* Los Angeles, California, November 11.

Cane, L. (1985). *The Physiotherapy Profession Today*. Sydney: Australian Physiotherapy Association (New South Wales Branch Office).

Capel, S. (1998). Nurses' access to library and information services. *Nursing Standards, 12*(25), 45-47.

Carey, T., Garrett, J., & Jackman, A., (2000). Beyond the good prognosis. Examination of an inception cohort of patient with chronic low back pain. *Spine, 25,* 115 - 120.

Charlton, B. (1997). Restoring the balance: Evidence-based medicine put in its place. *Journal of Evaluation in Clinical Practice, 3,* 87-98.

Cherkin, D., Deyo, R., Wheeler, K., & Ciol, M. (1995a). Physician variation in diagnostic testing for low back pain. Who you see is what you get. *Arthritis Rheumatology, 37*, 15 - 22.

Cherkin, D., Deyo, R., Wheeler, K., & Ciol, M. (1995b). Physician views about training low back pain. The results of a national survey. *Spine*, *20*, 1 - 9.

Chou, R., Qaseem, A., Snow, V., Casey, D., Cross Jr, J., Shekelle, P., et al. (2007). Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Annals of Internal Medicine, 147*, 478 - 491.

Closs, S., & Lewin, B. (1998). Perceived barriers to research utilization: A survey of four therapies. *British Journal of Therapy and Rehabilitation, 5,* 151-155.

Coates, R. (1990). Ethics and physiotherapy. *Australian Journal of Physiotherapy, 36,* 84-87.

Collins, A., Brown, J., & Newman, S. (1987). *Cognitive apprenticeship: Teaching the crafts of reading, writing and mathemathics.*Cambridge, MA: Center for study of reading.

Connolly, B., Lupinnaci, M., & Bush, A. (2001). Changes in attitudes and perceptions about research in physical therapy among professional physical therapist students and new graduates. *Physical Therapy, 81*(5), 1127-1134.

Critchley, D., Ratcliffe, J., Noonan, S., Jones, R., & Hurley, M. (2007). Effectiveness and cost-effectiveness of three types of physiotherapy used to reduce chronic low back pain disability. *Spine, 32*(14), 1474-1481.

Dagenais, S., Caro, J., & Haldeman, S. (2008). A systematic review of low back pain cost of illness studies in the United States and internationally. *The Spine Journal, 8,* 8 - 20.

Dahl, J. (2000, November 2 - 5). *Implementing the JCAHO pain management standards.* Paper presented at the American Pain Society 19th Annual Meeting, Atlanta, Georgia.

Davidson, R., Duerson, M., Romrell, I., Pauly, R., & Watson, R. (2004). Evaluating evidence-based medicine skills during a performance-based examination. *Academic Medicine, 79,* 272-275.

de Jong, J., Vlaeyen, J., Onghena, P., Goossens, M., Geilen, M., & Mulder. (2005). Fear of movement/(re)injury in chronic low back pain: education or exposure in vivo as mediator to fear reduction? *Clinical Journal of Pain, 21*(1), 9-17.

de Vera Barredo, R. (2005). Reflection and evidence-based practice in action: a case based application. *The Internet Journal of Allied Health Sciences and Practice, 3*(3), 1-10.

de Vet, H., de Bie, R., van der Heijden, G., Verhagen, A., Sijpkes, P., & Knipschild, P. (1997). Systematic reviews on the basis of methodological criteria. *Physiotherapy, 83*, 284-289.

Devor, M. (2005). Response of nerves to injury in relation to neuropathic pain. In S. McMahon & M. Koltzenburg (Eds.), *Melzack and Wall's Textbook of Pain*. Edinburgh: Elsevier.

Devor, M. (2006). Sodium channels and mechanisms of neuropathic pain. *Journal of Pain, 7*(1Suppl 1), S3 - S12.

Deyo, R. & Diehl, A. (1988). Psychosocial predictors of disability in patients with low back pain. *Journal of Rheumatology, 15*, 1557-64.

Deyo, R. (1996). Acute low back pain: A new paradigm for management. *British Medical Journal, 313,* 1343-1344.

Difabio, R. (1999). Myth of evidence-based practice. *Journal of Orthopedic and Sports Physical Therapy, 29,*(11), 632-634.

Dopson, S., & Fitzgerald, L. (2006). The role of the middle manager in the implementation of evidence-based health care. *Journal of Nursing Management, 14,* 43-51.

Driever, M. (2002). Are evidenced-based practice and best practice the same? *Western Journal of Nursing Research, 24*(5), 591-597.

Egger, M., Juni, P., Bartlett, C., Holenstein, F., & Sterne, J. (2003) How important are comprehensive literature searches and the assessment of trial quality in systematic reviews? Empirical study. *Health Technology Assessment, 7,* 1-76.

Farmer, J., & Richardson, S. (1997). Information for trained nurses in remote areas, do electronically networked systems provide the answer? *Health Library Review, 14,* 97-103.

Fell, D., & Burnham, J. (2004). Access is key: teaching students and physical therapists to access evidence, expert opinion, and patient values for evidence-based practice. *Journal of Physical Therapy Education, 18*(3), 12-23.

Fetters, L., Wagenaar, R., Slavin, M., Dalton, D., Ellis, T., & Starr, J. (2002, June 7). *Integrating evidence-based practice into academic curricula: necessary conditions, critical skills.* Paper presented at the Physical Therapy Annual Conference & Exposition, Washington, D.C.

Fordyce, W. (1976a). Behavioral concepts in chronic pain and illness. In P. Davidson (Ed.), *The behavioral management of anxiety, depression, and pain*. New York: Brunner and Mazel Company.

Fordyce, W. (1976b). *Behavioural methods for chronic pain and illness*. St. Louis: C. V. Mosby.

Forrest, J., & Miller, S. (2001). Integrating evidence-based decision making into allied health curricula. *Journal of Allied Health*, *30,* 215-222.

Fritz, J., George, S., & Delitto, A. (2001). The role of fear-avoidance beliefs in acute low back pain: relationships with current and future disability and work status. *Pain, 94,* 7 - 15.

Gatchel, R. J. (2004). Comorbidity of chronic pain and mental health: The biopsychosocial perspective. *American Psychologist, 59*, 794-805.

Gatchel, R. J. (2005). *Clinical essentials of pain management*. Paper presented at the American Psychological Association.

Gatchel, R., & Rollings, K. (2008). Evidence-informed management of chronic low back pain with cognitive behavioral therapy. *The Spine Journal, 8*(1), 40-44.

George. S., Fritz, J., Bialosky, J., & Donald, D. (2003) The effect of a fear-avoidance-based physical therapy intervention for patients with acute low back pain: results of a randomized clinical trial. *Spine 28*(23), 2551 - 2560.

Gibson, B & Martin, D. (2003). Qualitative research and evidence-based physiotherapy practice. *Physiotherapy, 89,* 350-358.

Gibson, K. (2005). Creating advocates for physical therapy. *Physical Therapy, July,* 28-32.

Gieselman, J., Stark, N., & Farruggia, M. (2000). Implications of the situated learning model for teaching and learning nursing research. *The Journal of Continuing Education in Nursing, 31*(6),263-268.

Glasziou, P., & Irwig, L. (1995). an evidence-based approach to individualizing treatment. *British Medical Journal, 311,* 1356-1359.

Godin, G. & Kok, G. (1996). The theory of planned behavior: A review of its applications to health-related behavior. *American Journal of Health Promotion, 11*, 87-98.

Gore, M., Sadosky, A., Stacey, B., Tai, K., & Leslie, D. (2012). The burden of chronic low back pain: clinical cormorbidities, treatment patterns, and health care costs in usual care settings. *Spine, 37*(11), E668 - 677.

Green, M., & Ellis, P. (1997). Impact of an evidence-based medicine curriculum based on adult learning theory. *Journal of General Internal Medicine, 12,* 742-750.

Grimmer, K., (2001). Providing evidence of good allied health care outpatient care for the veteran population: the development of a unique management system. *Journal of Allied Health, 31,* 15-21.

Grimmer, K., Bialocerkowski, A., Kumar, S., & Milanese, S. (2004). Implementing evidence in clinical practice: the 'therapies' dilemma. *Physiotherapy, 90,*189-194.

Grimmer, K., Bowman, P., & Roper, J. (2000). Episodes of allied health outpatient care: An investigation of service delivery in acute public hospital settings. *Disability Rehabilitation, 31,* 15-21.

Grimshaw, J., Shirran, L., Thomas, R., Mowatt, G., Fraser, C., Bero, L., Grilli, R., Harvey, E., Oxman, A., & O'Brien, M. (2001). Changing Provider Behavior: An overview of systematic reviews of interventions. *Medical Care, 39*(8), II-2 - II-45.

Guba, E. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Resources Information Center Annual Review Paper, 29*, 75-91.

Haldeman, S., & Dagenais, S. (2008). A supermarket approach to the evidence informed management of chronic low back pain. *Spine, 8*(1), 1 - 8.

Halladay, M., & Bero, L. (2000). Implementing evidence-based practice in health care. *Public Money & Management, Oct-Nov,*43-50.

Haines, A. & Jones, R. (1994) Education and debate, implementing findings of research. *British Medical Journal. 308,* 1488 - 1492 .

Haines, A., Kuruvilla, S., & Borchert, M. (2004). Bridging the implementation gap between knowledge and action for health. *Bulletin of the World Health Organization, 82,* 724-732.

Hart, L., Deyo, R., & Cherkin, D. (1995). Physician office visits for low back pain: frequency, clinical evaluation, and treatment pattern from a U.S. national survey. *Spine, 20*, 11-19.

Hatala, R., & Guyatt, G., (2002). Evaluating the teaching of evidence-based medicine. *Journal of American Medical Association, 288,* 1110-1112.

Hayden, J., van Tulder, M., Malmivaara, A., & Koes, B. (2005). Meta-analysis: exercise therapy for non-specific low back pain. *Annals of Internal Medicine, 142*(9), 765 - 775 & W-168 - W-184.

Heymans, M., de Vet, H., Bongers, P., Knol, D., Koes, B., & van Mechelen, W. (2006). The effectiveness of high-intensity versus low-intensity back schools in an occupational setting. *Spine, 31*(10), 1075-1082.

Herbert, R. (2000a). How to estimate treatment effects from reports of clinical trials, I: continuous outsomes. *Australian Journal of Physiotherapy, 46,* 229-235.

Herbert, R. (2000b). How to estimate treatment effects from reports of clinical trials, II: dichotomous outcomes. *Australian Journal of Physiotherapy, 46,* 309-313.

Herbert, R., Maher, C., Moseley, A., & Sherrington, C. (2001). Effective physiotherapy. *British Medical Journal, 323*(7316), 788-790.

Herbert, R., Sherrington, C., Maher, C., & Moseley, A. (2001). Evidence-based physiotherapy: Imperfect but necessary. *Physiotherapy Theory and Practice, 17,* 201-211.

Hlobil, H., Staal, J., Twisk, J., Koke, A., Ariens, G., Smid, T., et al. (2005). The effects of a graded activity intervention for low back pain in occupational health on sick leave, functional status, and pain: 120 month results of a randomized controlled trial. *Journal of Occupational Rehabilitation, 15*(4), 569-580.

Hopewell, S., Clarke, M., Stewart, L., & Tierney, J. (2003). Time to publication for results of clinical trials. In: *Cochrane Library* (Vol. 4). Chicester, United Kingdom: John Wiley & Sons Ltd.

https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#safe=active&q=defn%20implementation

Iles, R., & Davidson, M. (2006). Evidence based practice: a survey of physiotherpists' current practice. *Physiotherapy Research International, 11*(2), 93 - 103.

Indahl, A., Velund, L., & Reikeraas, O. (1995). Good prognosis for low back pain when left untampered. A randomized clinical trial. *Spine, 20*, 473-477.

Janis, I. (1972). *Victims of Groupthink.* New York, NY: Houghton Mifflin.

Janis, I., & Mann, L. (1977). *Decision making: A psychological analysis of conflict, choice, and commitment.* New York, NY: Free Press.

Jette, D., Bacon, K., Batty, C., Carlson, M., Ferland, A., Hemingway, R., et al. (2003). Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. *Physical Therapy, 83*(9), 787-805.

Kamwendo, K. (2002). What do Swedish physiotherapists think about research? A survey of perceptions, attitudes, intentions, and engagement. *Physiotherapy Research International, 7*(1), 23-24.

Karjalainen, K., Malmivaara, M., Risto, R., Jauhiainen, M., & Koes, B. (2001). Multidisciplinary biopsychosocial rehabilitation for sub acute low back pain in working-age adults. A systematic review within the framework of the Cochrane collaboration back review group. *Spine, 26*(3), 262-269.

Keefe, F. J., & France, C. R. (1999). Pain:Biopsychosocial mechanisms and managment. *Current Directions in Psychological Science, 8*(5), 137-141.

Kelland, K., Hoe, E., McGuire, M., Yu, J., Andreoli, A., & Nixon, S. (2014). Excelling in the role of advocate: A qualitative study exploring advocacy as an essential physiotherapy competency. *Physiotherapy Canada, 66*(1), 74-80.

Klennerman, L., Slade, P., Stanley, I., Pennie, B., Reilly, J., Atchison, L., et al. (1995). The prediction of chronicity in patients with an acute attack of low back pain in a general practice setting. *Spine, 20*(4), 478-484.

Koes, B., & Hoving, J. (1998). The value of the randomized clinical trial in the field of physiotherapy. *Manual Therapy, 3,* 179-186.

Koles-Snijders, A., Vlaeyen, J., Goossens, M., Rutten-van Molken, M., Heuts, P., Breukelen, G. et al. (1999). Chronic low back pain: What does cognitive coping skills training add to operant behavioral treatment? Results of a randomized clinical trial. *Journal of Consulting and Clinical Psychology, 67*(6), 931-944.

Latremoliere, A., & Woolf, C. (2009). Central sensitization: a generator of pain hypersensitivity by central neural plasticity. *The Journal of Pain: Official Journal of the American Pain Society, 10*(9), 895-926.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* New York: Cambridge University Press.

Law, M., Stewart, D., Pollock, N., Letts, N., Bosch, J., & Westmorland, M. (1998). Critical review forms (qualitative studies); Available at http://ptwww.cchs.usyd.edu.au/pedro.

Leeuw, M., Goosens, M., van Breukelen, G., de Jong, J., Heuts, P., Smeets, R., et al. (2008). Exposure in vivo versus operant graded activity in chronic low back pain patients: results of a randomized controlled trial. *Pain, 138,*192-207.

Leipzig, R., Wallace, E., Smith, L., Sullivant, J., Dunn, K., & McGinn, T. (2003). Teaching evidence-based medicine: a regional dissemination model. *Teaching and Learning in Medicine, 15,* 204-209.

Lethem, J., Slade, P., Troup, J., & Bentley G. (1983). Outline of a fear-avoidance model of exaggerated pain perception. *Behavioral Research Therapy, 21,* 401-408.

Lindstrom, I., Ohlund, C., Eek, C., Wallin, L., Peterson, L., & Fordyce, W. (1992). The effect of graded activity on patients with subacute low back pain. *Physical Therapy, 72,* 279-290.

Linton, S., Hellsing, A., & Andersson, D. (1993). A controlled study of the effects of an early intervention on acute musculoskeletal pain problems. *Pain,54,* 353 - 359.

Linton, S. (1998). The socioeconomic impact of chronic back pain. *Pain, 75,* 163 - 168.

Linton, S. (2000). A review of psychological risk factors in back and neck pain. *Spine, 25*, 1148-56.

Little, P., Griffin, S., & Kelly, J. (1998). Effect of educational leaflets and questions on knowledge of contraception in women taking the combined contraceptive pill: a randomized controlled trial. *British Medical Journal, 316*, 1948-1952.

Little, P., Roberts, L., Blowers, H., Garwood, J., Cantrell, T., Landridge, J., et al. (2001). Should we give detailed advice and information booklets to patients with back pain? *Spine, 26*(19), 2065-2072.

Lloyd-Smith, W. (1997). Evidence-based practice and occupational therapy. *British Journal of Occupational Therapy, 60*, 474-478.

Louw, A., & Puentedura, E. (2013). *Therapeutic neuroscience education: teaching patients about pain:* International Spine and Pain Institute.

Louw, J., Peltzer, K., Naidoo, P., Matseke, G., McHunu, G., & Tutshana, B. (2012). Quality of life among tuberculosis, TB retreatment and/or TB-HIV co-infected primary public health care patients in three districts in South Africa. *Health and Quality Life Outcomes, 10*(1), 77.

Macedo, L., Smeets, R., Maher, C., Latimer, J., & McAuley, J. (2010). Graded activity and graded exposure for persistent nonspecific low back pain: a systematic review. *Physical Therapy, 90*(6), 860 - 879.

Maher, C., Moseley, A., Sherrington, C., Herbert, R. (2001). Core journals of evidence-based physiotherapy practice. *Physiotherapy Theory and Practice, 17,* 143-151.

Maher, C., Sherrington, C., Elkins, M., Herbert, R., & Moseley, A. (2004). Challenges for evidence-based physical therapy: Accessing and interpreting high-quality evidence on therapy, *Physical Therapy, 84*(7), 644-654.

McColl, A., Smith, H., White, P., & Field, J. (1998). General practitioners' perception of the route to evidence based medicine: a questionnaire survey. *British Medical Journal*, *316*, 361 - 365.

McCrory, P. (2001). Evidence-based sports medicine. *British Journal of Sports Medicine, 35,* 79-80.

McGinn, T., Selez, M., & Korenstein, D. (2002). A method for real-time evidence-based practice general medicine attending rounds. *Academic Medicine, 77*(11), 1150-1152.

McKenna, H., Ashton, S., & Kenney, S. (2004). Barriers to evidence-based practice in primary care. *Journal of Advanced Nursing, 45,* 178-189.

Mechanic, E. (1986). Illness behavior: An overview. In S. V. McHugh, T (Ed.), *Illness behavior: A multidisciplinary model* (pp. 101-110). New York: Plenum Press.

Meichenbaum, D., & Turk, D. (1976). The cognitive-behavioral management of anxiety, depression and pain. In P. Davidson (Ed.), *The behavioral management of anxiety, depression and pain* New York: Brunner/Mazel.

Melzack, R., & Katz, J. (2004). The Gate Control Theory: Reaching for the Brain. In T. Hadjistavropoulos, and Craig, Kenneth (Ed.), *Pain: Psychological Perspectives*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Merskey, H., & Bogduk, N. (1994). *Classification of chronic pain.* Seattle: International Association on the Study of Pain press.

Metcalfe, C., Lewin, R., Wisher, S., Perry, S., Bannigan, K., & Klaber-Moffett, J. (2001). Barriers to implementing the evidence base in four NHS therapies: Dieticians, occupational therapists, physiotherapists, speech and language therapists, *Physiotherapy, 87*(8), 433-441.

Miyamoto, H., Doita, M., Nishida, K., Yamamoto, T., Sumi, M., & Kurosaka, M. (2006). Effects of cyclic mechanical stress on the production of inflammatory agents by nucleus pulposus and anulus fibrosus derived cells in vitro. *Spine 31*(1), 4 - 9.

Moseley, G. (2003). A pain neuromatrix approach to patients with chronic pain. *Manual Therapy, 8*(3), 130-140.

Mugford, M., Banfield, P., & O'Hanlon, M. (1991). Effects of feedback of information on clinical practice: a review. *British Medical Journal, 303,* 398-402.

Muncey, H. (2000). The challenge of change in practice. In L. Gifford (Ed.) *Topical issues in pain 2. Biopsychosocial assessment relationships and pain* (pp. 37). Falmouth: CNS Press.

Murray, I., Murray, S., MacKenzie, K., & Coleman, S. (2005). How evidence based is the management of two common sports injuries in a sports injury clinic? *British Journal of Sports Medicine, 39*, 912-916.

Nagda, J., & Bajwa, Z. (2004). Definitions and classification of pain. In C. Warfield, & Bajwa, Z (Ed.), *Principles and practice of pain medicine*. New York: McGraw-Hill.

Nachemson, A. (1992). Newest knowledge of low back pain: a critical look. *Clinical Orthopaedics and Related Research, 279,* 8-20.

Newham, D. (1994). Practical Research. *Physiotherapy,80,*337-339.

Newman, M., Papadopoulos, I., & Sigsworth, J. (1998). Barriers to evidence-based practice. *Intensive Critical Care Nursing, 14,* 231-238.

Newton-John, T., Spence, S., & Schotte, D. (1995). Cognitive-Behavioral Therapy versus EMG biofeedback in the treatment of chronic low back pain. *Behavioral Research Therapy, 33*(6), 691-697.

Nicholas, M., Wilson, P., & Goyen, J., (1991). Operant-behavioral and cognitive-behavioral treatment for chronic low back pain. *Behavioral Research Therapy, 29*(3), 225-238.

Nicholas, M., Wilson, P., & Goyen, J. (1992). Comparison of cognitive-behavioral group treatment and an alternative non-psychological treatment for chronic low back pain. *Pain, 48*, 339-347.

Norman, G., & Shannon, S. (1998). Effectiveness of instruction in critical appraisal (evidence-based medicine) skills: a critical appraisal. *Canadian Medical Association Journal, 158,* 177-181.

Norwood, S. (2010). *Research Essentials: Foundations for evidenced-based practice*. Boston: Pearson.

O'Brien, M. (2001). Keeping up to date: continuing education improvement strategies and evidence-based physiotherapy practice. *Physiotherapy Theory and Practice, 17,*187-199.

O'Brien, M., Freemantle, N., Oxman, A., Wolf, D., Davis, D., & Herrin, J. (2001). Continuing education meetings and workshops: Effects on professional practice and health care outcomes. *Cochrane database of systematic reviews, 1,* doi:10.1002/14651858.CD003030.

Odeen, M., Magnussen, L., Maeland, S., Eriksen, L. & Tveito, T. (2012). Systematic review of active workplace interventions to reduce sickness absence. *Occupational Medicine 63*, 7 - 16.

Parker-Taillon, D. (2002). CPA initiatives put the spotlight on evidence-based practice in physiotherapy. *Physiotherapy Canada, Winter,* 12-15.

Patten, M. (1987). *How to use qualitative methods in evaluation*. Newbury Park: Sage Publications.

Pengel, L., Refshauge, K., Maher, C., Nicholas, M., Herbert, R., McNair, P. (2007). Physiotherapist-directed exercise, advice, or both for subacute low back pain. *Annals of Internal Medicine, 146*(11) 787-796.

Philips, H. (1987). Avoidance behavior and its role in sustaining chronic pain. *Behavioral Research Therapy, 25*(4), 273-279.

Picavet, H., Vlaeyen, J., & Schouten, J. (2002). Pain catastrophizing and kinesiophobia: Predictors of chronic low back pain. *American Journal of Epidemiology, 156,* 1028-1034.

Plack, M & Wong, C. (2002). The evolution of the doctorate of physical therapy: Moving beyond the controversy. *Journal of Physical Therapy, 16*(1), 48-59.

Ploeg, J., Davies, B., Edwards, N., Gifford, W., & Miller, P. (2007). Factors influencing best-practice guideline implementation: Lessons learned from administrators, nursing staff, and project leaders. *Worldviews on Evidence-based Nursing, Fourth quarter,* 210-219.

Pomeroy, V., Talls, R., & Stitt, E. (2003). Dismantling some barriers to evidence-based practice with 'hands-on' clinical research secondments: Initial development. *Physiotherapy, 89*(5), 266-275.

Portney, L. (2004). Evidence-based practice and clinical decision making: it's not just the research course anymore. *Journal of Physical Therapy Education, 18*(3), 46-51.

Prochaska, J. & DiClemente, C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research and Practice, 20,* 161-173.f

Prochaska, J., DiClemente, C., & Norcross, J. (1992). In search of how people change: applications to addictive behaviors. *American Psychologist, 47*(9), 1102-1114.

Prochaska, J., & Velicer, W. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12*(1), 38-48.

Resnick, L. (1989). *Knowing, learning, and instruction: Essays in honor of Robert Glaser.* Hillsdale, NJ: Lawrence Erlbaum Associates of Publishers.

Retsas, A. (2000). Barriers to using research evidence in nursing practice. *Journal of Advanced Nursing, 31*, 599 - 606.

Richardson, B., & Jerosch-Herold, C. (1998). Appraisal of clinic effectiveness - an ACE approach to promoting evidence-based therapy. *Journal of Clinical Effectiveness*, *3*(4), 146-150.

Ritchie, J. (1999). Using qualitative research to enhance the evidence-based practice of health care providers. *Australian Journal of Physiotherapy, 45,* 251-256.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context.* New York, NY: Oxford University Press.

Ross, I., & Davidson, M. (2006). Evidenced-based practice: a survey of physiotherapists' current practice. *Physiotherapy Research International, 11*(2), 93-103.

Rozier, C., Raymond, M., Goldstein, M., & Hamilton, B. (1998). Gender and physical therapy career success factors. *Physical Therapy, 78*, 690-704.

Ryan, C., Gray, H., Newton, M., & Granat, M. (2010). Pain biology education and exercise classes compared to pain biology education alone for individuals with chronic low back pain: A pilot randomized controlled trial. *Manual Therapy, 15*(4), 382-387.

Rybstein-Blinchik, E. (1979). Effects of different cognitive strategies on chronic pain experience. *Journal of Behavioral Medicine, 2,* 93-100.

Sackett, D., Haynes, R., Tugwell, P. (1985). *Clinical epidemiology: A basic science for clinical medicine.* Boston: Little, Brown.

Sackett, D., Rosenberg, W., Gray, J., Haynes, B., & Richardson, W. (1996). Evidence based medicine: what it is and what it isn't. *British Medical Journal, 312*(7023), 71 - 72.

Sackett, D., Straus, S., Richardson, S., Rosenberg, W., & Haynes, B. (2000). *Evidence-based Medicine*. London: Churchill Livingstone.

Salbach, N., Jaglal, S., & Williams, J. (2013). Reliability and validity of the evidence-based practice confidence scale. *Journal of Continuing Education in the Health Professions, 33*(1), 33-40.

Scherer, R., & Langenberg, P. (2003). Full publication of results initially presented in abstracts In: *Cochrane Library* (Vol. 4). Chicester, United Kingdom: John Wiley & Sons Ltd.

Scherer, S & Smith, M. (2002). Teaching evidence-based practice in academic and clinical settings. *Cardiopulmonary Physical Therapy, 13*(2), 23-27.

Seres, J., & Newman, R. (1976). Results of treatment of chronic low back pain at the Portland Pain Center. *Journal of Neurosurgery, 45*, 32.

Sieben, J., Vlaeyen, J., Tuerlinckx, S., & Portegijs, P. (2002). Pain-related fear in acute low back pain: the first two weeks of a new episode. *European Journal of Pain, 6*(3), 229-237.

Silagy, C. (1998). Evidence-based practice and the Cochrane collaboration: Implications for physiotherapy. In *Fifth International Congress of the Australian Physiotherapy Association Proceedings* (Vol. 1, pp. 112-116). Hobart.

Smeets, R., Severens, J., Beelen, S., Vlaeyen, J. & Knottnerus, J. (2009). More is not always better: cost-effectiveness analysis of combined single behavioral and single physical rehabilitation programs for chronic low back pain. *European Journal of Pain, 13,* 71-81.

Smith, C., Ganschow, P., Reilly, B., Evans, A., McNutt, R., Osei, A., et al. (2000). Teaching residents evidence-based medicine skills: a controlled trial of effectiveness and assessment of durability. *Journal of General Internal Medicine, 15*(10), 710-715.

State University of New York (SUNY) Health Sciences Center at Brooklyn. Guide to research methods: the evidence pyramid. Available at: http://servers.medlib.hscbklyn.edu/ebm/2100.htm. Accessed June 27, 2014.

Staal, J., Hlobil, H., Twick, J., Smid, T., Koke, A. & van Mechelen, W. (2004). Graded activity for low back pain in occupational health care: a randomized controlled trial. *Annals of Internal Medicine, 140* (2), 77 - 85.

Steenstra, I., Anema, J., Bongers, P., de Vet, H., Knol, D., & van Mechelen, W. (2005). The effectiveness of graded activity for low back pain in occupational healthcare. *Occupational and Environmental Medicine, 63*(11), 718-725.

Stern, J., & Simes, R. (1997). Publication bias: evidence of delayed publication in a cohort study of clinical research projects. *British Medical Journal, 315,* 640-645.

Sumison, T. (1997). Client centered implications of evidence-based practice. *Physiotherapy, 83*(7), 373-374.

Tarasuk, V., & Eakin, J. (1994). Back problems are for life: perceived vulnerability and its implications for chronic disability. *Journal of Occupational Rehabilitation, 4,* 55-64.

ter Riet, G., de Craen, A., de Boer, A., & Kessels, A. (1998). Is placebo analgesia mediated by endogenous opioids? A systematic review. *Pain, 76*(3), 273 - 275.

Threlkeld, A., Jensen, G., & Royeen, C. (1999). The clinical doctorate: A framework for analysis in physical therapy education. *Physical Therapy, 79*(6), 567-581.

Troup, J. (1988). The perception of musculoskeletal pain and incapacity for work: prevention and early treatment. *Physiotherapy, 74,* 435-439.

Turk, D. (1996). Biopsychosocial perspective on chronic pain In R. J. Gatchel, and Turk, Dennis C (Ed.), *Psychological approaches to pain management: A practioner's handbook* (pp. 3-32). New York: Guilford Press.

Turk, D., & Flor, H. (1999). Chronic pain: a biobehavioral perspective. In R. Gatchel & D. Turk (Eds.), *Psychosocial Factors in Pain*. New York: Guilford Press.

Turk, D., Meichenbaum, D., & Genest, M. (1983). *Pain and behavioral medicine: A cognitive-behavioral perspective.* New York: Guilford Press.

Turk, D. C., & Monarch, E. S. (2002). Biiopsychosocial perspective on chronic pain. In D. C. Turk, & Gatchel, Robert J (Ed.), *Psychological Approaches to Pain Management* (pp. 3-29). New York Guilford Press.

Turner, J. (1982). Comparison of Group progressive-relaxation training and cognitive-behavioral group therapy for chronic low back pain. *Journal of Consulting and Clinical Psychology, 50*(5), 757-765.

Turner, P. & Whitfield, T. (1997). Physiotherapists' use of evidence-based practice: a cross national survey. *Physiotherapy Research International, 2*(1), 17-29.

Turner, P. & Whitfield, T. (1999). Physiotherapists' reasons for selection of treatment techniques: a cross national survey. *Physiotherapy Theory and Practice, 15*, 235-246.

Twomey, L. (1990). A growing commitment to research and evaluation. *Australian Journal of Physiotherapy, 36*, 83.

United.States.Census.Bureau. (2010). 2010 Census Data. Retrieved 12-18-10

van der Giessen, R., Speksnijder, C., & Helders, P. (2012). The effectiveness of graded activity in patients with non-specific low back pain: a systematic review. *Disability & Rehabilitation 34*(13), 1070 -1076.

van den Hoogen, H., Koes, B., & van Eijk, J. (1998). On the course of low back pain in general practice: a one-year follow up study. *Ann Rheum Dis, 57*, 13-19.

van der Roer, N., van Tulder, M., Barendse, J., Knol, D., van Mechelen, W., & de Vet, H. (2008). Intensive group training protocol versus guideline physiotherapy for patients with chronic low back pain: a randomized controlled trial. *European Spine Journal, 17,* 1193-1200.

van der Wouden, J. & MacAuley, D. (1998). Use of READER method of critical appraisal in general practice. *British Medical Journal, 317,* 819.

van Tulder, M., Koes, B., & Bouter, L. (1997). Conservative treatment of acute and chronic nonspecific low back pain: A systematic review of randomized controlled trials of the most common interventions. *Spine, 22*(18), 2128-2156.

Vgotsky, L. (1978). *Mind in Society,* Cambridge, MA; Harvard University Press.

Vlaeyen, J., de Jong, J., Geilen, M., Heuts, P., & van Bruekelen, G. (2002). The treatment of fear of movement/(re)injury in chronic low back pain: Further evidence on effectiveness of exposure in vivo. *The Clinical Journal of Pain, 18,* 251-261.

Vlaeyen, J., & Linton, S. (2000). Fear-avoidance and its consequences in chronic musculoskeletal pain: A state of the art. *Pain, 85,*317-332.

Waddell, G., Feder, G., & Lewis, M. (1997). Systematic reviews of bed rest and advice to stay active for acute low back pain. *British Journal of General Practice, October,* 647-652.

Waddell, G. (2004). *The back pain revolution* (2nd ed.). Edinburgh: Churchhill Livingstone.

Wakefield, A. Evidence-based physiotherapy: A case for pragmatic randomized controlled trials. *Physiotherapy, 86*(8), 394-396.

Wakiji, E. (1997). Mapping the literature of physical therapy. *Bull Medical Library Association, 85,* 284-288.

Walid, M., Donahue, S., Darmohray, D., Hyer, L., & Robinson, J., (2008). The fifth vital sign - what does it mean? *Pain Practice, 8*(6), 417-422.

Walker-Dilks, C. (2001). Searching the physiotherapy evidence-based literature. *Physiotherapy Theory Practice, 17,* 137-142.

Wasiak, R., Kim, J., & Pransky, G. (2006). Work disability and costs caused by recurrence of low back pain: longer and more costly than in first episodes. *Spine, 31*(2), 219-225.

Wentz, R. (2002). Visibility of research: FUTON bias. *Lancet, 360,* 1256.

Woods, M., & Asmundson, G. (2008). Evaluating the efficacy of graded in vivo exposure for the treatment of fear in patients with chronic low back pain: a randomized controlled trail. *Pain, 136,* 271-280.

Woolf, C. (2007). Central sensitization: uncovering the relation between pain and plasticity. *Anesthesiology, 106*(4), 864-867.

www.APTA.org. (2010). Who are Physical Therapists?

www.NATA.org. (2009). FACTS about Athletic Trainers and the National Athletic Trainers' Association.

Zusman, M. (1997). Instigators of inactivity intolerance. *Manual Therapy, 2,* 75-86.