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Abstract

Low back pain affects over 80% of the population impacting their quality of life and causing both disability and loss of work productivity. Acute low back pain is seen as a "favorable" prognosis yet many patients continue to suffer from chronic low back pain. Psychological barriers such as fear-avoidance beliefs have been shown to be a contributing factor in low back pain rehabilitation and chronicity. This project was designed to evaluate if fear-avoidance was a health determinant that affects how primary care providers create treatment plans and to explore the relationship between fear-avoidance beliefs with physical therapy outcomes. Specifically, the purpose of this scholarly project was to determine if there was an association between fear-avoidance beliefs and the use of medication, duration of physical therapy treatment, initial functional ability, and overall functional change following physical therapy in patients with acute low back pain. In this cross-sectional study, a retrospective, convenience sample of 6,528 individuals with acute low back pain of less than three months were evaluated. The results show that high fear-avoidance beliefs were significantly associated with the use of prescription medication, decreased functional ability score, and decreased overall functional score change following physical therapy treatment. Prescription medication was also demonstrated to be a significant predictor of functional ability prior to physical therapy. This study's results suggest that fear-avoidance beliefs were an important predictor of clinical outcomes. Clinical implications include considerations for fear-avoidance beliefs in patients with acute low back pain when assessing and creating treatment plans.

Keywords: Low back pain, acute pain, fear-avoidance beliefs, physical therapy

Introduction and Background

Low back pain is an epidemic health dilemma that negatively impacts quality of life. In the United States, it is one of the most common reasons that patients visit their primary care providers and is the second leading cause of disability (Freburger et al., 2009; Qaseem, Wilt, McLean, & Forciea, 2017). Due to the prevalence of low back pain, a large volume of research exists related to its diagnosis and management. In fact, Freburger et al. (2009) suggest that over 80% of the population will endure low back pain at least once in their lifetime. According to the World Health Organization (2013), low back pain remains in the top 10 illnesses and injuries that contribute to the largest amount of disability-adjusted life years. In addition, low back pain also negatively affects the United States economy. Studies estimate that 149 million working days are lost annually along with an annual loss of 100 to 200 billion dollars due to low back pain alone (Freburger et al., 2009; Qaseem et al., 2017; World Health Organization, 2013).

Various circumstances contribute to the cause of low back pain, both physically and psychologically. Illnesses, injuries, and occupational demands are a few examples of physical causes. Psychological factors that affect an individual's pain perception and even predict long-term disability include fear-avoidance beliefs, depression, anxiety, health locus of control, and coping-mechanisms (Fritz & George, 2002). Psychosocial factors continue to affect a patient's recovery; literature supports that clinicians should create low back pain treatment plans based upon a biopsychosocial approach since it ultimately influences a patient's response to treatment and rehabilitation (Snodgrass, 2011; Waddell & Burton, 2001).

Problem Statement

High fear-avoidance in patients with low back pain is related to disability and poor physical health, yet the majority of the research on fear-avoidance beliefs falls within the scope of

practice for physical therapy (Sions & Hicks, 2011). Published research has changed physical therapy guidelines, treatment plans, and education on how to provide effective care. Physical therapists have established interventions to overcome not only physical barriers for recovery but also psychological barriers such as fear-avoidance. Physical therapists treat patients based upon the idea that a biopsychosocial approach is effective for recovery. More research needs to be conducted on fear-avoidance beliefs and how primary care providers respond to patients with acute low back pain and establish treatment plans.

Purpose

The overarching aim of this project was to determine if fear-avoidance was a health determinant that affects how primary providers create treatment plans and to explore the relationship between fear-avoidance beliefs with physical therapy outcomes. Fear-avoidance plays a role in how patients respond to rehabilitation and this project's objective was to determine if objectively assessing a patient's fear-avoidance beliefs could influence providers' practice.

The specific purpose of this scholarly project was to determine if there was an association between fear-avoidance beliefs and the use of medication, duration of physical therapy treatment, initial functional ability, and functional change following physical therapy in patients with acute low back pain of less than three months duration. Based on literature review, it was hypothesized that patients with a high fear-avoidance score would be prescribed more medication than patients without high fear-avoidance beliefs. It was also hypothesized that a high fear-avoidance beliefs score would correlate with an increased amount of treatment episodes for acute low back pain at physical therapy, a lower functional score prior to physical therapy, and a greater functional change following physical therapy.

Review of Evidence

Fear-avoidance belief is a psychological barrier that influences patients' recovery and disease management. Fear-avoidance is the behavior individuals demonstrate as a manner to avoid specific activities or positions based upon their fear that it will cause pain (Panhale, Gurav, & Nahar, 2016). "Fear of pain and what we do about pain may be more disabling than pain itself" (Waddell, Newton, Henderson, Somerville, & Main, 1993, p. 164). In fact, the national guidelines for diagnosing and treating low back pain recommend that providers should "include assessment of psychosocial risk factors, which predict risk for chronic disabling back pain" (Chou et al., 2007, p. 478).

Fear-avoidance belief was first established in patients with chronic low back pain, but acute low back pain associations have emerged within the literature. In patients with acute low back pain, fear-avoidance beliefs has been demonstrated to have a predictive value in determining which patients would return to work without restrictions, and fear-avoidance beliefs were significantly higher in patients who experienced work absenteeism and reduced work productivity (Fritz & George, 2002; Mannion et al., 2009). George, Fritz, and McNeil (2006) found that changes in fear-avoidance beliefs were associated to changes in both disability and lumbar flexion. Other researchers demonstrated that primary care providers who perceived their patients to have higher physical activity and work-related fear-avoidance beliefs significantly recommended imaging more frequently (Gremeaux, Coudeyre, Viviez, Bousquet, & Dupeyron, 2015). A higher physical activity fear-avoidance belief has also been associated with significantly more recommendations to rest in patients with acute low back pain, which is contradictory to national guidelines (Gremeaux et al., 2015; Qaseem et al., 2017).

National evidence-based guidelines and treatment protocols have been established to provide a framework for health care providers to systematically provide the most effective and efficient quality care as possible (Qaseem et al., 2017). Previously established guidelines illustrate assessment tools, 'red flags' or warning signs to look for, indications for diagnostics, and management including medication, non-pharmacological therapy, and education (Chou et al., 2007; Qaseem et al., 2017). However, several studies have illustrated how guidelines are not rigorously utilized, which can reduce the quality and increase the cost of care (Graves, Fulton-Kehoe, Jarvik, & Franklin, 2014; Hush, 2008; Mafi, McCarthy, Davis, & Landon, 2013).

Prescription medication is one option in the management of low back pain; however, according to national guidelines, patients with acute and subacute low back pain should first be treated with non-pharmacological therapy (Qaseem et al., 2017). The World Health Organization (2013) stated that providers are rarely assessing the causative agent for low back pain and it is the norm for providers to immediately treat with pain medications. Patients who were prescribed opioids prematurely when compared to guidelines were statistically at higher risk of undergoing low back surgery within two years (Webster, Verma, & Gatchel, 2007). Continued opioid use was positively correlated to both an increased duration and increased recurrence of disability (Cifuentes, Willetts, & Wasiak, 2011; Webster et al., 2007). In fact, "nonsteroidal anti-inflammatory drugs (NSAIDs), skeletal muscle relaxants, antidepressants, and opioids" are the most frequently prescribed pharmacological therapies for low back pain (Chou et al., 2017, p. 480).

In the 2017 clinical practice guideline from the American College of Physicians, treatment plans for acute low back pain include education, recommendation to remain active, options regarding self-care, superficial heat, "massage, acupuncture, or spinal manipulation"

(Qaseem et al., 2017, p. 521). Pharmacological interventions should be considered if "desired" based on patient preferences and medication-associated risks; NSAIDs and skeletal muscle relaxants are recommended as first line medications (Qaseem et al., 2017, p. 521). Clinicians are also advised to educate patients about their "generally favorable prognosis of acute low back pain" (Qaseem et al., 2017, p. 521). However, about 20% of patients who suffer from acute low back pain will progress and endure chronic low back pain with continual symptoms for up to at least one year (Panhale et al., 2016). Various psychological factors have been demonstrated to play a significant role in the progression of pain problems; however, there is no current inclusion of specific interventions to address psychological barriers associated with acute low back pain (Panhale et al., 2016; Qaseem et al., 2017). A systematic review indicated that the following nonpharmacological therapies had insufficient evidence to determine their effectiveness: "transcutaneous electrical nerve stimulation (TENS), electrical muscle stimulation, inferential therapy, short-wave diathermy, traction, superficial cold, motor control exercise (MCE), Pilates, tai chi, yoga, psychological therapies, multidisciplinary rehabilitation, ultrasound, and taping" (Qaseem et al., 2017, p. 518).

Theoretical Model

The social cognitive theory provided the theoretical framework and described the underpinnings for the purpose and application of this scholarly project. The theory was created by Albert Bandura in 1986 but multiple additions and modifications have been integrated (Butts & Rich, 2015). It was chosen for this project because of its core concepts and the belief that a reciprocal interaction exists between individual internal factors, behavior, and environmental influences (Hammer, Degerfeldt, & Denison, 2007). The theory is comprised of a combination of concepts including cognitive, behavioral, and emotional models that are necessary to produce

a behavior change (Butts & Rich, 2015). Several of the theory's key constructs are applicable to health behavior specifically including observational learning, reinforcement, self-efficacy, behavioral capability, and outcome expectations (Butts & Rich, 2015; LaMorte, 2016). Moreover, health behavior interventions and modifications are often based on the social cognitive theory (Butts & Rich, 2015).

Each of the three components of the social cognitive theory's foundation as well as its constructs is applicable to both patients and primary care providers in this project. Concepts within the social cognitive theory help describe contributing factors of a patient's fear-avoidance belief in activity and work performance; some factors include self-efficacy, risk perception, expectations, past experiences, fitness level, motivation, perceived physical impairment, and outside influences (Bandura, 2004). The social cognitive theory also provides clinicians a structure to assess barriers to treating patients based upon a more biopsychosocial approach. This includes assessing their own behavioral capability such as knowledge and clinical practice, reinforcement from other providers in the community, and access to additional health care modalities such as physical therapy (Bandura, 2004).

The social cognitive theory is widely used in health care because it focuses on accomplishing a specific health behavior but also sustaining that behavior long-term (LaMorte, 2016). A goal for both patients and providers is to determine an effective treatment plan for acute low back pain in order to achieve sustaining results. As health care evolves and more emphasis is placed on prevention, primary care providers have the opportunity to assess the patient as a holistic being and utilize multidisciplinary functions in order to mitigate acute low back pain and maintain healthy behaviors before it becomes a chronic health issue.

Application

The United States is in an era of opioid epidemicity. In fact, opioids along with NSAIDs, antidepressants, and muscle relaxants are the medicines that are most frequently prescribed to patients with low back pain (Chou et al., 2017). The social cognitive theory's constructs including outcome expectations and reinforcement play a role in how providers prescribe and how patients modify health behaviors (LaMorte, 2016). Factors included within the social cognitive theory's concepts such as knowledge, attitude, past experiences, perceived physical impairment, coping mechanisms, and cultural expectations influence a patient's view on prescription medication (Bandura, 2004). Factors that influence health care providers' practice include knowledge of guidelines, treatment options, attitude, routine clinical practice, and dissemination of national guidelines. Therefore, it was hypothesized that a high initial fear-avoidance beliefs score would be associated with increased medication usage.

The number of physical therapy treatments could be affected by patients' outcome expectations, motivation, past experiences, previous fitness level, self-efficacy, perceived physical impairment, access to the facility, and reinforcement (Bandura, 2004). These factors are incorporated into the social cognitive theory's concepts. Since evidence has also previously associated fear-avoidance beliefs with work loss and disability, it was hypothesized that a high initial fear-avoidance beliefs score would be correlated to an increased number of physical therapy treatments or visits (Fritz & George, 2002; George et al., 2006).

As stated in the original fear-avoidance beliefs questionnaire, "fear of pain and what we do about pain may be more disabling than pain itself" (Waddell et al., 1993, p. 164). Since evidence indicated that fear-avoidance and disability were associated and the social cognitive theory posed constructs of patients' self-efficacy and risk perception, it was hypothesized that a

high fear-avoidance beliefs score would be associated with a lower initial functional score (Bandura, 2004; George et al., 2006). Also, because evidence previously associated opioids with increased duration of disability and an increased recurrence of disability, prescription medication was hypothesized to be a variable associated with a lower initial functional score (Cifuentes et al., 2011; Webster et al., 2007). However, research has shown that physical therapy can not only improve patients' functional ability and pain intensity, but it also has treatment interventions to manage fear-avoidance beliefs (George, Bialosky, & Fritz, 2004; George, Fritz, Bialosky, & Donald, 2003). Therefore, it was hypothesized that a high final fear-avoidance beliefs score would be associated with an increased overall functional score change. Factors from the social cognitive theory that influence functional ability include attitude, previous fitness level, and perceived physical impairment (LaMorte, 2016). To control for age and gender, both demographic variables were included in the linear regression analyses evaluating initial functional score and overall functional score change.

Project Design

Clinical Setting

The project leader collaborated with a physical therapy practice in the southeastern United States. This physical therapy franchise utilizes manual therapy as a treatment tool, and the physical therapists treat pain disorders, injuries, and facilitate recovery following surgery. Focus on Therapeutic Outcomes, Inc. (FOTO) was used as an instrument to gather data. It is a company that is utilized among 4,700 rehabilitation clinics (FOTO, 2017b). Their data system collects, measures, and evaluates rehabilitation outcomes and then FOTO provides feedback to clinicians in order to establish patient-specific treatment plans (FOTO, 2017b). The

collaborating southeastern physical therapy practice uses FOTO's patient data services within their clinic.

Project Population

Individuals with acute low back pain of less than three months duration was the major subject identifier. In this scholarly project, acute low back pain was operationally defined as pain of less than three months duration. Qaseem et al. (2017) defined acute low back pain as pain "lasting less than 4 weeks, subacute back pain lasts 4 to 12 weeks, and chronic back pain lasts more than 12 weeks" (p. 514). In the United States national low back pain treatment guidelines of 2017, acute and subacute pain is treated with the same protocol (Qaseem et al., 2017). Therefore, to improve future practice, length of time for acute and subacute pain was combined into 'acute'. Acute was also chosen as a pain descriptor in hope to prevent future low back pain chronicity and disability.

For inclusion into this scholarly project, criteria for patient eligibility was predetermined prior to gathering data. Inclusion criteria was as follows: individuals ages 18 to 65 years old, first referral to physical therapy, and ability to read and write in English. Exclusion criteria included patients who suffered back pain lasting longer than three months and who previously received treatment for this condition. Chronic low back pain, pain that lasts longer than three months, requires a different approach for treatment and diagnostic imaging by primary care providers (Qaseem et al., 2017).

The sampling criteria were chosen for specific reasons. The specific age range was chosen to include the most patients in this study without having vast variations in ability and development. Children and elderly patients were excluded since their treatment plans have the potential to be significantly adjusted compared to adults overall. Also, it was essential that

patients who had never been to physical therapy were analyzed. Previously received treatment could create bias for the patient and ultimately for the referring provider. Furthermore, FOTO's intake assessment and status assessment questionnaires can be completed by patients in English, Spanish, or French; however, this study was limited to English only to ensure language barriers between patients and physical therapists did not affect functional improvement.

Because data was collected retrospectively and there was no interaction with patients directly, informed consent was not necessary. Institutional review board approval was obtained from Belmont University. Data included patients who received treatment from the southeastern physical therapy practice from the years 2014 to 2016 to minimize additional variations.

Data Collection Process/Measurements

The scholarly project was an analytical, cross-sectional study. Data was gathered from a retrospective, convenience sample utilizing a large database, FOTO. Inclusion and exclusion criteria for patient eligibility were established by the project leader. The criteria was then provided to the collaborating southeastern physical therapy practice and FOTO in order to collect data. The southeastern physical therapy practice received the data based upon established criteria from FOTO and distributed the data to the project leader in a table format.

Included in the data set were patient demographics and patient outcome measures. Patient demographics were as follows: age, gender, primary language, and duration of pain prior to first treatment. The patient outcome measures included prescription medication for their low back pain, number of treatment episodes, initial functional status score, final functional status score, functional status change, initial fear-avoidance beliefs score, and final fear-avoidance beliefs score.

Sources of Data/Data Collection Instruments

The physical therapy practice in the southeastern United States consulted with FOTO to obtain the selected de-identified patient outcome measures from FOTO's database of previously collected patient information. For this scholarly project, FOTO captured and compiled the specified patient measures and distributed it to the collaborating southeastern physical therapy practice. Data was captured within patient-reported questionnaires. These questionnaires also incorporated instruments such as the fear-avoidance beliefs questionnaire to measure fear-avoidance beliefs and a spine-specific computerized adaptive testing to measure perceived functional ability (FOTO, 2017c).

Focus on Therapeutic Outcomes. Focus on Therapeutic Outcomes is a company that provides the largest outpatient rehabilitation data management system in the United States (Resnik, Liu, Mor, & Hart, 2008). It has developed into a standardized measurement and outcomes database that partners with rehabilitation and physical therapy clinics to promote patient-specific, quality treatment plans (Resnik et al., 2008; Sindhu et al., 2012). Not only does this electronic database system collect information on patients, it also gathers data on providers, clinical organizations, and services provided (Resnik et al., 2008). The survey tool the company utilizes contains standardized and validated computer-administered instruments for over 25 separate categories of assessments (FOTO, 2018; Swinkels et al., 2007). One study found that FOTO could be utilized for the purpose of quality assurance, health policy, research, benchmarks and comparison to nationally aggregated data, and marketing (Swinkels et al., 2007). Data from FOTO continues to be analyzed in research and has been "published in national and international scientific journals" (Swinkels et al., 2007, p. 158).

This scholarly project utilized FOTO's intake assessment and status assessment questionnaires. Patients completed the intake assessment on their first day at physical therapy before receiving treatment or the intake assessment was mailed electronically to patients prior to their first day at physical therapy (FOTO, 2017c). The assessment results were collected as a part of FOTO's computerized adaptive testing (CAT). The status assessments were completed in intervals at every four to six treatments and again on the last date of treatment provided by the physical therapy practice. Focus on Therapeutic Outcomes indicated that it is optimal to collect the final status assessment on the patient's final day of physical therapy or at least within seven days of the patient's last visit (FOTO, 2017c). Some of the variables captured specifically in the assessment survey for this scholarly project included age, gender, primary language, duration of pain prior to first treatment, and prescription medication for their low back pain. In regards to the specific prescription medication question included in the questionnaire, the patients could choose to select 'Yes' or 'No' (FOTO, 2017a). Duration of physical therapy treatment measured by the number of treatment visits was also collected by FOTO.

Fear-avoidance beliefs questionnaire. The fear-avoidance beliefs questionnaire is an instrument found within FOTO's assessments. The fear-avoidance beliefs questionnaire has been adapted and validated to fit certain research study designs, but the original fear-avoidance beliefs questionnaire was developed for patients with chronic low back pain (Waddell et al., 1993). The original questionnaire incorporates 16 statements; each statement is ranked from zero to six (George et al., 2006). The higher values correlate to a higher fear-avoidance (George et al., 2006). The questionnaire is divided into two different categories: fear-avoidance related to physical activity and fear-avoidance related to work activities (Waddell et al., 1993). Psychometric properties of this tool showed that an "average kappa of 0.74 was reported for the

individual items" (George et al., 2006, p. 199), internal consistency for the work subscale was α=0.88, and internal consistency for physical activity was α=0.77 (Waddell et al., 1993). An additional study tested the validity of the fear-avoidance beliefs questionnaire in patients with acute low back pain of less than four weeks. Test-retest stability for the entire questionnaire, including physical activity and work-related activities, demonstrated to be significantly reliable (Swinkels-Meewisse, Swinkels, Verbeek, Vlaeyen, & Oostendorp, 2003).

The FOTO assessment surveys specifically measured physical activity fear-avoidance (FOTO, 2017c). The initial assessment and status assessment surveys evaluated patients' fear-avoidance beliefs regarding physical activity by utilizing a single-item screening assessment tool (FOTO, 2017c). Using differential item functioning and item response theory methods, Hart et al. (2009) demonstrated that a single-item screening tool for fear-avoidance was accurate and efficient regardless of the neuromuscular impairment being treated. The original version of the fear-avoidance beliefs questionnaire referenced a patient's back within the screening questions; it was also demonstrated that "back" can be eliminated from the screening item and still be accurate (Hart et al., 2009). In FOTO's assessment survey, the computerized adaptive testing determined the number of items patients were presented based upon their answer; patients responded on a five-point Likert scale: completely disagree, somewhat disagree, unsure, somewhat agree, and completely agree (FOTO, n.d.). Using these screening questions, FOTO evaluated and modified the scores to be consistent with all other patient-specific functional scores; therefore, the scores ranged from 0 to 100. A higher score indicates a greater fear-avoidance that the patient was experiencing. An overall elevated or "high" score are scores greater or equal to 44 (FOTO, n.d.).

Lumbar computerized adaptive testing. A patient's functional status was measured using spine-specific computerized adaptive testing at intake and discharge. Computerized adaptive testing utilizes item response theory to calculate a score from 0 to 100; the higher the score, the higher the person's physical capabilities (Hart et al., 2011). This instrument has "internal consistency reliability (r= .92) and person separation (3.42)" for patients with lumbar spine syndromes (Hart et al., 2011, p. 1817). In Hart et al. (2011) study, the minimal clinically important improvement (MCII) values were utilized to determine if an individual improved or remained unaffected with treatment; each starting value at intake categorized the minimal values for change. The minimal improvement value was 9 for admission intake functional scores of 0 to 43; 5 for admission intake functional scores of 44 to 51; 3 for admission intake functional scores of 52 to 58; and 5 for admission intake functional scores of 59 to 100 (Hart et al., 2011).

In this scholarly project, patients' functional ability was evaluated before and after physical therapy treatment and was captured as a part of FOTO's patient inquiry intake and status assessments (FOTO, 2017c). The computerized adaptive testing utilized item response theory and pre-determined "stopping rules" to ensure the functional status score was accurate and the process was efficient (FOTO, 2017c; Ying-Chih, 2010). Minimal clinically important improvement values were also annotated within FOTO's summary to providers to indicate if the patient reached significant improvement in functional ability when comparing status assessment to initial assessment (FOTO, 2017c; Ying-Chih, Hart, Werneke, Stratford, & Mioduski, 2010). In order to be consistent with all other patient specific functional scores, FOTO scored functional status on a scale from 0 to 100 (FOTO, 2017c). The greater the functional status score, the greater functional ability the patient perceived (FOTO, 2017c).

Statistical Analysis

SPSS was used to perform statistical analysis including descriptive analysis, χ^2, ANOVA, correlations, independent t-test, and regression. Power was assessed Post hoc utilizing G*Power to establish a power at a $\alpha=0.05$, n(2654,3874), which determined this test to have a power = 0.98 to detect an effect size of 0.1 (Erdfelder, Faul, & Buchner, 1996).

Results

The population sample in this study included 6,528 participants. Of this sample, 2,587 (39.6%) were male and 3,941 (60.4%) were female. The average age of participants was approximately 45 years old with an average initial fear-avoidance belief score of 47.52. Descriptive statistics for the sample, medication, and non-medication groups are presented with group difference statistics (Table 1). There were no significant differences found.

An independent samples t-test was conducted to determine if medication was more prominent in patients with high initial fear-avoidance beliefs scores. Levene's test indicates heterogeneity F (3874, 2654) = 9.84, p = 0.002. There was a significant difference in the fear avoidance beliefs scores for the medication group (M=48.54 SD=21.98) and the non-medication group (M=46.04 SD=20.81) conditions; t (6526)=4.610, $p < .001$; d= 0.116. This supports the assumption. (See Table 2).

A correlation was run to assess the association for initial fear-avoidance beliefs with number of visits. Pearson's correlation coefficient was computed for initial fear-avoidance beliefs with number of visits. Results indicated that (r = .006, p = .627) they are not significantly correlated. This does not support the assumption. (See Table 3).

A linear regression model was constructed and executed to assess the impact of the initial fear-avoidance beliefs score on initial functional score. The use of prescription medication was

also included in the statistical analysis to determine its influence on initial functional score. Pearson and Point-biserial correlations were computed for regression variable (see table 4). Results indicate a significant relationship ($F(4,6523) = 162.785$, $p < .001$), with a R squared of .091. Initial fear-avoidance beliefs ($\beta = -.148$, $p < .001$) and medication ($\beta = -.244$, $p < .001$) were significant predictors of initial functional ability. (See Table 5).

A linear regression model was constructed and executed to assess the impact of the final fear-avoidance beliefs score on overall functional score change from beginning to end. Pearson and Point-biserial correlations were computed for regression variable (see table 6). Results indicate a significant relationship ($F(3,6524) = 95.164$, $p < 0.001$), with a R squared of .042. Final fear-avoidance beliefs score ($\beta = -.183$, $p < .001$) was a significant predictor of a patient's overall functional change. (See Table 7).

Discussion

Most of the research related to fear-avoidance beliefs has targeted its effect on patients with chronic low back pain. The objective of this study was to strengthen the limited number of studies regarding fear-avoidance beliefs in patients with acute low back pain and looked at it through a multidisciplinary lens including both primary care providers and physical therapy.

Based upon the statistical findings, this study found that patients who were prescribed medication had a significantly higher fear-avoidance beliefs score. No current studies can be found on the influence of fear-avoidance beliefs with initial prescription; however, one study demonstrated as the dosage of opioid medication increases patients had a higher fear-avoidance beliefs score (Morasco et al., 2017). That study was completed with participants who suffered any type of musculoskeletal pain and had received a 90-day opioid prescription (Morasco et al., 2017). The Centers for Disease Control and Prevention (CDC, 2017) stated that primary care

providers were responsible for almost 50% of the opioid prescriptions. The positive association between medication and fear-avoidance may be best explained with the help of the social cognitive theory and the current United States opioid epidemic. Factors such as outcome expectations, knowledge, attitude, motivation, past experiences, risk perception, coping mechanisms, and cultural expectations can all influence a patient's preference and desire for a medication (Bandura, 2004; LaMorte, 2016). However, participants in this study only had to indicate if they were on a prescription medication, not the type or number of prescriptions for the existing low back pain. Also, there is a problem of temporal ambiguity. Medication and initial fear-avoidance beliefs were measured prior to the first physical therapy treatment session. Ambiguity lies within the causal direction: did fear-avoidance beliefs influence clinicians' prescribing of medication or did the prescription prompt or enhance fear-avoidance beliefs regarding low back pain?

Patients with a higher initial fear-avoidance belief score demonstrated to have a significantly lower initial functional score. The final fear-avoidance belief score was also a significant predictor of overall functional score change. Supporting these results, Panhale et al. (2016) demonstrated that fear-avoidance in low back pain of at least three months was positively associated with physical impairments measured by the Back Performance Scale. "As the fear increases, the physical impairment is more and vice versa" (Panhale et al., 2016, p. 378). The Back Performance Scale measured physical impairment by evaluating daily activities including the "sock test, pick-up test, roll-up test, fingertip-to-floor test, and lift test" (Panhale et al., 2016, p. 376). Fear-avoidance was assessed using both the work and physical activity subscales. Similarly, George et al. (2006) demonstrated that fear-avoidance beliefs for physical activity was negatively associated to functional ability assessed by lumbar flexion. It was also demonstrated

that changes in fear-avoidance were predictive of changes in lumbar flexion and disability over a four-week period. Lumbar flexion was evaluated by physical therapists and disability was assessed utilizing the Oswestry Disability Questionnaire. The previous study examined patients with acute low back pain of less than 60 days and ages 18 to 55 years old in comparison to this study: acute low back pain of less than three months and ages 18 to 65 years old. Furthermore, the previous study indicated that "changes in lumbar flexion were correlated to changes in fear-avoidance beliefs and average pain intensity" (George et al., 2006, p. 199).

No current literature can be found regarding both prescription medication and functional ability, even though previous research has been conducted on pain intensity. Temporal ambiguity also affects medication and the initial perceived functional ability. Medication was prescribed before physical therapy; however, they were measured at the same time. Did prescription medication precipitate the patient's perception of their functional capabilities or did their presentation and history of functional capabilities influence clinicians' treatment plan to prescribe a medication?

The social cognitive theory reaffirms this study's findings amongst fear-avoidance with functional ability and medication. Fear-avoidance is a psychological factor that can influence patients' perceptions and their presentation at primary care clinics and physical therapy. Panhale et al. (2016) indicated the following:

> Psychological factors are a "sequence of processes starting with initial awareness of a noxious stimulus; then, cognitive processing, appraisal, and interpretation that lead people to act on their pain (i.e., their pain behavior). These processes are influenced by their consequences and are limited by the environment (e.g., cultural and social values)." (p. 378).

Furthermore, interpretation of pain is a result of "cognitive and emotional processing" that shapes individuals' behavior; this interpretation is influenced by emotional distress, expectations, beliefs, and attitudes (Panhale et al., 2016, p. 378). These descriptions depict each component of the reciprocal interaction between personal factors, behavior, and the environment of the social cognitive theory and factors that are integrated within the theory (Hammer et al., 2007). These factors can influence both patient perceptions and the interaction between patients and their health care providers.

Strengths and Limitations

Strengths of this study included a large sample size and validated measurement tools. 6,528 patients were evaluated and no missing data had to be accounted for during statistical analysis. In addition, all measurement tools were validated: fear-avoidance beliefs questionnaire, lumbar computerized adaptive testing, and FOTO's patient database. Also, few studies look at acute low back pain and medication.

Several limitations were present in this study and need to be considered when interpreting results. Secondary data was retrieved from a retrospective, convenience sample. Patient reported questionnaires were utilized; this relies on patients' understanding of questions and recall of information. A better measure for medication information could be gathered from chart review, insurance claims, or prescription details; measurement on type of medication, dosage, and when/who prescribed would also be more beneficial. Temporal factors may also influence results. The initial fear-avoidance beliefs score and medication were measured only prior to the first day of physical therapy, not during the visit to the primary care provider. Also, this study was only able to explain 9.1% and 4.2% of the variance for initial functional score and functional change, respectively. Furthermore, no causation was determined in this study, only association.

Implications

Psychological factors influence patients' rehabilitation and recovery. More education needs to be provided to nurse practitioners in primary care offices on psychological influences such as fear-avoidance, measurement tools available, and how to create treatment plans for musculoskeletal conditions. In addition to the Fear-Avoidance Beliefs Questionnaire, the STarT Back screening tool is an additional questionnaire that helps primary care providers stratify patients' risk in developing chronic low back pain (Robinson & Dagfinrud, 2017).

This study added to the limited research on fear-avoidance beliefs in patients with acute low back pain; however, current literature is lacking sufficient evidence concerning fear-avoidance beliefs with acute pain syndromes to prevent chronic and debilitating conditions. In order to not only mitigate low back pain from becoming chronic but also eliminate the need for unnecessary prescription medication, especially opioids, more research needs to be conducted on fear-avoidance beliefs and physical therapy as an early treatment modality for acute low back pain.

Conclusion

Low back pain is a multifactorial syndrome that requires a broad understanding of what pain is and how it can affect patients. Psychological factors and patient perceptions such as fear-avoidance beliefs alter patients' recovery and treatment plans. Nurse practitioners need to advocate for a different approach in treating patients with acute low back pain, which includes decreasing the use of medications, especially opioids, as first line treatment, getting patients active sooner, and considering an earlier referral to physical therapy. The ultimate goal for nurse practitioners is to create a treatment plan that will prevent patients from developing chronic back pain.

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Table 1
Sample Descriptive Statistics

Demographics	Sample	Medication	No Medication	Sig.
n(%)	6528(100)	3874(59.34)	2654(40.66)	
Age m(sd)	44.92(12.68)	45.14(12.27)	44.59(13.25)	F(1,6526) = 3.02; p = .082
Gender n(%)				$\chi^2(1) = 0.02$; p = .887
Male	2587(39.6)	1538(39.7)	1049(39.5)	
Female	3941(60.4)	2336(60.3)	1605(60.5)	

Table 2
Independent T-Test for Initial Fear-Avoidance Beliefs Grouped by Medication

	Medication			No Medication						
	M	SD	n	M	SD	n	t	df	p	95% CI
Initial FAB	48.54	21.98	3874	46.04	20.81	2654	4.66	5898	< .001	1.45; 3.55

Table 3
Pearson Correlation for Initial Fear-Avoidance and Number of Visits

	M(sd)	Initial FAB
Initial FAB	47.52(21.55)	
Visits	11.36(6.60)	r = .006, p = .627

*$p \leq 0.05$, **$p \leq 0.01$

Table 4
Pearson Correlation for Initial Functional Score, Age, Gender, Initial Fear-Avoidance Beliefs, and Medication

	M(std)	Initial FS	Age	Gender	Initial FAB
Initial FS	49.07(13.16)				
Age	44.92(12.68)	-.030**			
Gender†	0.40(.489)	.066**	-.019		
Initial FAB	47.52(21.55)	-.157**	-.071 **	.034**	
Medication†	0.59(0.491)	-.253**	.022*	.002	.057**

*$p \leq 0.05$, **$p \leq 0.01$ † Point-Biserial Correlations

Table 5
Linear Regression for Initial Functional Score

	β	t	*p*	F	*p*	95% CI
Constant		81.15	< .001	162.79	< .001	
Age	-0.034	-2.90	.004			-0.060; -0.012
Gender	0.070	5.96	< .001			1.27; 2.52
Initial FAB	-0.148	-12.45	< .001			-0.104; -0.076
Medication	-0.244	-20.66	< .001			-7.17; -5.93

Table 6
Pearson Correlation for Functional Score Change, Age, Gender, and Last Fear-Avoidance

	M(std)	FS change	Age	Gender
FS change	23.58(17.18)			
Age	44.92(12.68)	-.093**		
Gender†	0.40(0.489)	-.002	-.019	
Last FAB	47.52(21.55)	-.180**	-.024 *	.022*

*p ≤ 0.05, **p ≤ 0.01 † Point-Biserial Correlations

Table 7
Linear Regression for Functional Score Change

	β	t	*p*	F	*p*	95% CI
Constant		40.005	< .001	95.164	< .001	
Age	-0.097	-8.03	.004			-0.060; -0.012
Gender	0.000	-0.025	.980			1.27; 2.52
Last FA	-0.183	-15.05	< .001			-0.104; -0.076