DETERMINING THE EFFECTIVENESS OF NONPHARMACOLOGICAL TREATMENT MODALITIES FOR ADULT PATIENTS WITH CHRONIC LOW BACK PAIN: AN INTEGRATIVE REVIEW

An Integrative Review

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

Sydia Spence

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Scholarly Project Chair Approval:

Dr. Cynthia Goodrich, EdD, MSN, RN, CNE 03/29/2022

ABSTRACT

Chronic low back pain continues to be a major health issue, affecting a significant percentage of the population worldwide. It is one of the major contributors to long-term disability. People with ongoing and recurrent low back pain experience lowered quality of life, long-term disability, lost productivity, and medical costs due to urgent and emergency care visits. Pharmacological treatment modalities often present with serious safety concerns, ineffectiveness due to limited evidence-based studies, undesirable side effects, and the possibility of addiction. Therefore, many clinicians and patients seek alternative approaches to remedy persistent low back pain. Various nonpharmacological therapies have shown favorable results in studies for chronic low back pain treatment. The purpose of this integrative review is to analyze, summarize, and synthesize current literature on nonpharmacological treatment modalities of acupressure, acupuncture, cupping, massage, mindfulness, spinal manipulation, tai chi, therapeutic exercise, and yoga on the prevention and treatment of chronic low back pain. These nonpharmacological treatment options have been proven to be effective in many studies, but some studies lacked high-level evidence support.

Keywords: chronic low back pain, nonpharmacological treatment modalities

Copyright Page

Dedication

First and foremost, I want to give thanks to my God, because without his guidance and strength, this would not have been possible. Thank you, God, for the blessings that you have bestowed upon my life. I would like to dedicate this scholarly project in memory of my mother and daughter, who would have been elated by my accomplishment. To my husband, Wilton Spence, and my children, Kenia, Shadia and J'Sean: Your constant love, support, and encouragement gave me the motivation and strength to continue at times when it seems like it was not possible. I could not have accomplished this goal without you. Wilton, you were always in the background to help with the little things that were so instrumental for my success. My family, I love you dearly, and I share this accomplishment and the successful completion of this chapter of my life with you.

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List of Abbreviations

Chronic low back pain (CLBP)

Complementary and Alternative Medicine (CAM)

Cumulative Index to Nursing & Allied Health Literature (CINAHL)

Doctor of Nursing Practice (DNP)

Institutional Review Board (IRB)

Levels of evidence (LOE)

Nonsteroidal anti-inflammatory drugs (NSAIDs)

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

Randomized controlled trial (RCT)

SECTION ONE: FORMULATING THE REVIEW QUESTION

Chronic low back pain (CLBP) is a common and persistent musculoskeletal disorder that affects many people worldwide. The continued prevalence of CLBP is proof that there is a lack of understanding of this disorder and effective treatment modalities. This highly prevalent condition has a substantial impact on patients, as well as the health care system and society. Petrucci et al. (2021) and Saper et al. (2017) stated that up to 30% of the adult population worldwide suffer from CLBP, and between 50% and 80% of adults have at least one episode of CLBP during their lifetime. Drazin et al. (2016) and Dutmer et al. (2019) expressed that the societal costs of low back pain are approximately 1% to 2% of the gross national product, which equates to about $50 billion loss in productivity and total costs in excess of $100 billion per year. Low back pain is one of most common reasons for physician and emergency room visits in the United States. Drazin et al. (2016) emphasized that only about 2% to 5% of chronic low back patients seek medical treatment, resulting in an estimated 2.6 million visits each year. In fact, low back pain is the second leading cause of office visits (Polaski et al., 2021), absenteeism, and disability (Drazin et al., 2016). It contributes to physical and psychosocial problems; in addition, it has become a leading public health and economic dilemma, costing the US over $200 million per annum (Saper et al., 2017). The lifetime prevalence of CLBP is about 40% in adults (Comachio et al., 2020). Physicians, patients, and payers who have exhausted traditional treatment options are opting for novel therapies in complementary and alternative medicine (CAM) to alleviate this condition in patients. There are various nonpharmacological therapy treatment options that have been used with positive responses in reducing CLBP in adult patients.

Background

Use of Pharmaceuticals for Chronic Low Back Pain Management

CLBP is often managed through biomedical approaches (medications), mainly prescription opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, muscle relaxers, and systematic corticosteroids. The challenge amongst doctoral nursing practice primary care providers is choosing the best pharmacologic therapy by balancing the risks and benefits to manage the long-term symptoms of CLBP. Studies have shown that opioids, NSAIDs, and systemic corticosteroids provide minimal low back relief compared to placebos (Day et al., 2019). Furthermore, research has shown that pharmacological treatments such as opioids involve risks of serious side effects, such as addiction, sedation, and overdose.

Acetaminophen. Acetaminophen is well-known analgesic that is often used as the first-line drug therapy for patients with CLBP. However, its mechanism of action is uncertain, and some studies have shown that it is not more effective that placebo in controlling CLBP, and it is not recommended as a first-line treatment option (Ketenci & Zure, 2021).

NSAIDs. NSAIDs these are widely used for pain relief and inflammation reduction in adult patients with CLBP. Ibuprofen and naproxen are the most common over-the-counter analgesics used for CLBP. Gudin et al. (2020) stated that NSAIDs operate as nonselective cyclooxygenase inhibitors that synthesize the prostaglandins that are involved in the production of pain and inflammation. However, due to possibility of toxicity and risk of peptic ulcer disease and acute renal failure, NSAIDs are not recommended for long-term use in the treatment of CLBP.

Opioids. Long-term opioid therapy has become the gold standard for managing and treating chronic musculoskeletal pain, including CLBP, despite the paucity of high-quality

evidence about their benefits and risks. Krebs et al. (2018) indicated that the increasing rates of opioid overdose deaths have raised concerned about the use of opioids in the treatment of CLBP. These concerns are mainly due to the high morbidity and mortality rates associated with opioid use and the lack of evidence to support their effectiveness in addressing the symptoms CLBP. The management of patients with CLBP is complicated by contending comorbidities that decrease treatment options as well as by various patient (fear of ruinous side effects of medication) and provider (inadequate training) barriers. The insufficiency of high-quality randomized clinical trials has proven to be a significant barrier in CLBP management. According to Goldsmith et al. (2020), the guidelines for chronic musculoskeletal pain conditions like CLBP suggested the avoidance of opioid to control chronic pain and advocate for the use of non-drug therapies as first-line treatments.

The Centers for Disease Control and Prevention (2021) documented that opioid treatment should not be the first-line or usual therapy for CLBP. Prior to initiating therapy for CLBP, trained pain management health care professionals should institute realistic treatment goals with all patients for pain management and functioning. Clinicians should ensure that there is discussion about the discontinuation of opioids if the risks outweigh the benefits.

Systemic Corticosteroids. Corticosteroids comprise a class of medications that has effects like those of the adrenal hormone cortisol and acts as a potent anti-inflammatory agent. Corticosteroids can be injected directly into the vertebrae or administered systemically. They are one of the oldest long-term treatments for adults with CLBP. While systemic corticosteroids are effective short term for CLBP, the joint guidelines of the American College of Physicians and the American Pain Society advise against their long-term use because evidence-based studies

have not found them to be more effective than placebos (Chou et al., 2007; Pangarkar et al., 2019).

Use of Complementary and Alternative Medicine/Non-Pharmacological Treatment in Chronic LBP

Despite its prevalence, health care and societal costs, and decreased quality of care, CLBP continues to be mismanaged. Falci, et al., (2016) stated that people with persistent conditions tend to use nonpharmacological treatments for self-care and disease management, even with a paucity of evidence, because of the long-term and sedative effects of pharmacological methods. Nonpharmacological therapies are approaches that are not mainstream in conventional medicine and are usually used in conjunction with or instead of standard medical treatment. Qaseem et al. (2017) strongly recommended the use of mind-body therapy (mindfulness), exercise-based therapies (therapeutic exercise, yoga, and tai chi), biomechanical intervention therapy (massage, and spinal manipulation), and bio-energetic intervention therapy (acupuncture) in the treatment of CLBP. Nonpharmacological treatments are recommended as first-line options because they have fewer side effects than their pharmacological counterparts (Chou et al., 2007).

Defining Concepts and Variables

The conceptual and operational definitions of terms related to CLBP are important to this integrative review. According to Toronto and Remington (2020), a conceptual definition depicts the concept, while the operational definition portrays the concept in an observable and measurable way. The important variables that need to be defined for this scholarly project were CLBP and CAM. CLBP that has been present for longer than 12 weeks negatively affects the individual's quality of life and functionality regularly. CAM treatment modalities are

conceptually defined as nonpharmacological treatment regimens that tend to follow an Eastern medicine approach in the treatment of chronic back pain in adults. The terms *complementary and alternative medicine* and *nonpharmacological treatment modalities* are used interchangeably.

There are many different nonpharmacological therapies (see Appendix C) that are used effectively to treat adults with CLBP in the health sector, including mind-body therapy (mindfulness), exercise-based therapies (therapeutic exercise, yoga, and tai chi), biomechanical intervention therapy (massage, and spinal manipulation), and bio-energetic intervention therapy (acupuncture, acupressure and moxibustion). *Low back pain* refers to pain that targets the lumbar area of the spine. It affects people of all ages and is a striking supporter of various maladies and the health care burden globally. According to Polaski et al. (2021), about one quarter of adults in the US have low back pain that needs to be treated. Low back is often classified as acute, subacute, or chronic and is treated based on duration of symptoms, cause, radicular symptoms, and abnormalities (Qaseem et al., 2017). Normally, acute low back pain is sudden and lasts less than four weeks, subacute low back pain lasts approximately four to 12 weeks, and CLBP lasts more than 12 weeks.

Mindfulness Meditation

Mindfulness meditation is a nonpharmacological mind-body therapy that assists the mind in becoming aware of the present moment through purposeful attention in a nonjudgmental manner. The principles and practices of mindfulness meditation have been proven to effectively reduce the symptoms associated with CLBP in adults (Luiggi-Hernandez et al., 2018).

Therapeutic Exercise

Therapeutic exercise programs are designed to strengthen the lower back muscles to promote stability and flexibility. Therapeutic exercise is an effective component of the

management of musculoskeletal pain such as CLBP. According to Kligler et al. (2018), guidelines from the American College of Rheumatology strongly recommend both stretching and muscle strengthening in the management of CLBP.

Massage

Massage is a manual alternative biomechanical intervention therapy used by licensed massage therapists to manipulate muscles and soft tissues to release stress and tension, provide symptoms relief, and support wellness. There are many types of massage that can be used in relieving CLBP symptoms. Trigger point massage relieves muscle spasms or knots in the back through the application of direct pressure to those areas. Deep tissue massage relieves tightness in spinal areas that are used repeatedly during the day for sitting, standing, or walking. Bellido-Fernández et al. (2018) stated that the application of massage therapy in patients with chronic nonspecific low back pain showed a reduction in the level of pain, increased lumbar spine mobility, and disability improvement.

Spinal Manipulation

Spinal manipulation is a hands-on non-drug treatment therapy that is administered by specialists such as chiropractors, osteopathic physicians, and physical therapists to mobilize and manipulate the spinal column. Mobilizations are passive movements within the control and range of motion of the patient that utilize low-grade velocity to improve mobility in areas that are restricted such as joints, connective tissues, or muscles. The removal of the restrictions by mobilization reduces the source of the pain and leads to symptomatic relief for the patient. Manipulation is a common technique that utilizes a high-velocity, low-amplitude thrust over the restricted areas. This results in an audible cracking or popping sound emerging from cavitation

of the joint. Rubinstein et al. (2019) reported that spinal manipulative therapies provided effective short-term relief for CLBP adult patients.

Cupping

Cupping is an ancient Eastern medicine therapy that has been used for thousands of years to treat chronic pain. Volpato et al. (2020) stated that dry cupping has been used effectively in the last decade to treat painful conditions, an assertion that is supported by systematic clinical trials. Cupping therapy uses cups, mainly made from glass or silicone, attached to the skin to create a suction. This suction assists with the reduction of pain, and inflammation, and improvement of blood flow, thus optimizing relaxation and well-being. Cupping a cost-effective treatment option with few adverse effects, fast results, and application simplicity in patients with CLBP.

Acupuncture

Acupuncture is an element of traditional Chinese medicine that is used by licensed acupuncturists and chiropractors to relieve CLBP symptoms (Yu et al., 2020). Acupuncture can be used in conjunction with moxibustion and cupping. Acupuncture utilizes needles to rebalance the body's energy or *qi* through invisible channels and meridians. The needling process causes the body to release natural chemicals to fight the symptoms associated with CLBP, thus bringing relief to these areas.

Moxibustion

Moxibustion therapy is heat therapy that is used to strengthen the blood and stimulate the flow of qi. It is the burning of a special type of leaves, called *mugwort*, close to the area of pain to enhance healing. It is often used with acupuncture.

Acupressure

Acupressure is an ancient Asian healing art that uses the fingers to press certain points to energize the body's natural curative abilities. It helps to promote relaxation and wellness and treat diseases. Traditional Chinese practitioners use special acupressure points that lie on the meridian of the body or ear (auricular acupressure). It is believed that these invisible channels carry vital energy (qi) that connects with specific organs and heals the ailing body part. According to Yeh et al. (2016), auricular acupressure is a micro-acupuncture technique that uses botanical seeds or pellets along the ear to create acupuncture-like effects that stimulates the central nervous system through the cranial nerves on the ear auricle.

Tai Chi

Tai chi is a Chinese mind-body exercise therapy that is typically used to manage chronic pain conditions through a series of slow, focused movements accompanied by breathing and meditation. The involvement of slow motion and weight shifting may improve musculoskeletal strength and joint stability. Tai chi helps to improve body posture, which can reduce CLBP. Kligler et al. (2018) supported the use of tai chi as first-line treatment for CLBP.

Yoga

Yoga is an ancient nonpharmacologic Ayurvedic practice consisting of breathing techniques, physical postures, movement, and meditation/mindfulness techniques. These techniques are used to maintain back strength and flexibility, thus improving mobility and decrease symptoms of CLBP. Groessl et al. (2020) stated that randomized controlled trials (RCTs) of yoga practice for CLBP showed a reduction in pain, disability, and medication use in the general public.

Rationale for Conducting the Review

Even though pain is a signal mechanic that lets the body knows when there is something wrong that needs to be addressed to prevent tissue damage, CLBP is perceived by many as a discomfort that diminishes the quality of life and contributes to stress, insomnia, and mental health conditions such as depression and anxiety. There are many factors that may contribute CLBP such as lifestyle, improper sitting positions, and certain occupations. The rationale or purpose for conducting the integrative review is to identify articles that may fill the knowledge gap around the use of alternative medicine to treat CLBP in adults. The review questions were broadly focused to allow the inclusion of more articles focused on the use of alternative medicine in treating CLBP. The aim of this integrative review is to identify and review different alternative therapies that have been used to treat CLBP in adults and find the most effective method to treat this condition (Whittemore & Knafl, 2005).

Purpose of the Integrative Review

The aim of this integrative review is to examine different nonpharmacological treatment and management modalities for CLBP. The main goal of this integrative review is to provide a better understanding of this topic through synthesis of diverse sources (Toronto & Remington, 2020). This integrative review was conducted to look at nonpharmacological treatment options and their effects on CLBP. This integrative review provides an updated literature review on nonpharmacological options to apprise health care professionals on the current available data so they may make informed decisions during the management and treatment of patients with CLBP.

Review Questions

The following question was used as a guide for this integrative review: Are nonpharmacological treatment modalities (acupuncture, manipulative therapies, and mind/body

therapies) effective for the management and treatment of adults with CLBP? The following supportive questions were used as the focus of this integrative review:

1. Are manipulative therapies (therapeutic exercise, tai chi, chiropractic spinal manipulation, and massage therapy) beneficial?
2. What is the effectiveness of mind/body methods (yoga and mindfulness-based cognitive therapy) in treating CLBP?
3. Are acupuncture, acupressure, and cupping effective nonpharmacological treatment modalities for CLBP?

Integrative Review Goals

The goals of this integrative review were as follows:

- To present an integrative review with current evidence pertaining to the use of nonpharmacological treatment modalities for CLBP.
- To pinpoint gaps in present research.
- To raise awareness of different nonpharmacological treatment options for CLBP.
- To bring awareness for future research and inform practice.
- To provide education to patients, community population, and health care professionals on the use of different nonpharmacological treatment options for CLBP.

Formulate Inclusion and Exclusion Criteria

A systematic search strategy was used to locate the articles for this integrative review. The inclusion criteria for the literature review included studies written in English within the last six years (2015–2021), peer-reviewed articles, and studies focused on adult patients diagnosed with CLBP and complementary and alternative treatment modalities (see Appendix C). The age of the patients in the studies was not restricted; studies involved patients between the ages of 18

and 75. According to Toronto and Remington (2020), the application of a non-strict age range enables the inclusion of several significant studies that might have been otherwise excluded. However, a strict definition of CLBP was used to exclude other chronic pain conditions or other types of low back pain. The inclusion criteria also looked for RCT studies and systematic reviews that used adult patients, male or female, within the clinical setting. The use of research articles published with the past six years ensured that the most updated evidence was used. The database searches included Cumulative Index of Nursing and Allied Health Literature (CINAHL) with PLUS Full Text, Medline, ProQuest Nursing and Allied Health Database, and PubMed.

Conceptual Framework

The conceptual framework used to guide this integrative review was based on the methodology developed by Whittemore and Knafl (2005). The integrative review method permits the combination of diverse methodologies of past empirical and nonempirical research using a process of problem identification, literature search, data evaluation, and data analysis, which has direct applicability to clinical practice. This review comprehensively researched the complexities of CAM and reduction in CLBP in adults. The aim of this systematic integrative review is to examine research literature to identify the evidence that is available on the effectiveness of alternative medicine in reducing CLBP in adults.

SECTION TWO: COMPREHENSIVE AND SYSTEMATIC SEARCH

Search Organization and Reporting Strategies

A systematic integrative review was completed to conduct this review. The reviewer modified the integrative review question into a search strategy to identify and find relevant literature comprehensively and systematically. The conceptual framework used to guide this

integrative review was the methodology by Whittemore and Knafl (2005). This review comprehensively researched the complexities of CAM and reduction of CLBP in adults. This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

The university librarian was consulted for guidance on this literature search and recommended tools for literature organization. The Whittemore and Knafl (2005) methodological framework suggests addressing the concepts of integration in the following stages: problem identification, literature search, data evaluation, data analysis, and presentation. A literature search for all English-language original research studies on CLBP in adults that were treated using alternative medicine was conducted. The systematic database search included natural and controlled language and Boolean operator.

Terminology

Key words/terminologies that were used to locate these articles were *chronic low back pain, alternative medicine treatment therapies, Oriental medicine treatment, Chinese medicine treatment modalities, acupuncture, acupressure, massage therapy, mindfulness, cupping, moxibustion, therapeutic exercise, tai chi, yoga*, and *spinal manipulation.* The search was conducted using various nursing, allied health, medical, and interdisciplinary databases, such as CINAHL Plus with Full Text, ProQuest, EBSCO MEDLINE w/Full-Text (EBSCO), and PubMed Central. Date delimitators were set for the past six years only.

SECTION THREE: MANAGING THE COLLECTED DATA

The data were collected in accordance with guidance from Toronto and Remington (2020). A systematic comprehensive review was completed during the search process, and all retrieved articles were labeled. A planning timeline was initiated from the beginning of the

review that allowed this reviewer to design protocols for each step of the project. The timeline allowed for the selection of proper tools to make the process more efficient. A clear description of the evidence rating process informs the reader about the quality and rigor of the articles used in the review.

The screening, selecting, and sorting of the collected articles was a challenging and time-consuming process. The articles were screened by relevance using the corresponding eligibility criteria, then full-text articles were selected and sorted by study type. The PRISMA flowchart was used to show the flow of articles through the review process (Toronto & Remington, 2020). This flowchart (see Appendix E) contains the number of articles collected, screened, and selected. Screening for relevance is the process of discarding articles that are not relevant to the project. Abstracts were reviewed so the reviewer could discard articles that did not match all the required criteria and those that were not relevant.

The Melnyk level of evidence matrix was used to select the journal articles with high levels of evidence for this scholarly project. The screening process involved the review of 3,514 articles (titles and abstracts) for eligibility that focused on CLBP adult patients and nonpharmacological treatment options, including CAM modalities. After a thorough screening process and sorting, 122 articles remained for further abstract screening. The remaining articles were profiled in a Word document to identify the author, title, and inclusion and exclusion criteria for review. Toronto and Remington (2020) recommended a step by-step approach to screen by title, remove duplicates, and eliminate nonrelevant titles. The articles were screened by relevance, and finally sorted by study type. After applying the inclusion and exclusion criteria, only 22 articles remained. This information was captured using the literature matrix, the narrative inclusion and exclusion criteria, and the PRISMA flowchart (Appendix E).

SECTION FOUR: QUALITY APPRAISAL

Conducting an effective appraisal of the quality of the articles included within the integrative review is an important step in developing rigor and enhancing the integrative review. Whittemore and Knafl (2005) stated that due to the diversity of articles and literature that can be included in an integrative review, it is essential that the most relevant critical appraisal tool is selected. A transparent and consistent appraisal tool will improve the rigor of the integrative review. The application of the inclusion and exclusion criteria helped to eliminate inferior studies. All literature was assessed for quality prior to being used in the integrative review (Toronto & Remington, 2020). Methodological rigor is also important to the research quality.

Sources of Bias

Bias is possible at any stage of the integrative review. Toronto and Remington (2020) stated that the project leader should use measures to reduce bias in design and analysis so that the quality of the studies selected is not affected. Bias is anything that has the potential to distort the results of a study away from the truth. Bias has the potential to influence the believability and trustworthiness of the results. The method used to assess bias was transparent and reproducible. Common types of bias that may distort the truth are selection, measurement, attrition, and performance. In quantitative studies bias affects the reliability and validity of the study while in qualitative research, the trustworthiness may be affected by transferability, credibility, confirmability, and dependability. The utilization of Melnyk's levels of evidence requires an evaluation of the presence of bias and the strengths and limitations of the study (Melnyk & Fineout-Overholt, 2015).

Most of the studies included in the review identified limitations; however, there were two studies that did not address any limitations. One identified limitation of the studies used in this

integrative review was selection bias due to relatively small sample sizes that may not be reflective of the larger population (Bellido-Fernández, et al, 2018; Chen et al., 2020; Godley & Smith, 2020; Lemmon & Hampton, 2018; Polaski et al., 2021; Wellington, 2016 Yang et al., 2017). Performance bias was present in some studies due to lack of participant blinding during intervention (Comachio et al., 2020; Polaski et al., 2021). Other limitations of the selected studies included the lack of high-quality evidence to validate the efficacy, in order to recommend their use in guiding practice (Wu et al., 2015) and attrition bias due to lack of follow-up for some participants (Godley & Smith, 2020). The topic selected did not offer many studies with high levels of evidence due to the limited research that is currently available.

Internal Validity

Internal validity is the focus on risk of bias and believability of the results. It also refers to how close the results of the study are to the truth when achieved using proper scientific methods. Many of the studies used in this review had several biases that may compromise the internal validity of the integrative review. However, these studies were still used in the integrative review due to the limited number of studies available in this area. Individuals with CLBP tend to have limited physical performance and psychological problems (Polaski, et al, 2021). Various alternative treatment modalities have been used to provide improvement in care. These treatments have shown to promote benefits such as pain level reduction, increased low back mobility, disability improvement, and improvement of overall health and quality of life in patients with chronic non-specific low back pain.

Appraisal Tools

Both Whittemore and Knafl (2005) and Toronto and Remington (2020) agreed that there is no gold standard for the evaluation and appraisal of literature, but it is recommended that

evidence within the integrative review be critically appraised. It is a challenging task selecting the most appropriate critical appraisal tool to assess the literature for the integrative review. Toronto and Remington (2020) identified various appraisal tools that can be used; however, it is important to use the best critical appraisal tool for the specific integrative review because the use of various appraisal tools can lead to different conclusions about quality when applied to the same study.

The literature in the integrative review was critically appraised for methodological rigor using the Melnyk's level of evidence tool as seen in the literature matrix (see Appendix F). The level of evidence bases the appraisal of the quality of the articles on the study design and not on other factors of quality. The articles presented in the integrative review had various levels of evidence. Melnyk described seven levels of evidence, with Level 1 as the highest obtainable level (systematic reviews) and Level 7 as the lowest level (expert opinion). Twenty-two articles were included in this integrative review: 12 Level 1 studies, eight Level 2 studies, and two Level 6 studies. Each of the articles included in this review contributed relevant information toward answering the clinical question.

Applicability of Results

Each section of each study, including the title, abstract, introduction, design, sampling, data collection, ethical considerations, results, discussion, and relevance was analyzed (Toronto & Remington, 2020). After this rigorous process, the decision for article selection for the scholarly project was made using the inclusion and exclusion criteria. This process minimized obvious biases and increased transparency.

Reporting Guidelines

In an integrative review, due to biases that are present in research reports, the researcher should not assume that the quality of the research shows the quality of the research. The PRISMA flowchart was used to identify eligible articles for this research (see Appendix E). PRISMA is a reporting guideline that uses three phases (identification, screening, and inclusion) to identify relevant articles. The utilization of the PRISMA flowchart mitigates bias in this scholarly review. Toronto and Remington (2020) expressed that PRISMA is effective in increasing the quality and transparency of an integrative review.

SECTION FIVE: DATA ANALYSIS AND SYNTHESIS

Data Analysis Methods (Thematic Analysis)

The data analysis and synthesis stage of the integrative review process can be challenging because it calls for the synthesis of data from sources using different methodologies. Whittemore and Knafl (2005) stipulated that adherence to a methodological strategy at this stage is essential to mitigate potential bias. The selected articles for inclusion were summarized into an integrated article critique and leveling matrix about the use of nonpharmacological treatment modalities for CLBP to support the integration and interpretation of the body of literature (Toronto & Remington, 2020). It is important that the researcher is familiar with the definition of synthesis. It is a creative process that produces new ideas or concepts in addressing alternative treatment modalities in patients with CLBP.

The data analysis stage of the integrative review involves the categorization, ordering, and summarization of data from diverse sources with different levels of methodological rigor. Whittemore and Knafl (2005) stated that even though there is no definitive recommended data analysis method, the utilization of an inductive analysis will provide clarity, rigor, and

replicability. Thematic analysis was used for this review. Thematic analysis identifies, analyzes, and reports common patterns within the literature. The development of the article critique and leveling matrix consisted of the collection and recording of the data for each source to include the author, date, title, applicability for the purpose of the integrative review, sample characteristics, methodology used, limitations, and relevance. The literature summary is presented in a table format (Toronto & Remington, 2020; Whittemore & Knafl, 2005). The literature review seen in the matrix showed several positive outcomes of the use of alternative treatment therapies for CLBP. One main theme (nonpharmacological treatment modalities for CLBP) and 10 subthemes (acupuncture, acupressure with/without auricular, cupping, massage therapy/tui na, mindfulness, moxibustion, spinal manipulation, tai chi, therapeutic exercise, and yoga) were identified by the thematic analysis. Overall, the studies reviewed support the use of nonpharmacological treatment modalities for adults with CLBP.

Descriptive Results

Toronto and Remington (2020) stated that there are no established guidelines to structure the report of an integrative review and suggested that it is best to begin this section with a comprehensive description of the sample of literature used for the review. There were 22 studies included in the literature matrix (see Appendix F) of this review. Some articles discussed more than one nonpharmacological treatment modality for addressing CLBP (five of 15; 33%): Chou et al. (2017) conducted a systematic review study on exercise, tai chi, yoga, mindfulness, acupuncture, and spinal manipulative therapy as nonpharmacological treatments for CLBP. The article by Lemmon and Hampton (2018) is a low-level evidence study that provided excellent evidence to support this review by highlighting nonpharmacological treatments of CLBP. Qaseem et al. (2017) conducted a systematic review that provided excellent support evidence for

this review by outlining noninvasive treatments (acupuncture, massage, tai chi, yoga, mindfulness, and spinal manipulation) that have been used in CLBP. Wellington (2016) was a low-level descriptive study that provided excellent evidence to support the use of noninvasive and alternative treatments for the management of CLBP, including yoga, spinal manipulation, massage, acupuncture, and acupressure. Wong et al. (2017) depicted diverse noninvasive strategies for the management of CLBP through therapies like acupuncture, exercise, massage, and spinal manipulation, which provided an excellent flow of evidence to support this review. Two systematic reviews of RCTs (Chen et al., 2020; Zhu et al., 2020) discussed the effects of moxibustion on CLBP. Bellido-Fernández et al. (2018) conducted an RCT that looked at the effectiveness of massage therapy (tui na) in nonspecific CLBP that provided good evidence in support of this review. Comachio et al. (2020), Godley and Smith (2020), and Yeganeh et al. (2017) discussed the effectiveness and efficacy of acupuncture and acupressure in the treatment of CLBP and provided moderate quality evidence. Polaski et al. (2021) looked at the integration of meditation and exercise therapy in a randomized controlled pilot of a combined nonpharmacological interventions focused on reducing disability and pain in patients with CLBP. Saper et al.'s (2017) RCT examined the use of yoga for the treatment of CLBP.

Synthesis

This section discusses prevalent themes amongst the literature studies (see Appendix F) in answering the clinical question: Are nonpharmacological treatment modalities effective for the management and treatment of adults with CLBP?

Nonpharmacological Modalities for CLBP

Acupuncture

Several studies found that acupuncture has a significant effect in alleviating CLBP immediately after intervention by reducing pain and improving function (Comachio et al., 2020; Lemmon & Hampton, 2018; Qaseem et al., 2017). Comachio et al. (2020) showed positive outcomes in pain reduction and improvement of function and found acupuncture to be a powerful therapeutic agent to pain improvement within 15 to 20 minutes of intervention. Lemmon and Hampton (2018) found moderate quality evidence that supported the use of acupuncture for short-term pain reduction. Qaseem et al. (2017) found that for CLBP, acupuncture was associated with lower pain intensity and better functioning immediately after the treatment and up to 12 weeks when compared to the use of no acupuncture. This study also showed that when compared to NSAIDs, acupuncture provided greater pain relief. A systematic review by Chou, et al (2017) concluded that acupuncture is somewhat effective in the reduction of pain but did not improve functioning.

Acupressure and Auricular Acupressure

The studies by Godley and Smith (2020), Wellington (2014), Yang et al. (2017), and Yeganeh et al. (2017) found remarkable improvements in treatment outcomes after interventions that lasted until the next follow-up visit for some patients. Two studies on auricular acupressure (Godley & Smith, 2020; Yang et al., 2017) showed improvement in pain and functioning for up to six months. Godley and Smith (2020) found that auricular acupressure was more widely accepted by elderly patients above 65 due to the ease of self-administration, low cost, and low risk of adverse effects. The study also showed that the efficacy of the therapy did not change whether the acupressure was given by a therapist or self-administered. Yang et al. (2017)

illustrated that auricular acupressure may have favorable effects on CLBP when compared with other agents. Two studies on body acupressure (Wellington, 2014; Yeganeh et al., 2017) found notable improvements in patients' pain level and functioning. In a large study of 146 participants in Taiwan, Wellington (2014) indicated that a group receiving body acupressure reported significantly lower pain scores after a four-week treatment that were still significant at the six-month follow-up than the group receiving physical therapy. The study also showed improved functioning and improved pain levels at four-week and six-month follow-ups. The study by Yeganeh et al. (2017) suggest that acupressure provides a clinically beneficial effect compared with other treatments or sham treatments.

Cupping

An RCT by Almeida Silva et al. (2021) suggested that dry cupping has a significant positive impact on CLBP based upon an assessment of quality of life, pain intensity, functionality, and range of motion. There was reduction in pain intensity after the first intervention and, in some participants, up to four to eight weeks after treatment. The researchers believed that this positive effect on pain is accomplished by improvement in the local blood flow and supply to the treatment area, causing an activation of biological processes.

Massage

Massage therapy is one of the most studied techniques for CLBP and has been used worldwide for many years, with the oldest documented use occurring in China in 2700 BCE (Wellington, 2014). Several studies have shown the efficacy of massage therapy in patients with CLBP (Bellido-Fernández et al., 2018; Chou et al., 2007; Lemmon & Hampton, 2018; Qaseem et al., 2017; Wong et al., 2017). One study (Wong et al., 2017) recommended against the use of massage therapy for CLBP. Two studies (Chou et al., 2007; Qaseem et al., 2017) reported that

relaxation massage had small effects on short-term pain in patients. Chou et al. (2007) found that there was some evidence supporting the effectiveness of massage in treating CLBP, while Qaseem et al. (2017) found that foot massage did not show any improvements in pain. However, moderate-quality studies found that relaxation massage provided short-term pain relief. Also, low-quality evidence indicated that combining massage with acupuncture or exercise was superior to the intervention being used alone for short-term pain relief in adult patients with CLBP. The study by Bellido-Fernández et al. (2018) showed that the use of the traditional Chinese medicine therapeutic massage (tui na) had a more significant positive effect on pain and functional disability.

Mindfulness

Numerous studies have indicated the therapeutic effects of mindfulness and meditation (Chou et al., 2007; Day et al., 2019; Lemmon & Hampton, 2018; Luiggi-Hernandez et al., 2018; Polaski et al., 2021; Qaseem et al., 2017). A study by Lemmon and Hampton (2018) showed that amongst participants using mindfulness for pain conditions, there was a medium-sized effect on pain based on low-quality evidence. Two systematic reviews (Chou et al., 2007; Qaseem et al., 2017) found that mindfulness-based stress reduction is an effective treatment for CLBP. One study showed a small improvement in pain at 26 and 52 weeks and in function at 26 weeks compared with usual care (Qaseem et al., 2017). A study by Wellington (2014) found cognitive behavior therapy to be effective as a psychological intervention that improved pain intensity, pain-related interference, health-related quality of life, and depression. However, no study assessed which combination of modalities provided the best therapeutic outcomes. A systematic review by Luiggi-Hernandez et al. (2018) provided strong support of various ways that mindfulness meditation affects CLBP in older adults to make it more manageable. The three

identified themes were overcoming pain, pain awareness, and pain significance. All themes showed participants using mindfulness as a pain reduction technique (Luiggi-Hernandez et al., 2018). One RCT by Polaski et al. (2021) assessed the combined intervention effects of mindfulness meditation followed by aerobic walking exercise in patients with CLBP and illustrated that meditation and exercise together were able to increase mindfulness and decrease self-reported ratings of low back pain from baseline. Another RCT indicated that cognitive therapy, mindfulness meditation, and mindfulness-based cognitive therapy for CLBP were all associated with significant changes in pain control and pain catastrophizing to a similar degree.

Moxibustion

Two systematic reviews (Chen et al., 2020; Zhu et al., 2020) studied the effects and efficacy of moxibustion on CLBP, and both studies showed that moxibustion was more effective when used with acupuncture. Zhu et al. (2020) highlighted that traditional Chinese medicine practitioners believe that CLBP is caused by wind invasion, cold and moisture, and a sedentary lifestyle that causes blood stagnation. They believed that when moxibustion is used in combination with acupuncture, there is in an improvement in CLBP because the therapy clears the blood, relieves nerve root compression, promotes blood circulation in the waist, and eliminates edema by stimulating acupoints to relieve pain. When compared to Western medicine, moxibustion has a superior effect on CLBP and shows better effect when used with acupuncture. However, Zhu et al (2020) did not find any improvement when moxibustion was used with exercise and other interventions.

Tai Chi

Some studies tested the efficacy of tai chi on the treatment of CLBP (Chou et al., 2007; Kong et al., 2016; Lemmon & Hampton, 2018; Qaseem et al., 2017). All studies showed

reduction in pain level with the use of tai chi. An RCT study (Lemmon & Hampton, 2018) revealed that during a 12-week course of tai chi or physical therapy, tai chi was more effective for CLBP than regular physical therapy. Two studies provided low-quality evidence that support that tai chi resulted in moderate pain improvement, increased function, and decreased pain intensity at three- and six-month follow-ups (Chou et al., 2007; Qaseem et al., 2017). Kong et al. (2016) tested the effects of tai chi using three RCTs and found that it significantly reduced CLBP over 10-week, 24-week, and 28-week periods.

Spinal Manipulation

Manipulative therapy is regularly used amongst patients who participate in nonpharmacological treatment for CLBP. Various studies conducted on the use of spinal manipulation for CLBP illustrated good efficacy (Chou et al., 2007; Qaseem et al., 2017; Rubinstein et al., 2019; Yeganeh et al., 2017). Rubinstein et al. (2019) found in their systematic review that moderate-quality evidence suggests that spinal manipulative therapy results in effective short- and long-term pain relief and improved function. A robust RCT study of low quality was conducted by Yeganeh et al. (2017) and showed that when spinal manipulative therapy was compared with physical therapy in CLBP, spinal manipulative therapy was shown to be superior to physical therapy. However, Chou et al. (2007) supported that spinal manipulation resulted in minor pain relief but did not report on functioning, and Qaseem et al. (2017) stated that low-quality evidence showed no support of spinal manipulation for the treatment of CLBP while moderate quality evidence did not support the use of spinal manipulation for improving function and pain relief.

Therapeutic Exercise

Using exercise as a treatment therapy for CLBP can be effective when done properly (Chou et al., 2007; Nicolson et al., 2017; Polaski et al., 2021). Polaski et al. (2021) showed that low- to moderate-intensity exercise is effective in improving CLBP. Evidence illustrates that exercise therapy has the potential to decrease the burden associated with CLBP. In a systematic review of nine studies, Nicolson et al. (2017) showed that when a physiotherapist is present during exercise, patients are more compliant and there is an improvement in pain and functioning; individual high-quality studies also revealed that adherence to therapeutic exercise for CLBP may be effective. Overall, it was seen that no single exercise strategy was effective in improving CLBP. Low-quality evidence showed that the efficacy therapeutic exercise, like Pilates resulted in reduced pain but proved to be unclear on its effects on functioning (Qaseem et al., 2017). A previous study by Chou et al. (2007) did not show efficacy of exercise therapy for pain.

Yoga

Wellington (2014) stated that more than 14 million Americans practice yoga, with about one million using it as a treatment for CLBP. Some studies have shown that yoga is beneficial in relieving CLBP, and it is also a cost-effective and safe nonpharmacological treatment that can be used with pharmacological treatment options. Chou et al. (2007), Lemmon and Hampton (2018), Qaseem et al. (2017), Saper et al. (2017), Wellington (2014), and Wieland et al. (2017) illustrated the use of yoga for CLBP. Lemmon and Hampton (2018) showed, in a Cochrane review of 12 trials, moderate evidence of improvement in functionality, though of a small magnitude. Chou et al. (2007) found low-quality evidence supporting the efficacy of yoga for pain and function when compared with exercise therapy. Chou et al. (2007) evaluated 14 trial

studies and found that when compared to usual care, yoga was associated with lower pain scores and better function at short-term and long-term follow-ups, and Qaseem et al. (2017) showed similar effects in that low-quality evidence demonstrated that yoga resulted in moderately lower pain scores in the short term (less than 12 weeks) but not the long term (more than one year). When compared with regular exercise therapy involving stretching and strengthening back and leg muscles, yoga was found to have similar effect on pain relief and functional improvement (Wellington, 2014). One small study with about 80 participants compared an intensive one-week yoga routine with an intensive one-week residential exercise therapy program and found that there was a large improvement in low back pain and functionality. In a trial of yoga, physical therapy, and education, Saper et al. (2017) found that when yoga is used with physical therapy, participants had a meaningful improvement in function, and pain and some participants were more likely to discontinue the use of pain medications.

Ethical Considerations

The CITI training program (see Appendix A) and the Liberty Institutional Review Board (IRB; see Appendix B) were used by the project leader when conducting the research for this review. An IRB is a formal group that is created to review and monitor research involving human subjects. The CITI training program includes ethics courses for researchers embarking upon various projects. The Liberty University IRB approved this review and said that it is not classified as human subject research. This is an integrative review that does not include human participation and did not involve the collection of personal information; therefore, it was exempted. The approval letter from the IRB is available in Appendix B. The CITI training was successfully completed on September 13, 2021, by the project leader and was also completed by the project chair and is in effect until 2024 (see Appendix A).

Timeline

The completion of a final project is an academic requirement for graduation at the doctoral level. Embarking upon this journey requires strict adherence to proper time management skills to complete the challenging task. This integrative review was completed over four academic courses. The timeline shown below ensured timely completion of this scholarly project.

Task	Completion date
Pre-proposal approval	July 18, 2021
Article critique and leveling matrix	September 19, 2021
CITI training	October 15, 2021
Section One	November 5, 2021
Section Two	November 19, 2021
Section Three	December 3, 2021
Initial defense	December 16, 2021
IRB approval	December 17, 2021
Section Four	Jan 21, 2022
Section Five	February 18, 2022
Section Six	March 4, 2022
Final draft submitted to project chair	March 4, 2022
Final draft sent to editor	March 15, 2022
Final defense	By April 23, 2022
End of academic term	May 6, 2022

SECTION SIX: DISCUSSION

Summary of Evidence

The purpose of this review was to answer the clinical question: Are nonpharmacological treatment modalities (acupuncture, manipulative therapies, and mind/body therapies) effective for the treatment of adults with CLBP? The literature review emphasized that patients with CLBP could be treated with nonpharmacological treatment modalities (Chou et al., 2007; Qaseem et al., 2017). The purpose of this review was to identify various studies that addressed the use of alternative treatments rather than conventional medications for adult patients with CLBP. Numerous articles were evaluated, with some addressing the clinical question. Most

articles identified the use of a single alternative treatment option in managing and treating the symptoms of CLBP, such as moxibustion (Zhu et al., 2020) and tai chi (Kong et al., 2016). The findings from the studies showed that there is a need for more robust studies on the efficacy of nonpharmacological treatment options for these treatments to gain the acceptance of more conventional clinicians.

The information from the studies provided a better understanding of different nonpharmacological treatment options in treating CLBP in adults. It is well documented that acupuncture (Comachio et al., 2020), massage therapy (Bellido-Fernández et al., 2018), mindfulness (Luiggi-Hernandez et al., 2018), spinal manipulation (Yeganeh et al., 2017), therapeutic exercise (Nicolson et al., 2017), and yoga (Wellington, 2014) have been used in traditional clinical practices to treat and mange CLBP. This study has also shown that other treatment options like acupressure and auricular acupressure (Godley & Smith, 2020), cupping (Almeida Silva et al., 2021), moxibustion (Chen et al., 2020) and tai chi (Kong et al., 2016) have also been used in small studies to effectively treat and manage CLBP in adults.

Implication for Practice

The purpose of the Doctor of Nursing practice (DNP) degree is to prepare advanced practice nurses to perform research projects that will be used to optimize clinical practice and further the nursing profession. The DNP scholarly project aims to highlight the methodology that is used to deliver care to adult patients with CLBP and educate clinicians and practitioners in using CAM. The DNP Essentials (see Appendix G) were highlighted to pinpoint the applicability of foundational competencies of the advanced practice nurse in translating research into clinical practice. This integrative review plays an integral role in the implementation of nonpharmacological treatments for adult patients with CLBP. The project involved a rigorous

literature review that identified common themes that impacted pain relief and function in adult patients with CLBP. The goal of this integrative review was to determine the effects of nonpharmacological treatment modalities on CLBP in adult patients.

The literature review supports that nonpharmacological treatment modalities reduce pain and improve functionality. Large-scale evidence illustrated that many nonpharmacological therapies have a positive impact on the treatment of CLBP. Clinicians may use this information when considering the use of nonpharmacological treatment options as an alternative for pharmacological treatment in adult patients with low back pain. However, some of the studies in the integrative review identified the need for future research on nonpharmacological treatment modalities for CLBP because some of the articles provided low-quality evidence, and there are limited robust studies on nonpharmacological treatment of patients with CLBP. There was no identification of conflicting evidence in the review of the literature.

Dissemination

The final step in the integrative review process is the identification of various methods of dissemination. This integrative review will be sent to the Liberty University School of Nursing DNP committee for review. Upon approval, this integrative review will be submitted for publication in Scholars Crossing. This scholarly project will be shown as a poster presentation at the researcher's place of employment so that this information is readily available to primary care clinicians. Lastly, the project leader plans to communicate these results to the end users by submitting the article to the *Journal of Integrative and Complementary Medicine* and the *Journal of Holistic Nursing*.

Conclusion

Patients' and clinicians' dissatisfaction with the ineffectiveness of conventional medicine in reducing persistent and ongoing low back pain and the rising costs of health care paved the way for the use of CAM. This integrative review on the effects of nonpharmacological treatment modalities in adult patients with low back pain summarized past empirical literature and extracted data from diverse sources. The study demonstrated that nonpharmacological interventions are effective in reducing CLBP. The understanding of patients' symptoms and current health practices provides the basic of how to treat and manage patients' symptoms. Efforts to optimize patient care continue to be hampered by gaps in present research due to a paucity of robust studies.

This integrative review provides further awareness of the significance of nonpharmacological options in clinical practice. It showed the intricacies of alternative methods in dealing with pain symptoms. The use of these methods helps clinicians to have a broader treatment plan for managing the patient's pain. Multiple nonpharmacological strategies were highlighted that can be used to improve care and outcomes. Even though mindfulness was identified as a first-line treatment for CLBP, there remains a shortage of competent practitioners to provide behavioral intervention for these symptoms. Further and continued research is still needed to identify the best use and effects of nonpharmacological treatment interventions in the adult population, if they to be accepted as mainstream treatments.

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Appendix A

CITI Certificate

CITI PROGRAM

Completion Date 13-Sep-2021
Expiration Date 12-Sep-2024
Record ID 44953723

This is to certify that:

Sydia Spence

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

Social & Behavioral Research - Basic/Refresher
(Curriculum Group)
Social & Behavioral Researchers
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Liberty University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wcd4f136e-16f2-4166-96f7-d4740f37e5a7-44953723

Appendix B

IRB Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

December 16, 2021

Sydia Spence
Cynthia Goodrich

Re: IRB Application - IRB-FY21-22-537 NON-PHRAMACOLOGICAL TREATMENT MODALITIES FOR ADULTS WITH CHRONIC LOW BACK PAIN: AN INTEGRATIVE REVIEW

Dear Sydia Spence and Cynthia Goodrich,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your project with the data safeguarding methods mentioned in your IRB application.

Decision: No Human Subjects Research

Explanation: Your study is not considered human subjects research for the following reason:

It will not involve the collection of identifiable, private information from or about living individuals (45 CFR 46.102).

Please note that this decision only applies to your current application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.

Also, although you are welcome to use our recruitment and consent templates, you are not required to do so. If you choose to use our documents, please replace the word *research* with the word *project* throughout both documents.

If you have any questions about this determination or need assistance in determining whether possible modifications to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

Appendix C

Summary of Therapies

Functional Category	Therapy	Description of Therapy
Psychological/behavioral	Mindfulness/meditation	Use of focused attention in a non-judgmental manner
	Relaxation	Breathing techniques
Exercise therapy	Yoga	Combination of physical postures, breathing techniques and mental focus
	Tai Chi	Combination of slow movements coordinated breathing and focus
	Therapeutic exercise	Stretches or activities such as walking, or swimming done independently of in a group.
Manual	Acupuncture	The stimulation of acupoints on the body with fine needles
	Manipulative therapy	Manual adjustment of joints
	Massage	Manual application of pressure to muscles
	Cupping	The application of that causes a suction effect to the skin.

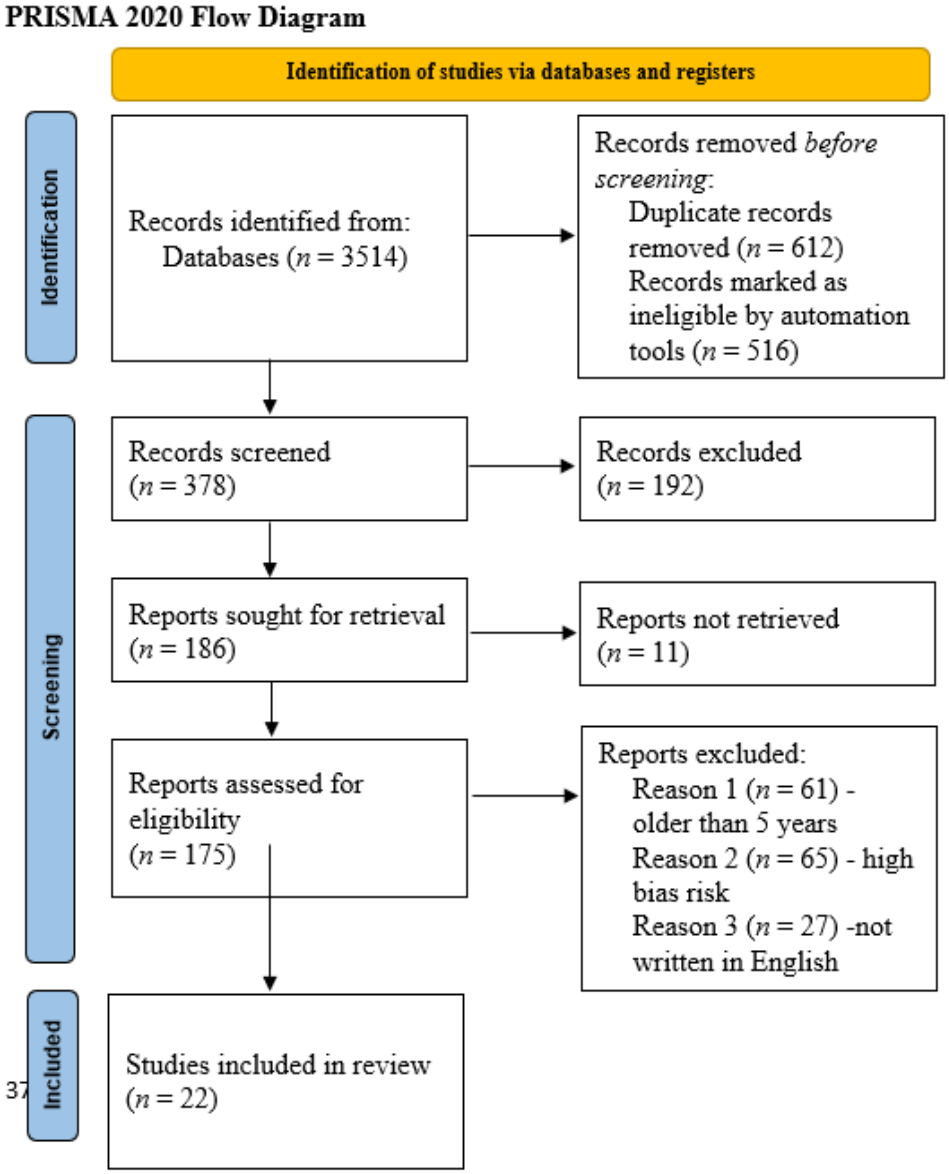
Appendix D

Inclusion an Exclusion Criteria Used for Literature Review

Inclusion	Exclusion
Peer reviewed articles	Articles which are not peer reviewed.
Articles written in the last six years	Articles older than six years
Articles that have adult patients diagnosed with chronic low back pain	Patients with acute or subacute low back pain; patients of pediatric population
Articles that discussed complementary and alternative treatment modalities	Articles that discussed conventional treatment modalities
Articles written in English	Written in foreign language

Appendix E

PRISMA Flow Diagram



Boutron, I., Hoffmann, T. C., & Mulrow, C. D. (2020). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ, 2021*(372), Article 71.

For more information, visit: http://www.prisma-statement.org/

Appendix F

Article Critique and Leveling Matrix Template

#	Article	Study Purpose	Sample	Study Design / Methods	Study Results	Level of Evidence (Melnyk)	Study Limitations	Would Use as Evidence to Support a Change?
1	Almeida Silva, H. J., Barbosa, G. M., Scattone Silva, R., Saragiotto, B. T., Oliveira, J. M. P., Pinheiro, Y. T., Lins, C. A. A., & de Souza, M. C. (2021). Dry cupping therapy is not superior to sham cupping to improve clinical outcomes in people with non-specific chronic low back pain: A randomized trial. *Journal of Physiotherapy (Elsevier)*, *67*(2), 132–139. https://doi.org/10.1016/j.jphys.2021.02.013	To evaluate the effect of dry cupping therapy on pain, physical function, trunk range of motion, quality of life and psychological symptoms in individuals with non-specific chronic low back pain.	Ninety individuals with chronic non-specific low back pain, aged from 18 to 59 years in 2 groups; dry cupping performed once a week for 8 weeks	RCT	The study showed that dry cupping was not more superior to the sham cupping provided to the placebo, in the improvement of pain in people with non-specific chronic low back pain.	Level 2	No standardized interventional protocol for use of cupping therapy or control of participants' medication intake	Yes, this supports alternative therapies for CLBP.

2	Bellido-Fernández, L., Jiménez-Rejano, J. J., Chillón-Martínez, R., Gómez-Benítez, M. A., De-La-Casa-Almeida, M., & Rebollo-Salas, M. (2018). Effectiveness of massage therapy (Tui Na) and abdominal hypo-pressive gymnastics in nonspecific chronic low back pain: A randomized controlled pilot study. *Evidence-Based Complementary and Alternative Medicine, 2018*(2). https://doi.org/10.1155/2018/3601984	To assesses effectiveness of massage therapy and abdominal hypo-pressive gymnastics and the combination of both to decrease pain and lumbar disability while increasing joint mobility and quality of life in patients with chronic nonspecific low back pain.	27 participants between 20 and 65 years, diagnosed with pain of mechanical origin characterized by having a duration of at least 12 weeks and no serious complications; received 8 interventions of 30 minutes.	RCT	The study showed that both individual groups reduce pain levels, improve disability, and increase the flexibility of the lumbar spine.	Level 2	Small sample size; non blinding of the physiotherapist responsible for applying the treatment; lack of standardized intervention parameters	Yes, it shows effectiveness of massage therapy on CLBP.
3	Chen, F., Ge, J., Leng, Y., Li, C., Chen, B., & Sun, Z. (2020). Efficacy and safety of	To systematically review and meta-analyze the efficacy of moxibustion in treating patients with	Ten RCTs, including 987 patients, met the inclusion criteria.	Systematic review & meta-analysis of randomized	The result showed that moxibustion plus other active	Level 1	It is difficult to draw firm conclusions that moxibustion is an effective	Yes, it provides very good information in support of the

	moxibustion for chronic low back pain: A systematic review and meta-analysis of randomized controlled trials. *Complementary Therapies in Clinical Practice*, *39,* Article 101130. https://doi.org/10.1016/j.ctcp.2020.101130	chronic low back pain (CLBP).		controlled trials	treatments (including western medicine, massage, acupuncture and core stability training) had better effects on low back pain relief compared with active treatments alone.		intervention for treating CLBP due to the small sample size of eligible trails and the high risk of bias among the available articles. Rigorously designed large-scale RCTs are required to further confirm the results in this review.	integrative review (IR).
4	Chou, R., Deyo, R., Friedly, J., Skelly, A., Hashimoto, R., Weimer, M., Fu, R., Dana, T., Kraegel, P., Griffin, J., Grusing, S., & Brodt, E. D. (2017). Nonpharmacologic therapies for low back pain: A systematic review for an American college of physicians clinical	To systematically review the current evidence on nonpharmacologic therapies for acute or chronic non-radicular or radicular low back pain.	Randomized trials of 9 nonpharmacologic options versus sham treatment, wait list, or usual care, or of 1 nonpharmacologic option versus another.	Systematic review of randomized controlled trials	Several nonpharmacologic therapies for primarily chronic low back pain are associated with small to moderate, usually short-term effects on pain; findings include new evidence on mind–body interventions	Level 1	Qualitatively synthesized new trials with prior meta-analyses, restricted to English-language studies; heterogeneity in treatment techniques; and inability to exclude placebo effects.	Yes, it provides excellent support for non pharmacological therapies for CLBP.

	practice guideline. *Annals of Internal Medicine*, *166*(7), 493–505. https://doi.org/10.7326/M16-2459							
5	Comachio, J., Oliveira, C. C., Silva, I. F. R., Magalhães, M. O., & Marques, A. P. (2020). Effectiveness of manual and electrical acupuncture for chronic non-specific low back pain: A randomized controlled trial. *Journal of Acupuncture & Meridian Studies*, *13*(3), 87–93.	To identify effectiveness of electroacupuncture (EA) and manual acupuncture (MA) on pain and disability in patients with chronic nonspecific low back.	Sixty-six patients between 20 and 60 years of age with non-specific chronic low back for at least the previous three months and ≥3 points on a 10 numerical analogic scale.	Randomized Control Trial (RCT)	The study shows that both EA and MA treatment therapies had similar efficacy in reducing pain and disability for chronic nonspecific low back pain to pain intensity and disability respectively.	Level 2	The main limitation of this study was that the therapist and patients were not blinded to group allocation.	Yes, provides excellent information to support the IR.
6	Day, M. A., Ward, L. C., Ehde, D. M., Thorn, B. E., Burns, J., Barnier, A., Mattingley, J. B., & Jensen, M. P. (2019). A pilot	To understand the mechanism of mmindfulness-based stress reduction and cognitive behavioral therapy for chronic low back pain.	Sixty-nine participants were adults (18 y of age and older) with a primary pain problem of CLBP lasting ≥3 months,	RCT	Cognitive therapy, mindfulness meditation, and mindfulness-based cognitive therapy for	Level 2	Small sample size of the pilot study.	Yes, the study provided good evidence to support a change

	randomized controlled trial comparing mindfulness meditation, cognitive therapy, and mindfulness-based cognitive therapy for chronic low back pain. *Pain Medicine, 20*(11), 2134–2148. https://doi.org/10.1093/pm/pny273		with pain experienced on ≥50% of days		chronic low back pain were all associated with meaningful changes in pain improvement.			
7	Godley, E., & Smith, M. A. (2020). Efficacy of acupressure for chronic low back pain: A systematic review. *Complementary Therapies in Clinical Practice*, *39,* Article 101146. https://doi.org/10.1016/j.ctcp.2020.101146	To establish the utility of acupressure for chronic low back pain (CLBP).	Six studies were included with a total of 468 patients who were nonpregnant adults 18 years or older with CLBP lasting 3 months or longer and did not have comorbid medical conditions that could exacerbate or contribute to their chronic pain condition.	SR	Acupressure is a feasible, effective, safe, low cost nonpharmacologic method to treat CLBP.	Level 1	Relatively small sample sizes (n = 50–129), selection bias, differences in acupressure treatment protocols, and lack of follow-up beyond 6 months.	Yes, it shows the efficacy of acupressure on CLBP.
8	Kong, L. J., Lauche, R., Klose, P., Bu, J. H.,	The effects of Tai Chi for chronic pain conditions	18 randomized controlled trials were included	SR	Results indicated that Tai Chi showed	Level 1	Bias in location and publication;	Yes, it provides good

	Yang, X. C., Guo, C. Q., Dobos, G., & Cheng, Y. W. (2016). Tai chi for chronic pain conditions: A systematic review and meta-analysis of randomized controlled trials. *Scientific Reports, 6*, Article 25325. https://doi.org/10.1038/srep25325				positive evidence on relief of chronic low back pain.		flaws in blinding methods used;	evidence in tai chi on CLBP
9	Lemmon, R., & Hampton, A. (2018). Nonpharmacologic treatment of chronic pain: What works? *Journal of Family Practice*, *67*(8), 474–483.	The effects of nonpharmacologic treatment on chronic low back pain.	Study of various nonpharmacological method of chronic low back pain treatment	Single descriptive study	Some nonpharmacological therapies were found to have low-moderate short-term pain reduction	Level 6	Limited quality studies for nonpharmacological therapies for chronic low back pain	Yes, it provides excellent evidence on nonpharmacological treatment for CLBP.
10	Luiggi-Hernandez, J., Woo, J., Hamm, M., Greco, C. M., Weiner, D. K., & Morone, N. E. (2018). Mindfulness for chronic low back pain: A qualitative analysis. *Pain*	To investigate dominant themes, present in the experiences of older adults applying mindfulness and meditation to cope with cLBP.	Twenty-five adults aged 65 years or older who had completed an 8-week mindfulness program.	SR	Mindfulness was an effective mean of coping with chronic low back pain	Level 1	Small study that comprised predominantly white, older adults with chronic lower back pain. Its results may not be generalized to a wider population.	Yes, provided very good information to support a change.

	Medicine, 19(11), 2138–2145. https://doi.org/10.1093/pm/pnx197							
11	Nicolson, P. J. A., Bennell, K. L., Dobson, F. L., Van Ginckel, A., Holden, M. A., & Hinman, R. S. (2017). Interventions to increase adherence to therapeutic exercise in older adults with low back pain and/or hip/knee osteoarthritis: A systematic review and meta-analysis. *British Journal of Sports Medicine, 51*(10), 791–799.	To evaluate whether interventions aimed at increasing adherence to therapeutic exercise increase adherence greater than a contextually equivalent control among older adults with chronic low back pain and/or hip/knee osteoarthritis.	Participants 45 years or older with chronic (>3 months) low back pain and/or hip/knee osteoarthritis were considered eligible.	SR	The benefits of exercise for older adults with chronic low back pain showed that it helps to decrease CLBP ling-term.	Level 1	Poor description of interventions in the studies.	Yes, this study provided very good information to support a change.
12	Polaski, A. M., Phelphs, A. L., Smith, T. J., Helm, E. R., Morone, N. E., Szucs, K. A., Kostek, M. C., & Kolber, B. J. (2021). Integrated meditation and	To examine the effects of a combined intervention of mindfulness meditation followed by aerobic walking exercise compared with a control	Thirty-eight adults-25 female, 13 men; aged 18-60- completed either meditation and exercise treatment (Med Ext) (n=18) or an audiobook control	RCT	The results showed that there were greater improvements in the Med Ext group disabilities and	Level 2	The possibility of performance bias due to lack of participants' blinding during intervention; small sample sizes	Yes, provided basic information to support the non-pharmacologic intervention focused on reducing

	exercise therapy: A randomized controlled pilot of a combined nonpharmacologic al intervention focused on reducing disability and pain in patients with chronic low back pain. *Pain Medicine, 22*(2), 444–458. https://doi.org/10.1093/pm/pnaa403	condition in chronic low back pain patients.	condition (n=20). Med Ext participants performed 12–17 minutes of guided meditation followed by 30 minutes of moderate-intensity walking exercise 5 days per week.		well as their mindfulness.			disability and pain in patients with chronic low back pain
13	Qaseem, et al. (Qaseem, A., Wilt, T. J., McLean, R. M., Forciea, M. A., Denberg, T. D., Barry, M. J., Boyd, C., Chow, R. D., Fitterman, N., Harris, R. P., Humphrey, L. L., & Vijan, S. (2017). Noninvasive treatments for acute, subacute, and chronic low back pain: A	To provide treatment guidance based on the efficacy, comparative effectiveness, and safety of noninvasive pharmacologic and nonpharmacologic treatments for acute (12 weeks) low back pain in primary care.	The target patient population includes adults with acute, subacute, or chronic low back pain.	Systematic review		Level 1	No limitations were discussed for this clinical guideline.	Yes, it provides excellent evidence on noninvasive treatments for CLBP.

	clinical practice guideline from the American College of Physicians. *Annals of Internal Medicine*, *166*(7), 514–530. https://doi.org/10.7326/M16-2367							
14	Rubinstein, S. M., de Zoete, A., Marienke, V. M., Assendelft, W. J. J., de Boer, M. R., & van Tulder, M. W. (2019). Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomized controlled trials. *BMJ: British Medical Journal (Online), 364*(2). https://doi.org/10.1136/bmj.l689	To assess the benefits and harms of spinal manipulative therapy (SMT) for the treatment of chronic low back pain.	Eligible studies included adults (≥18 years) and if more than 50% of the study population had pain lasting more than three months.	Systematic review and meta-analysis of randomized controlled trials.	Spinal manipulative therapies for chronic low back pain results in clinically better effects for short term improvement	Level 1	limited number of studies with a low risk of bias, and the impact of ambiguity of publication bias	The study provided good evidence to support a change.

15	Saper, R. B., Lemaster, C., Delitto, A., Sherman, K. J., Herman, P. M., Sadikova, E., Stevans, J., Keosaian, J. E., Cerrada, C. J., Femia, A. L., Roseen, E. J., Gardiner, P., Gergen Barnett, K., Faulkner, C., & Weinberg, J. (2017). Yoga, physical therapy, or education for chronic low back pain: A randomized noninferiority trial. *Annals of Internal Medicine*, *167*(2), 85–94. https://doi.org/10.7326/M16-2579	To determine whether yoga is noninferior to PT for CLBP	320 predominantly low-income, racially diverse adults with nonspecific CLBP.	RCT	The results showed that yoga and PT had similar effect for CLBP treatment while yoga was not superior to education for either outcome.	Level 2	Participants were not blinded to treatment assignment. The PT group had disproportionate loss to follow-up.	Yes, provided some information to support the IR.
16	Wei, X., Liu, B., He, L., Yang, X., Zhou, J., Zhao, H., & Liu, J. (2019). Acupuncture therapy for chronic	To evaluate the effectiveness and safety of acupuncture for the treatment of chronic low back pain and explore key	Participants with CLBP were included in the study; age from 16 to 80 years, using	RCT	The evidence showed that acupuncture provided an effective	Level 2	Selection bias was present	Yes, it provides excellent evidence on acupuncture for CLBP.

	low back pain: protocol of a prospective, multi-center, registry study. *BMC Musculoskeletal Disorders, 20,* Article 488. https://doi.org/10.1186/s12891-019-2894-4	factors affecting efficacy in the real world.	acupuncture as main therapy		therapy for low back pain.			
17	Wellington, J. (2014). Noninvasive and alternative management of chronic low back pain (efficacy and outcomes). *Neuromodulation*, *17*(Suppl. 2), 24–30. https://doi.org/10.1111/ner.12078	To provide a thorough literature review of available noninvasive and alternative treatment options for chronic low back pain.	A comprehensive search for available literature was done via various database for literature on noninvasive treatment modalities	Descriptive study	Exercise therapy with supervised PT, multidisciplinary biopsychosocial rehabilitation, and acupuncture were found to be effective in treatment for CLBP.	Level 6	The limited availability of evidence-based studies on non-invasive treatment modalities for CLBP.	Yes, it provides excellent evidence on noninvasive treatments for CLBP.
18	Wieland, L. S., Skoetz, N., Pilkington, K., Vempati, R., D'Adamo, C. R., & Berman, B. M. (2017). Yoga treatment for chronic non-	To assess the effects of yoga for treating chronic non-specific low back pain, compared to no specific treatment, a minimal intervention (e.g., education), or another active	12 trials (1080 participants) from different countries were used; aged 34-48 years.	RCT	Main results showed that was moderate to certainty improvement in CLBP.	Level 2	There was no comparison done in the types of biases that were presented in the articles used.	Yes, it provides good evidence on yoga for CLBP.

	specific low back pain. *Cochrane Database of Systematic Reviews*. https://doi.org/10.1002/14651858.CD010671.pub2	treatment, with a focus on pain, function, and adverse events.						
19	Wong, J. J., Côté, P., Sutton, D. A., Randhawa, K., Yu, H., Varatharajan, S., Goldgrub, R., Nordin, M., Gross, D. P., Shearer, H. M., Carroll, L. J., Stern, P. J., Ameis, A., Southerst, D., Mior, S., Stupar, M., Varatharajan, T., & Taylor, V. A. (2017). Clinical practice guidelines for the noninvasive management of low back pain: A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMa)	To identify effective conservative (noninvasive) interventions for the management of acute and chronic low back pain.	13 guidelines were used.	Systematic review	The findings showed that noninvasive management of nonspecific low back pain and recommend education, staying active/exercise, manual therapy,	Level 1	Restriction of guidelines published in English.	Yes, it provides excellent evidence on noninvasive treatments for CLBP.

	Collaboration. *European Journal of Pain*, *21*(2), 201–216. https://doi.org/10.1002/ejp.931							
20	Yang, L., Duan, P., Hou, Q., Du, S., Sun, J., Mei, S., & Wang, X. (2017). Efficacy of auricular acupressure for chronic low back pain: A systematic review and meta-analysis of randomized controlled trials. *Evidence-Based Complementary and Alternative Medicine*, *2017,* Article 6383649. https://doi.org/10.1155/2017/6383649	To identify the efficacy of auricular acupressure on pain and disability for chronic LBP by systematic review.	Seven studies (RCT) were used; ages 19-74; 369 adult patients with chronic LBP.	Systematic Review and Meta-Analysis of Randomized Controlled Trials.	The findings of this study showed that, for the immediate effect, auricular acupressure had large, significant effects in improving pain within 12 weeks.	Level 1	Limited number of studies for analysis; and the use of different interventions in controls may drawing firm conclusions about the effectiveness of auricular acupressure.	Provides good information on the usefulness of auricular acupressure for CLBP treatment at a high level of evidence.
21	Yeganeh, M., Baradaran, H. R., Qorbani, M., Moradi, Y., & Dastgiri, S. (2017). The effectiveness of	To determine the effectiveness of acupuncture, acupressure and chiropractic (non-pharmacological) interventions on the	10 studies from Medline, CINAHL, Science, CAJ Full-text Database, and Cochrane	systematic review and meta-analysis	The findings demonstrate that acupuncture, acupressure and chiropractic may have a	Level 1	Low methodological quality studies; small sample sizes; short term follow up of many RCTs	Yes, it provides adequate information on the effectiveness of acupuncture,

	acupuncture, acupressure and chiropractic interventions on treatment of chronic nonspecific low back pain in Iran: A systematic review and meta-analysis. *Complementary Therapies in Clinical Practice*, *27*, 11–18. https://doi.org/10.1016/j.ctcp.2016.11.012	treatment of chronic nonspecific low back pain in Iran.	databases were used.		favorable effect on self-reported pain and functional limitations on NSCLBP			acupressure and chiropractic interventions on treatment of chronic nonspecific low back pain
22	Zhu, S., Jun, X., Chen, J., Tang, G., Zhong, Z., Lu, L., Zhou, X., Guo, H., & Fan, H. (2020). The effectiveness of moxibustion for treating of low back pain: A protocol for systematic review and meta-analysis. *Medicine*, *99*(43), 1–5. https://doi.org/10.1	To assess the effectiveness and safety of moxibustion therapy for low back pain.	RCTs will be included, without restrictions on publication status; adult patients with low back pain, regardless of sex, race, or educational and economic status; control group and placebo.	Systematic review & meta-analysis of randomized controlled trials	The study showed a comprehensive review of the available evidence for the treatment of moxibustion with low back pain.	Level 1	None were stated	Yes, it provides excellent information to support the IR.

	097/MD.0000000000022522							

Appendix G

DNP ESSENTIALS (AACN, 2006)

Essentials of Doctoral Education for Advanced Practice Nursing		
Essential I	**Scientific Underpinnings for Practice**	The DNP scholarly project is a culmination of the DNP program, which, is the terminal nursing practice degree. It is an integration of the DNP essentials that builds awareness, and enhances the various challenges, that are faced by the nursing profession and health organizations today and in the future. It is a faculty-guided experience that provides opportunities to network, and collaborate with leaders, in the nursing profession, such as educators, nursing colleagues and others working across the nursing spectrum. The DNP scholarly project integrative review is a methodology that shows the translation of knowledge into practice that ensures consistency of learning (Toronto & Remington, 2020). The review is a summary of acknowledged literature about a topic and the communication of the synthesis of the literature to a targeted population.
Essential II	**Organizational and Systems Leadership for Quality Improvement and Systems Thinking**	It is the expectation that the DNP graduate has the foundational knowledge and skills to optimize healthcare and patient outcomes. They must know principles of management practices that balances productivity and quality of care and be able to evaluate the impact of policies and procedures on meeting the needs of the patients (Zaccagnini & Pecgacek, 2021). AACN (2006) stated that organizational and systems leaderships are paramount to the optimization of patient and healthcare outcomes, for the DNP graduates. This review sought to determine the effectiveness of nonpharmacological treatment for adults with chronic low back pain. The review will address the gaps in nonpharmacological treatment education and discuss various nonpharmacological treatment options that meet current and future patient needs based on evidence-based practices in nursing as well as other sciences.
Essential III	**Clinical Scholarship and Analytical Methods for Evidence-Based Practice**	Scholarship and research are the main characteristics of the doctoral degree (AACN, 2006). This project seeks to translate research into practice based on the clinical scholarship pertaining to the application of new knowledge into practice. This integrative review aims to detect isolated facts within the alternative treatment modalities and make connections across complementary alternative medicine and nursing disciplines through the scholarship of integration. This review will continue to evaluate these treatments practices with current evidence-based trends that seeks to discover new trends and applications in chronic low back pain management. The use of analytical methodology to critically appraise existing literature

		is imperative in order to decide the best evidence for practice (Zaccagnin & Pecgacek, 2021). This review utilized the Melnyk level of evidence for critically evaluating the levels of evidence for practice, in order to synthesize the current literature pertaining to the coordination of patient care.
Essential IV	**Information Systems/ Technology and Patient Care Technology for the Improvement and Transformation of Health care**	This Essential was evident throughout this project by the utilization of the conceptual framework (Whittemore & Knafl, 2005). The integrative review indicates the reviewer's ability to use information technology and systems, such as databases, platforms, and interfaces to find current articles appraise, critique, and synthesize. It focuses on the reviewer's ability to create, use and assess programs that guide outcomes (AACN, 2006). The importance of finding the most current literature from many articles and extracting relevant information to apply to patient care and health systems satisfies Essential IV. Whittemore and Knafl (2005) showed the importance of searching systematically for articles to optimize rigor and bias, which compels the reviewer to operate various search engines, databases, and platforms, such as, CINAHL, PubMed and Medline.
Essential V	**Health Care Policy for Advocacy in Healthcare**	Health care policy and advocacy in healthcare significantly impact the quality of patient care provided by the DNP graduate. The doctoral educated nurses can act as leaders in the developing and implementing health care policies that improves quality and access to care. This integrative review gives an update view on the current literature for adults with chronic low back pain. It also used as a measure to guide future research and closes the gap in literature that often neglects the use of alternative medicine in treating chronic low back pain. This review can be used to promote awareness of alternative treatment modalities for chronic LBP. Furthermore, the DNP scholarly project may guide healthcare policies and advocacy in healthcare for identified patient population of interest.
Essential VI	**Interprofessional Collaboration for Improving Patient and Population Health Outcomes**	The National Academy of Medicine formerly the Institute of Medicine in 2001, mandated that all healthcare professionals improve the quality of patient care through safety, effectiveness, efficiency, equitability, timeliness, and patient centeredness Zaccagnini, & Pecgacek, 2021). This essential is accomplished by this integrative review because the process of gathering informational literature, the reviewer had to collaborate with others healthcare professionals. Theis integrative review highlights the reviewer's effective communication skills with other professionals.
Essential VII	**Clinical Prevention and Population Health for Improving the Nation's Health**	This integrative review addressed the effectiveness of nonpharmacological treatment modalities in adult patients with chronic low back pain. AACN (2006) stated that in order to improve the health status of the population of the United States, the implementation of

		clinical prevention and population health activities is important. This scholarly project assesses the healthcare access of care and strategies of adult patients with chronic LBP. To be consistent with the national action calls for health promotion and disease prevention, this integrative review systematically searched for and located relevant articles to address the use of alternative medicines in treating chronic LBP patients.
Essential VII	**Advanced Nursing Practice**	The growth of specialization in nursing ensures the competence in highly complex areas of practice. Essential VIII depicts the fundamental practice competences that traverse beyond specialties and are evident in the DNP practice. The DNP graduate can draw on experiences from various healthcare settings, such as, hospitals, home and community health, ambulatory care clinics, and long-term care facilities. This integrative review will evaluate alternative therapeutic interventions based on nursing science to decrease chronic LBP. To transform the healthcare industry, this integrative review will function as an education tool for other healthcare professionals to enhance their understanding of alternative treatment modalities and optimize patient treatment options.