

COGNITIVE BEHAVIORAL THERAPY FOR CHRONIC PAIN MANAGEMENT IN  
PRIMARY CARE AND COMMUNITY SETTINGS DELIVERED BY HEALTH  
PROFESSIONALS OTHER THAN SPECIALISTS IN PSYCHIATRY OR PSYCHOLOGY

By

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A Project Submitted in Partial Fulfillment of the Requirements

for the Degree of

MASTER OF SCIENCE

in

Nursing

University of Alaska Anchorage

May, 2018

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### **Abstract**

**Background:** Chronic pain is prevalent, costly and commonly treated in primary care. Current evidence supports the use of integrated therapies that address the physiological and psychosocial factors in the pain experience. Cognitive behavioral therapy (CBT) has proven efficacy in the treatment of chronic pain conditions. However, psychological therapies, like CBT, are underutilized in chronic pain management. This may be the result of lack of mental health providers and typical delivery methods of individual therapy in private practice behavioral health settings.

**Objective:** To review the evidence for the use of CBT techniques by health care professionals other than specialist in psychiatrics or psychology, for the management of chronic pain in primary care and community settings.

**Methods:** The Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, PsycInfo, PubMed, Web of Science and Google Scholar databases were searched to identify qualitative and quantitative research involving CBT techniques used by non-mental health professionals in outpatient settings for adults with chronic non-cancer pain.

**Results:** The search yielded 253 relevant records, and 11 met final selection criteria. CBT-based interventions delivered by non-mental health professionals were effective in reducing physical disability and pain severity in individuals with chronic non-cancer pain.

**Conclusions:** Access to CBT-based interventions should be expanded to include delivery through health care professionals other than specialists in psychiatrics or psychology for the management of chronic pain in primary care.

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## **Introduction**

Chronic pain affects one hundred million American adults and costs the nation up to \$625 billion each year in treatment costs and lost productivity (Institute of Medicine [IOM], 2011; Mills, Torrance, & Smith, 2016). Chronic non-cancer pain (CNCP), defined as pain unrelated to malignancy or end of life processes, lasting three months or more (Chou et al., 2009), is a leading cause of physical, emotional and social disability (American Pain Society [APS], n.d.). Approximately half of patients experiencing chronic pain are managed in primary care and it frequently co-occurs with other long-term conditions (Breuer, Cruciani & Portenov, 2010; Mills, Torrance & Smith, 2016). Due to the risks of adverse effects, long term pharmacological treatments for these patients are controversial. The risks of abuse and overdose-related fatalities associated with opioid analgesics is especially concerning (Manchikanti et al., 2012; Reineke et al., 2015). Current evidence suggests that integrated approaches that address functional impairment and psychological factors associated with CNCP have better outcomes than pharmacological treatment alone (Chou et al., 2009).

## **Background**

In contrast to acute pain, chronic pain is not protective, and may be associated with pathological changes in the central and peripheral nervous system that result in persistent pain without evidence of, or disproportionate to the extent of physical injury (Santos et al., 2016). Pharmacotherapy is the most common approach to chronic pain management, typically involving the use of non-steroidal anti-inflammatory drugs (NSAIDs), acetaminophen, anti-epileptic drugs (AEDs), tricyclic antidepressants (TCAs), serotonin norepinephrine reuptake inhibitors (SNRIs), and opioid analgesics (Santos et al., 2016). There has been a dramatic increase in opioid prescriptions for chronic non-cancer pain in the past twenty years, a majority of which originated

from providers other than pain specialists (Manchikanti et al., 2012). The non-medical use of opioid analgesics is extensive, with a third of all chronic pain patients meeting the criteria for opioid misuse or abuse (Manchikanti et al., 2012). Furthermore, increased supply of opioid pain relievers has been a major contributor to opioid-related fatalities (Manchikanti et al., 2012). Quality evidence is lacking regarding the long-term effectiveness of opioid analgesics in chronic non-cancer pain, and opinions are mixed with respect to their risks and benefits in chronic pain management (Manchikanti et al., 2012).

### **Cognitive Behavioral Therapy**

Chronic pain is a complex process, involving biological, psychological and social factors (Turk & Okifurki, 2002). Current guidelines recommend treatments address the psychosocial factors that result from and contribute to chronic pain (Chou et al., 2009). Cognitive behavioral therapy (CBT) is a psychological therapy that has been extensively studied and has proven efficacy for the treatment of chronic non-cancer pain (Williams, Eccleston & Morely, 2012). CBT was developed through the application of concepts of the gate control theory of pain, social learning theory, and operant behavior principles to pain behaviors (Ehde, Dillworth & Turner, 2014). The gate control theory proposes that cognitive, affective and sensory experiences influence the perception of pain (The Gate Control Theory of Pain, 1978). Conversely, social learning theory and operant behavioral principles posit that pain behaviors are maintained through positive and negative reinforcement (Turk & Okifurki, 2002).

### **Framework**

CBT techniques are underpinned by principles of the biopsychosocial model. The model suggests that cognitive, affective and behavioral factors influence an individual's response to pain. (Turk & Okifurki, 2002). Unlike the biomedical perspective, that relies on

pathophysiological explanations for chronic pain, the biopsychosocial model views illness as a dynamic interaction between physiological processes, and psychological, social and contextual variables that shapes an individual's experience of pain (Turk & Okifurki, 2002). The importance of one's appraisal of their symptoms, ability to self-manage pain, as well as fear of pain and re-injury, are considered key attributes in one's adjustment to pain, within this model (Turk & Okifurki, 2002). Self-efficacy is a critical concept in the biopsychosocial model, because individuals who feel they have no control over their symptoms or lack confidence in their ability to manage their symptoms, will expend minimal effort at self-management, which may lead to increasing emotional distress and amplified symptom perception (Turk & Okifurki, 2002).

### **Significance**

#### **CBT in Community Settings**

Over thirty years of evidence has demonstrated the effectiveness of CBT (Williams, et al., 2012) in reducing pain and disability in individuals with CNCP and its techniques have been successfully delivered in community health care settings by trained health care providers that are not specialists in psychiatrics or psychology (Ehde et al., 2014). Trained dental hygienists delivered a CBT-based self-management intervention to women with chronic facial pain from temporomandibular disorders (TMD) The intervention was more effective in reducing both pain and difficulty performing daily activities than usual care or oral contraceptives (Turner et al., 2011). An exercise physiologist trained in CBT techniques delivered a self-management program for seniors with low back pain that reduced pain-related disability in all participants, with additional improvements in pain related outcomes for Hispanic participants (Beissner et al., 2012). Registered nurses have led outpatient chronic pain management programs based on CBT principles that reduced pain intensity, pain related disability and health-related quality of life



(Wells-Federman, Arnstein & Caudill, 2002). The latter two studies (Beissner et al., 2012; Wells Federman et al., 2002), however, had no comparison group.

### **Access to CBT**

Despite their proven efficacy, psychological interventions, such as CBT, are under-utilized in the treatment of chronic pain for a variety of reasons, to include lack of insurance coverage for mental health services, lack of access to providers, stigma associated with receiving psychological services and provider lack of knowledge regarding the use of CBT for chronic pain (Ehde et al., 2014). Limited access to CBT is also a result of traditional delivery methods of individual or group psychotherapy in private mental health practice or pain clinic settings (Ehde et al., 2014). A portfolio of service delivery methods has been advocated to increase access to CBT therapy to include the provision of CBT techniques in community settings by health professionals other than specialists in mental or behavioral health (Ehde et al., 2014; Kazdin & Blase, 2011). Nurses are prominent members of multidisciplinary teams that deliver CBT-based self-management programs for chronic pain management, and with their expanded nursing role, nurse practitioners have an opportunity to lead innovative care models to improve outcomes for individuals with chronic pain

### **Clinical Question**

What are the best practices for the use of cognitive behavioral therapy techniques for the management of chronic pain in primary care and community settings, by healthcare professionals other than specialists in psychiatrics or psychology, that are effective in reducing pain and disability and improving quality of life?

### **Literature Search Strategy**

A search of the literature was conducted using PsycInfo, Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, Medline, Google Scholar, and Web of Science, from January 2007 to August 2017. Criteria for inclusion were limited to adults 18 years and older with chronic non-cancer pain, peer-reviewed publications in the English language, and CBT or psychoeducation delivered by non-psychiatric providers in outpatient settings. Research was excluded if pain had occurred less than three months, treatment was related to end of life processes, or outcome measures did not address pain intensity, pain related disability or health-related quality of life. Initial key search terms included, chronic pain, cognitive behavioral therapy, and primary care. Key words identified during the literature review process were added to the search strategy, to include chronic widespread pain, chronic non-cancer pain, chronic pain management, pain coping skills training, psychoeducation, self-management, ambulatory care, and routine care. Few studies were identified in the primary care setting during the initial search that met inclusion criteria. Therefore, the search strategy was expanded to reflect professions that have historically delivered CBT-based techniques outside of mental health settings; discovered during the literature review process. These terms included nurse practitioner, primary care provider, general practitioner, health care provider, physical therapist, physiotherapist, occupational therapists, and dental hygienist.

A total of six hundred and eight records were retrieved during the literature search process. Of these records, two hundred fifty-three were retrieved from database key word searches, three hundred forty-five from cited reference and related articles link searches and ten from hand searches of relevant retrieved articles. The cited reference and related articles link searches were conducted using the two most relevant retrieved studies for the use of CBT in

primary care by health care professionals other than specialists in psychiatrics or psychology (Broderick et al., 2014; Lamb et al. 2010). Duplicates were excluded. Sixty-four studies were relevant after title and abstract review, of which nineteen met inclusion criteria.

### **Data Evaluation and Critical Appraisal**

Evidence was evaluated for validity, reliability, credibility and applicability using Melnyk and Fineout-Overholt's (2015) rapid critical appraisal checklists (Appendix A). Research that was applicable to the clinical question and met credibility, reliability and validity criteria during the critical appraisal process was assigned a level of evidence and graded for quality using the evidence pyramid and evidence quality guide from Dearholt and Dang (2012). The evidence pyramid (Appendix B) describes seven levels of evidence based on study design. While the evidence quality guide (Appendix C) assigns quality grades A, B or C based on high, good or poor-quality evidence, respectively.

### **Data Display**

Data was displayed in two evidence evaluation tables patterned after templates by Melnyk and Fineout-Overholt (2015). These features included citation, design, conceptual framework, sample/setting, variables, outcome measures, data analysis, results, worth to practice, level of evidence and quality grade. Data in the evaluation tables were grouped by level of evidence and clinical setting to better represent the strength of evidence relative to clinical setting. A total of eleven studies yielded grade A or B evidence, and were incorporated into the data evaluation tables for inclusion in the data synthesis process (Appendix D). Poor quality evidence, grade C, was excluded from this review to ensure that review findings and subsequent recommendations were based on high to good quality evidence. Studies not included in the data synthesis process were placed into separate data evaluation tables (Appendix E).

### **Critical Appraisal**

During the data evaluation process, eight studies were excluded due to validity or reliability concerns. Of those excluded, three were one group, pre-test/post-test, pre-experimental designs (Ikemoto et al., 2015; Salvetti et al., 2012; Taloyan, Alingahizadeh & Lofvander, 2013). Pre-experimental designs often yield weak evidence because they exert little to no control over the effects of extraneous variables, therefore interpretation is difficult, even with statistically significant results (Sutherland, 2017, p. 240). One excluded study was a retrospective cohort design (Arden, Fatoye & Yeowell, 2017) that evaluated a rehabilitation service based on CBT techniques. However, the clinical question and statistical analysis methods chosen aligned with a retrospective, pre-experimental design. The study was appraised using critical appraisal checklists for both cohort and experimental designs, each indicating significant methodological concerns and poor-quality evidence. Two randomized controlled trials (RCT), were excluded for internal validity concerns (Hunt et al., 2013; Monticone et al., 2012). Hunt et al. (2013) conducted a pilot study that failed to find a difference between the intervention and control group in outcomes, however, the sample was reported to be too small to detect significant differences. Similarly, Monticone et al. (2012) found no differences between a CBT-based intervention plus exercise versus active control group; although the authors reported the calculation of the a priori power analysis was based on large effects sizes to justify the intervention. This is in contrast to a recent systematic review that found small to moderate effect sizes typical for CBT based interventions when compared with active control groups, and were reported to be consistent with previous systematic reviews of CBT based interventions (Williams et al., 2012). Additionally, intervention fidelity was compromised due to a lack of standardized delivery of the intervention. A quasi-experimental study (Arnold et al., 2009) was also excluded

due to small sample size and insufficient power to detect significant differences between groups, as well as a lack of detailed description of the intervention, either in the report or references. Finally, a grade B quality improvement program (Whitten & Stanik-Huitt, 2013) was excluded, because the intervention was co-delivered by a psychotherapist and family nurse practitioner. The intervention description did not account for the tasks carried out by each discipline, thus it was difficult to determine which profession delivered the intervention and whether this violated the inclusion criteria for this review.

### **Data Synthesis**

Two data synthesis tables were created to categorize the evidence around the variables of interest (Appendix B). One table synthesized the data for effectiveness of interventions, grouped by provider and care setting, and one compared components of effective CBT interventions. This strategy was used to clarify evidence surrounding multiple variables, in order to identify what was effective based on professional skill set of the provider and care setting in which the intervention is delivered. Data variables were placed in data synthesis tables adapted from Melnyk & Fineout-Overholt, (2015).

#### **Effectiveness of Interventions**

Improvement in physical function and reduced disability was the most common finding across all studies and care settings, demonstrated in eight out of ten randomized controlled trials [RCT] (Bair et al., 2015; Broderick et al., 2014; Dysvik, Kvaløy, Stokkeland, & Natvig, 2010; Khan, Akhter, Soomro, & Ali, 2014; Kroenke et al., 2009; Lamb et al., 2010; Lambeek et al., 2010; McGillon), and one quasi-experimental study (Dysvik et al., 2010). Pain severity was also decreased in six RCTs (Bair et al., 2015; Broderick et al., 2014; Dysvik et al., 2010; Khan et al., 2014; Kroenke et al., 2009; Lamb et al., 2010; McGillon et al., 2008) and one quasi-experimental

study (Dysvik et al., 2010). Additionally, one quasi-experimental study found that gains in outcomes for disability, pain severity and quality of life could be maintained with extended follow up interventions based on CBT techniques (Dysvik, Kvaløy, & Natvig, 2012). Improvements in health-related quality of life was the least observed outcome with only two RCTs (Kroenke et al. 2009; McGillon et al., 2008) and one quasi-experimental study (Dysvik et al., 2010) reporting improvements in some quality of life subscales. In contrast to these findings, one grade B RCT using physiotherapist to deliver CBT, failed to find significant differences in pain severity, disability or health related quality of life, between intervention and control groups (Johnson et al., 2007). While this study was included in the review because its quality rating was good, the authors reported a concern related to a lack of therapeutic communication skills by physiotherapists delivering the intervention and concluded that the brief, four-day training was too short for the physiotherapists to adopt CBT skills into practice. This is in contrast to the three studies demonstrating effective interventions delivered by nurse practitioners, registered nurses, and multidisciplinary teams (Broderick et al., 2014; Kroenke et al., 2009; Lamb et al., 2010), wherein training programs were approximately two days in length. Therapeutic communication and therapist-patient relationship is a key component in effective delivery of CBT techniques (Furnes, Natvig & Dysvik, 2014) and may have influenced findings by Johnson et al. (2007).

### **Provider and Clinical Setting**

Of the eleven studies in this review, five were conducted in primary care (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., 2009; Lamb et al., 2010; Lamb et al, 2012) and six in community settings (Dysvik, et al., 2010; Dysvik et al., 2012; Khan et al., 2014; Johnson et al., 2007; Lambeek et al., 2010; McGillon et al., 2008). Three of the six studies in community

settings were conducted in outpatient rehabilitation programs delivered by nurses (Dysvik et al., 2010; Dysvik et al., 2012; McGillon, 2008). One quasi-experimental study and extended follow up intervention in this setting (Dysvik et al., 2010; Dysvik et al., 2012) consisted of a nurse led pain chronic management program wherein nurses experienced in the management of chronic pain facilitated CBT-based interventions along with a multidisciplinary team. Two studies were conducted in outpatient physiotherapy practice, delivered by physiotherapists (Khan et al., 2014; Johnson et al., 2007), and one was conducted by occupational therapists in an occupational medicine clinic (Lambeek et al., 2010). One RCT using physiotherapists to deliver CBT (Johnson et al., 2007) that failed to show significant differences between intervention and control groups determined during assessment of intervention fidelity, that a majority of sessions demonstrated only some evidence of CBT techniques. Therapeutic techniques such as discussion of participant expectation of treatment, exploration of beliefs, identifying anxieties and fears, pain diaries and management of flare-ups had low levels of adherence to the manual had very low adherence to the manual. Additionally, physiotherapist training in this study was not conducted by a mental health professional.

Nursing professionals exclusively delivered CBT in a majority of interventions in primary care (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., 2009). Training of nursing professionals involved the use of psychologists that were experienced in delivering CBT in all studies conducted in primary care. Additionally, nursing clinicians were supported through weekly contact with both physician experts in chronic pain management and psychologists experienced in the delivery of CBT in two of the three studies in primary care (Bair et al., 2015; Kroenke et al., 2009). Nurse practitioners were monitored for intervention fidelity using audio recording of sessions to ensure not only the elements of CBT were being delivered, but

therapeutic communications and active engagement skills were being utilized (Broderick et al., 2014).

### **Component of CBT Interventions**

Cognitive restructuring was used in six out of eleven studies, and was the most common CBT technique employed across studies and the most commonly utilized technique by the nursing professionals (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., 2009; Lamb et al., 2010; Lamb et al., 2012; Khan et al., 2014). Goal setting, relaxation techniques, coping education, such as planning for relapses and flare ups, and home skills practice were also frequently utilized by nursing professionals (Broderick et al., 2014; Dysvik et al., 2010; Dysvik et al., 2012; Kroenke et al., 2009; McGillon et al., 2008). Graded activity increases were most frequently used by physiotherapists (Khan et al., 2014; Johnson et al., 2007). The number of techniques used varied by intervention delivery method. Group sessions utilized a greater number of techniques, ranging from nine to eleven CBT components (Dysvik et al., 2010; Dysvik et al., 2012; Khan et al., 2014; Lamb et al., 2010; Lamb et al., 2012; McGillon et al., 2008). Conversely, individual sessions utilized a range of three to five techniques (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., 2009; Lambeek et al., 2010). The length of group sessions in primary care varied from ninety minutes to two hours (Lamb et al., 2010; Lamb et al., 2012), whereas individual sessions were thirty to forty-five minutes (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., 2009). In community settings, group sessions (Dysvik, Kvaløy, Stokkeland & Natvig., 2010; McGillon et al., 2008) ranged from two to five hours in length.

### **Strengths**

Nine (Bair et al., 2015; Broderick et al., 2014; Johnson et al., 2007; Khan et al., 2014; Kroenke et al., 2009; Lamb et al., 2010; Lamb et al., 2012; Lambeek et al., 2010; McGillon et



al., 2008) of the eleven studies utilized in the data synthesis process provided level I evidence in support of the delivery of CBT based interventions health care professionals that are not specialists in mental health, four (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., 2009; McGillon et al., 2008) of which were rated high quality, and four (Khan et al., 2014; Lamb et al., 2010; Lamb et al., 2012; Lambeek et al., 2010) as good quality. Thus, the evidence presented is generalizable and applicable to practice (Melnik & Fineout-Overholt, 2015). Five studies were conducted at multiple sites, that included both urban and rural settings (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., 2009; Lamb et al., 2010; Lamb et al., 2012), and had large sample sizes (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., Lamb et al., 2010; Lamb et al., 2012), to strengthen the generalizability of the findings. Six studies in the review utilized manualized protocols to enhance intervention fidelity and reproducibility (Bair et al., Broderick et al., 2014; Khan et al., 2014; Kroenke et al., 2009; Lamb et al., 2010; McGillon et al., 2008). Finally, nearly half of the studies in this review represented evidence for the use of CBT-based interventions in primary care, by non-mental health professionals.

### **Limitations**

A majority of the studies in this review are directed toward improving outcomes in patients with chronic musculoskeletal pain (Bair et al., 2015; Broderick et al., 2014; Johnson et al., 2007; Khan et al., 2014; Kroenke et al., 2009; Lamb et al., 2010; Lamb et al., 2012; Lambeek et al., 2010), in contrast to the broader population of chronic non-cancer pain. While musculoskeletal pain is often the most frequently encountered diagnosis in chronic pain populations, the lack of representation of other pain diagnoses in study samples may affect the generalizability of findings. Four of the studies represented interventions that combined CBT techniques with other interventions (Bair et al., 2015; Dysvik et al., 2010; Kroenke et al., 2009;

Lambeek et al., 2010), without evaluating CBT alone. It is possible that the positive outcomes observed are not attributable solely to CBT. Lastly, seven studies were conducted in countries with national health care systems (Dysvik et al., 2010; Dysvik et al., 2012; Johnson et al., 2007; Lamb et al., 2010; Lamb et al., 2012; Lambeek et al., 2010; McGillon et al., 2008), two were conducted in the VA health care system (Bair et al., 2015; Kroenke et al., 2009) and one in a large, multi-site health care organization (Broderick et al., 2014) which may influence the feasibility of these interventions in private practice settings.

## **Discussion**

### **Implications**

There is sufficient evidence to support the use of CBT-based interventions by health care providers other than specialists in psychiatrics or psychiatry in primary care and in settings other than mental and behavioral health, to reduce pain severity and disability associated with chronic musculoskeletal pain. In addition, the delivery of CBT-based interventions is feasible in both settings. Manualized protocols are available that are designed specifically for health care providers that are not mental health professionals, and are tailored to distinct pain populations, such as chronic low back pain and osteoarthritis (Hansen & Lamb, 2012; Broderick et al., 2014). Furthermore, a variety of delivery methods can be utilized, to include telephone, group and individual sessions, allowing for implementation in a variety of outpatient settings. Multi-disciplinary support, specifically from CBT specialists is necessary for successful implementation, as a majority of health care professionals in this review received a two-day training program in addition to specialist oversight to attain and maintain proficiency. Best practices in training providers to deliver effective behavioral change interventions include ensuring established criteria are met, training providers together, taking into account different

experience levels, standardized training manuals, structured practice and role playing, observation of implementation, scoring adherence to program via written checklists, conducting written examinations and certification of providers (Bryant et al., 2014). Additionally, regular supervision or access to specialists to negotiate difficulties is recommended to maintain skills (Bellg et al., 2004). Support at this level may be challenging to obtain and thus implementation of CBT-based interventions may be more easily accomplished in organizations where there is already access to mental health providers, such as organizations that have adopted the patient centered medical home model or in regions with national health care systems.

### **Recommendations**

Access to effective non-pharmacological treatments for chronic non-cancer pain should be expanded through the delivery of CBT-based interventions by health care professionals other than specialists in psychiatrics or psychology. A variety of interventions and delivery methods have demonstrated effectiveness and are feasible in both primary care and community settings. Standardized protocols are a vital component in the replication of effective interventions, along with support from CBT specialists. Pain coping skills training (PCST) is a standardized, CBT-based intervention that has been effectively used by nurse practitioners (Broderick et al., 2014) to deliver CBT techniques to individuals with osteoarthritis. Furthermore, its use by physical therapists is currently being evaluated (Bryant et al., 2014). Training methods for PCST are standardized and have been specifically developed for health professionals that are not specialists in psychiatrics or psychology. The Back Skills Training (BeST) program is directed toward the management of chronic low back pain in primary care. Its standardized program was developed to train multiple disciplines to deliver the CBT-based interventions. Additionally, novel training methods for this program, using online courses are currently being evaluated (Richmond et al.,

2016). Both PCST and the BeST intervention require two-day provider training programs. Further research is needed to support the expansion of these interventions to other pain populations. Nevertheless, the prevalence of osteoarthritis and chronic low back pain in chronic pain populations, is justification for these interventions in primary care settings.

Nursing professionals commonly deliver CBT-based interventions in primary care (Bair et al., 2015; Broderick et al., 2014; Kroenke et al., 2009; Lamb et al., 2010). This may be due to the professions focus on chronic disease self-management, holistic care and patient education (Broderick et al., 2014), as well as training and experience in essential therapeutic communication skills. Nurse practitioners are well suited to deliver CBT-based interventions, such as PCST and BeST programs, due to their expanded nursing role and leadership in innovative health care delivery strategies.

### **Conclusion**

Chronic pain is prevalent, costly and commonly treated in primary care. Current evidence supports the effectiveness of integrated therapies that address the physiological, psychological and social variables that contribute to chronic pain. CBT-based interventions delivered by health care professionals other than mental health specialists effectively reduce physical disability and pain severity in individuals with chronic musculoskeletal pain. Access to these effective interventions should be expanded through the use of these health care professionals in both primary care and community settings. Nurse practitioners have effectively delivered CBT based interventions in these settings and are well suited to implement these programs into practice.

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## Appendix A

### Rapid Critical Appraisal Checklist for a Randomized Control Trial

#### 1. Are the results of the study valid?

- |  |     |    |
|--|-----|----|
| a. Were the subjects randomly assigned to the experimental and control groups?<br>Unknown                            | Yes | No |
| b. Was random assignment concealed from the individuals who were first enrolling subjects into the study?<br>Unknown | Yes | No |
| c. Were the subjects and providers blind to the study group?<br>Unknown  | Yes | No |
| d. Were reasons given to explain why subjects did not complete the study?<br>Unknown                                 | Yes | No |
| e. Were the follow-up assessments conducted long enough to fully study the effects of the intervention?<br>Unknown   | Yes | No |
| f. Were the subjects analyzed in the group to which they were randomly assigned?<br>Unknown                          | Yes | No |
| g. Was the control group appropriate?<br>Unknown   | Yes | No |
| h. Were the instruments used to measure the outcomes valid and reliable?<br>Unknown                                  | Yes | No |
| i. Were the subjects in each of the groups similar on demographic and baseline clinical variables?<br>Unknown        | Yes | No |

#### 2. What are the results?

- a. How large is the intervention or treatment effect (effect size, level of significance)?  
\_\_\_\_\_
- b. How precise is the intervention or treatment?  
\_\_\_\_\_

#### 3. Will the results help me in caring for my patients?

- |  |     |    |
|--|-----|----|
| a. Were all clinically important outcomes measured?<br>Unknown   | Yes | No |
| b. What are the risks and benefits of the treatment?<br>_____  |     |    |
| c. Is the treatment feasible in my clinical setting?<br>Unknown  | Yes | No |
| d. What are my patient's values/family's values and expectations for the outcome that trying to be prevented and the treatment itself? _____ |     |    |



## Appendix A

### Rapid Critical Appraisal of Cohort Studies

- |  |     |    |
|--|-----|----|
| <b>1. Are the results of the study valid?</b>  |     |    |
| a. Was there a representative and well-defined sample of patients at a similar point in the course of the disease? | Yes | No |
| Unknown  |     |    |
| b. Was follow-up sufficiently long and complete?   | Yes | No |
| Unknown  |     |    |
| c. Were objective and unbiased outcome criteria used?  | Yes | No |
| Unknown  |     |    |
| d. Did the analysis adjust for important prognostic risk factors and confounding variables?                        | Yes | No |
| Unknown  |     |    |
| <b>2. What are the results?</b>  |     |    |
| a. What is the magnitude of the relationship between predictors (i.e. prognostic indicators) and target outcomes?  | Yes | No |
| Unknown  |     |    |
| b. How likely is the outcome event(s) in a specified period of time?   | Yes | No |
| Unknown  |     |    |
| c. How precise are the study estimates?  | Yes | No |
| Unknown  |     |    |
| <b>3. Will the results help me in caring for my patients?</b>  |     |    |
| a. Were the study patients similar to my own?  | Yes | No |
| Unknown  |     |    |
| b. Will the results lead directly to selecting or avoiding therapy?  | Yes | No |
| Unknown  |     |    |
| c. Are the results useful for reassuring or counseling patients?   | Yes | No |
| Unknown  |     |    |

## Appendix A

### Rapid Critical Appraisal of Evidence-Based Guidelines and Quality Improvement Programs

Indicate the extent to which the item is met in the published report of the EBP or the QI project.

#### Validity of Evidence Synthesis (i.e., good methodology)

	1	2	3	4	5
	No	A little	Somewhat	Quite A Bit	Very Much
1. The title of the publication identifies the report/project as an EBP implementation or QI project					
2. The project report provides a structured summary that includes, as applicable: data to establish the existent and background of the clinical issue, inclusion and exclusion criteria, and sources of evidence, evidence synthesis, objectives and setting of the EBP or QI project, project limitations, results/outcomes, recommendations and implications for policy					
3. Report includes existing internal evidence to adequately describe the clinical issue					
4. Describes multiple information sources (e.g., databases contact with study authors to identify additional studies, or any other additional search strategies) included in the search strategy and date					
5. States the process for title, abstract, and article screening for selecting studies					
6. Describes the method of data extraction (e.g. independently or process for validating data from multiple reviewers)					



12. For each study, presents characteristics for which data were extracted (e.g. study size, design, method, follow-up period) and provides citation.
13. Presents data on risk of bias of each study and, if available, any outcome-level assessment
14. For all outcomes considered (benefit or harms) includes a table with summary data for each intervention group, effect estimates, and confidence intervals, ideally with a forest plot
15. Summarizes the main findings including the strength of evidence for each main outcome, considering their reference to key groups (i.e., healthcare providers, users, and policy makers)
16. Discusses limitations at study and outcome levels (e.g. risk of bias) at review level (e.g. incomplete retrieval of identified research, reporting bias)
17. Provides a general interpretation of the results in the context of other evidence and implications for further research, practice, or policy changes

**Validity of Implementation (i.e., well-done project)**

1. Purpose of project flows from evidence synthesis
2. Implementation protocol is sufficiently detailed to provide replication among project participants
3. Education of project participants and other stakeholders is clearly described
4. Outcomes are measured and measures supported in the evidence synthesis

**Reliability of Implementation Project (i.e., I can learn from or implement project results)**

1. Data are collected with sufficient rigor to be reliable for like groups to those participants of the project

2. Results of evidence implementation are clinically meaningful (statistics are interpreted as such)

**Application of Implementation ( i.e. this project is useful for my patients)**

1. How feasible is the project protocol?
2. Have the project managers considered/included all outcomes that are important to my work?

**Summary Score** \_\_\_\_\_

<b>Recommendations with consideration of this type of level IV intervention evidence:</b>
---

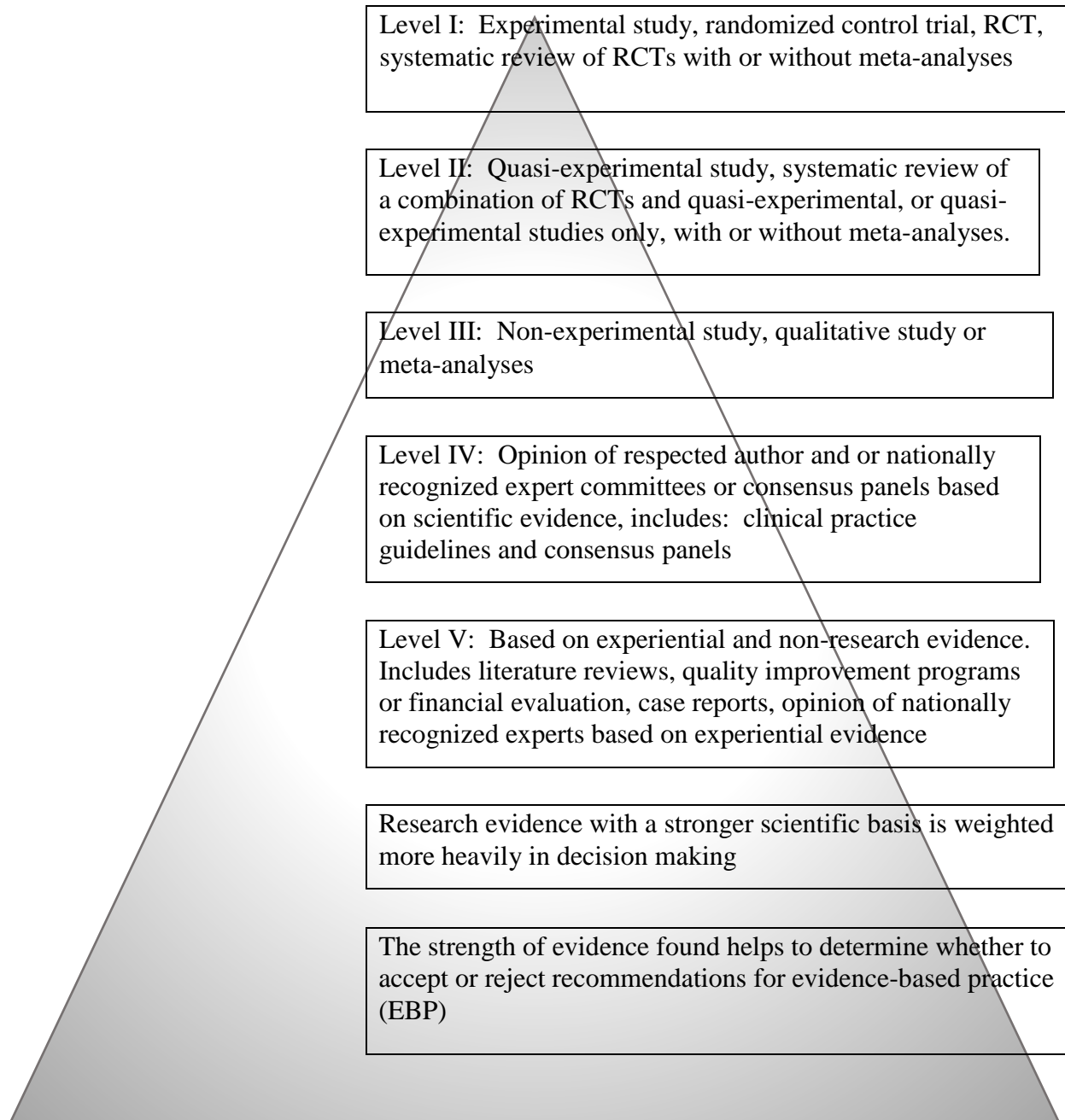
32-64 Consider evidence with extreme caution
--

65-128 Consider evidence with caution
---------------------------------------

128-160 Consider evidence with confidence
---

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### Appendix B Levels of Evidence



(Dearholt & Dang, 2012)

### Appendix C Evidence Quality Guide

#### Levels I, II, III (Includes Experimental, Quasi-Experimental and Non-Experimental Research Studies)

- A High Quality: Consistent, generalizable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence
- B Good Quality: Reasonably consistent results; sufficient sample size for the study design; some control, fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence
- C Low Quality or Major Flaws: Little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn.

#### Level IV (Includes Clinical Practice Guidelines and Positions Statements)

- A High Quality: Material officially sponsored by a professional, public, private organization, or government agency; documentation of a systematic literature search strategy; consistent results with sufficient numbers of well-designed studies; criteria-based evaluation of overall scientific strength and quality of included studies and definitive conclusions; national expertise is clearly evident; developed or revised within the last 5 years
- B Good Quality: Material officially sponsored by a professional, public, private organization, or government agency; reasonably thorough and appropriate systematic literature search strategy; reasonably consistent results, sufficient numbers of well-designed studies; evaluation of strengths and limitations of included studies with fairly definitive conclusions; national expertise is clearly evident; developed or revised within the last 5 years
  - C Low Quality or Major Flaws: Material not sponsored by an official organization or agency; undefined, poorly defined, or limited literature search strategy; no evaluation of strengths and limitations of included studies, insufficient evidence with inconsistent results, conclusions cannot be drawn; not revised within the last 5 years Evidence

#### Level V (Includes Literature Reviews, Quality Improvement, Expert Opinion, Financial/Program Evaluation) Organizational Experience

- A High Quality: Expertise is clearly evident; draws definitive conclusions; provides scientific rationale; thought leader(s) in the field
- B Good Quality: Expertise appears to be credible; draws fairly definitive conclusions; provides logical argument for opinions
- C Low Quality or Major Flaws: Expertise is not discernible or is dubious; conclusions cannot be drawn

(Dearholt & Dang, 2012)

## Appendix D

## Evidence Tables for CBT by non-Mental Health Providers in Primary Care

Citation	Design Method	Frame-work	Sample Setting	Major Variables Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Worth to Practice
Bair et al., 2015	RCT	Stepped Care Model	N = 241 n = 121 Stepped Care (SC) n = 120 Usual Care (UC) VA Combat veterans with chronic pain (CP) in primary care (PC)	IV= SC Step 1: Medication optimization Step 2: Telephone CBT by RN  DV= Disability, Pain Interference (PI) Pain Severity (PS)	<b>RMDQ</b> -Disability $C\alpha = 0.84$ to $0.93$ <b>BPI</b> -PI $C\alpha = 0.88$ for PI SS <b>GCPS</b> -PS $C\alpha = 0.91$	Independent sample <i>t</i> test	Reductions in disability ( $p = 0.002$ , $d = 0.24$ ), PI ( $p = 0.003$ , $d = 0.26$ ) and PS ( $p = 0.001$ , $d = 0.21$ ), compared with UC at 9-month follow up	Strengths: New approach for complex pain, delivery method w/RN applies to diverse OP settings. Limitations: Convenience sample, participants not blinded, small ES, may not apply to non-vets or outside VA system, does not evaluate CBT alone. Feasible in private practice w/access to multi-disciplinary support. Level: I Quality: A
Broderick et al., 2014	RCT	Not Identified	N = 256 n = 129 PCST n = 127 UC  OA of hip and knee patients in PC and rheumatology clinics	IV = Individual sessions of CBT based, PCST by Non-MH NP,  DV = Pain severity (PS), pain interference (PI) & Quality of life (QOL)	PS composite: <b>WOMAC</b> IC = 0.70 to 0.95 <b>AIMS2</b> IC = 0.72 to 0.90* <b>BPI</b> IC = 0.89 IC of all SS = 0.70 PI composite: <b>WOMAC</b> <b>AIMS2</b> SS correlated, $r = 0.58$ <b>QOLS-16</b> –QOL IC >0.85, TRR = 0.76 IC = 0.91	Repeated Measures ANCOVA	Improvements in PS ( $p = 0.044$ , $d = 0.21$ ) and physical functioning [PI composite] ( $p = 0.027$ , $d = 0.17$ ) 12 months after treatment. NS differences in QOL ( $p = 0.119$ ).	Strengths: Care delivery model using NP to deliver PCST to CP populations, composites for OC measures Limitations: Convenience sample, assessor blinding compromised, attrition 29% at 12-mos follow up (no difference between groups), small ES, results may not be generalizable to other CP populations. Feasible in PC w/multidisciplinary support Level: I Quality: A
Kroenke et al., 2009	RCT	Stepped Care Model	N = 250 n = 123 SC n = 127 UC  Pt w/CMSP and depression at 5 VA PC	IV = Stepped Care 1. Optimized antidepressant therapy 2. CBT in person/telephone by RN	BPI-PS & PI GCPS-PS & disability RMDQ-Disability <b>SF-36</b> -HRQL TRR = 0.78, $C\alpha = 0.76$ to $0.90$	Independent sample <i>t</i> tests	Improvements in PS ( $p < 0.001$ ), PI ( $p < 0.001$ ), disability ( $p < 0.001$ ) & general health	Strengths: Multi-sites, instruments aligned with IMMPACT Limitations: Convenience sample, inappropriate CG, findings do not differentiate between effects for CBT



			and 6 University Community based clinics (CBC)	DV = PS, PI HRQL and disability			( $p = 0.002$ ) at 12 mos. No difference in social function ( $p = 0.11$ ) as part of HRQL.	therapy and antidepressant therapy alone. Level: I Quality: A
Lamb et al., 2010	RCT	Not Identified	N = 701 n = 468 BeST n = 233 BPA  Pt. w/ chronic low back pain (CLBP) in PC in UK	IV = Group CBT based BeST program by RN, OT, PT and psychologists  DV = Disability, pain severity (PS) & health related quality of life (HRQL)	Primary: <b>RMDQ</b> -Disability <b>MVK</b> -PS & disability $C\alpha = 0.91$ pain SS & 0.89 for disability SS. <b>SF-12</b> -HRQL $C\alpha = 0.85$ physical SS & 0.84 mental SS ICC = 0.72 physical, 0.62 mental SS.	Random Effect Linear Regression. RR = 30% improvement in primary outcomes	Reductions in disability RMDQ ( $p = 0.008$ , $d = 0.3$ , RR = 1.4, NNT = 7), disability MVK ( $p < 0.0001$ , $d = 0.4$ , RR = 1.2 NNT 7) and PS ( $p < 0.0001$ , $d = 0.4$ , RR = 1.2, NNT = 7). Improvement in PF as part of HRQL ( $p < 0.0001$ , $d = 0.5$ ). NS difference in mental health ( $p = 0.832$ ) as part of HRQL	Strengths: Block randomization by center and PS, inter-cluster correlation for group and therapist close to zero, Limitations, 2:1 unbalanced random assignment (in favor of IVN group), inappropriate CG, 36% loss to follow up rate at 12 months, role of multidisciplinary team members in IVN not reported. Feasible for PC with multidisciplinary support. Level: I Quality: B
Lamb et al., 2012	RCT Follow up study Lamb et al., 2010	Not identified	N = 395 n = 281 BeST n = 114 BPA+ UC  Pt. w/ CLBP in PC in UK (same participants from Lamb et al., 2010)	IV = CBT based BeST program by RN, OT, PT and psychologists  DV = Primary, Disability & PS Secondary, HRQL	<b>RMDQ</b> -Disability <b>MVK</b> -PS & disability <b>EQ-5D</b> -HRQL $C\alpha = 0.85$	Multiple Linear Regression Model for between group differences	Improvement over CG in disability RMDQ ( $p = 0.013$ , $d = 0.27$ ) & disability by MVK ( $p = 0.039$ , $d = 0.23$ ). no differences in PS ( $p = 0.107$ ) & HRQL ( $p = 0.387$ )	Strengths: 56% response rate at 34 mos. Statistical analyses to control for co-variables (age, sex, baseline of DV) Limitations: Difference in age (older), disability (less), QOL (better) than original participants ( $p < 0.05$ ); 2:1 response rate in favor of IVN group. Level: I Quality: B

Legend: VA: Veteran’s Affairs, IV: Independent variable, CBT: Cognitive Behavioral Therapy, RN: Registered Nurse, DV: Dependent variable, PCST: Pain Coping Skills Training, MH: Mental health, SS: Subscales,  $C\alpha$ : Cronbach’s alpha, TRR: Test/Retest Reliability, IC: Internal Consistency, RR: Relative risk, OP: Outpatient, ES: Effect Size, IVN: Intervention, OA: Osteoarthritis, OC: Outcome, IMMPACT: Initiative on Methods, Measurement and Pain Assessment in Clinical Trials, CG: Control group, BPA: Best

practice advise plus usual care, BeST: Back Skills Training Program, UK: United Kingdom, OT: Occupational Therapists, Physiotherapists, , ICC: Interclass correlation coefficient, NNT: Numbers needed to treat, CNCP: Chronic non-cancer pain, MHP: Mental health professional.

**Scales:** **RMDQ:** Roland Morris Disability Questionnaire (Roland & Morris, 1983), reliability data from (Roland & Fairbank, 2000); **BPI:** Brief Pain Inventory (Cleeland & Ryan, 1994), reliability data from (Tan, Jensen, Thoenby & Shanti., 2004); **GCPS:** Graded Chronic Pain Scale, (Von Korff, Ormel, Keefe & Dworkin, 1992) reliability data from (Von Korff, Jensen & Karoly, 2000), **WOMAC:** Western Ontario and McMasters Universities Osteoarthritis Index (Bellamy, Buchanan, Goldsmith, Campbell & Stitt, 1988), reliability data from present study, **AIMS2:** Arthritis Impact Measurement Scale (Meenan, Mason, Anderson, Guccione & Kazis, 1992), reliability data from present study, **BPI:** Brief Pain Inventory (Cleeland & Ryan, 1994), reliability data from present study, **QOLS-16:** Quality of Life Scale (Flanagan, 1982), reliability data from present study, **MVK:** Modified Von Korff Scale (Underwood, Barnett & Vickers, 1999), reliability data from (Underwood, Barnett & Vickers, 1999), reliability data from (Von Korff et al., 2000), **SF-12:** Short Form -12 Health Survey (Ware, Kosinski & Keller, 1996), reliability data from (Hayes, Bhandari, Kathe & Payakachat, 2017), **SF-36:** Short Form -36 General Health Survey (Ware & Gandek, 1994), reliability data from (Jenkinson, Wright & Coulter, 1994; Von Korff et al., 2000), **EQ-5D:** EuroQoL-5 Dimension Health Survey (EuroQoL Group, 1991), reliability data from (Tran, Ohinmaa & Nguyen, 2012)

**Appendix D**

**Evidence Tables for CBT by Non-Mental Health Providers in Community Settings**

Citation	Design Method	Frame-work	Sample Setting	Major Variables Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Worth to Practice
Dysvik, Kvaloy, Stokkeland & Natvig, 2010	Quasi-Experimental	Trans-theoretical Model	113 Adult CP patients in OP Rehab in Norway	IV = RN led multidisciplinary (MD) group CBT  DV = Pain severity (PS), pain interference (PI) & health related quality of life (HRQL)	<b>BPI-PS &amp; PI</b>  <b>SF-36-HRQL</b>	Paired Sample <i>t</i> Tests for changes pretest to posttest, RCI = 2x SD for clinically relevant change.	Improvements in PS ( $p < 0.001$ ), PI ( $p < 0.001$ ) physical health ( $p = 0.042$ ) & general mental health ( $p = 0.001$ ). Highest RCI for PS 18% and PI, 20%	Strengths: Nurse led MD CBT for CP, consecutive sample, wait list control, multiple pain diagnoses Limitations: Non-random assignment, more married in IVN group, more current pain in CG. Unknown feasibility in PC due to setting. Level: II Quality: A
Dysvik, Kvaloy & Natvig, 2012	Quasi-Experimental Pretest/ Posttest Follow up of Dysvik et al., 2010)	Trans-theoretical Model	N = 104 Adult CP patients in OP Rehab in Norway	IV = RN led multidisciplinary (MD) group CBT with 6 and 12 months follow up sessions  DV = PS PI & HRQL	<b>BPI-PS &amp; PI</b>  <b>SF-36-HRQL</b>	Paired <i>t</i> Tests	Maintained improvements at 6 and 12-month follow up compared w/ Dysvik et al., (2010) in PS ( $p = 0.63, p = 0.86$ ), PI ( $p = 0.13, p = 0.38$ ), physical health ( $p = 0.11, p = 0.36$ ) & mental health ( $p = 0.82, p = 0.89$ )	Strengths: INV maintained effects, consecutive sample, 92% response rate, participants served as own control. Limitations: No justification for attrition, more men dropped out. Level: II Quality: A
Khan, Akhter, Soomro & Ali, 2014	RCT	Bio-Psychosocial Model	N= 54 n= 27 CBT + Ex n= 27 Ex Pt. w/ chronic non-specific low back pain (CNSLBP) in OP Rehab in Pakistan	IV = Individual CBT based graded activities plus exercise by PT  DV = Pain Severity (PS) and Disability	<b>VAS (PS)</b>  <b>RMDQ (Disability)</b> C $\alpha$ = 0.84 to 0.93	Wilcoxon Signed Rank Test	Reduction in baseline scores for PS ( $p < 0.001$ ) and disability ( $p < 0.001$ ) compared with general exercises	Strengths: Participant blinding, power 99% Limitations: Assessors not blinded, excludes CLBP > 2yrs and >age 50yrs, protocol not manualized & all results not reported, compliance > in CG Level: I Quality: B

Johnson et al., 2007	RCT	Not Identified	<p>N = 234 n = 116 CBT + Ed n = 118 Ed</p> <p>Patient w/LBP <math>\geq 3</math> mos in PT OP clinics in UK</p>	<p>IV = CBT based group Ed program by physiotherapist</p> <p>DV = Pain intensity, disability &amp; QOL</p>	<p><b>VAS-</b> Pain intensity</p> <p>TRR = 0.94 for literate, 0.71 for illiterate; r = 0.62 to 0.9 (correlation w/VAS) (Hawker et al., 2011)</p> <p><b>RMDQ-</b> Disability</p> <p><b>EQ-5D-</b> QOL</p>	ANCOVA for difference between groups, co-variance baseline pain, RMDQ score, age, gender, LBP history and psychological distress	<p>NS reductions in pain intensity in CBT group (MD = -3.63, CI -8.48 to 1.23) and disability (MD = 0.60, CI -1.59 to 0.40) and NS improvement in QOL (MD = 0.04, CI -0.01 to 0.09) compared with control. Sig interaction effect in pain (<math>M = -11.74</math>, CI -26.18 to 2.70) and disability (<math>M = -2.81</math>, CI -5.66 to 0.04) for preference for CBT treatment prior to randomization</p>	<p>Strengths: Statistical comparisons of refusers and non-refusers, manualized protocol</p> <p>Limitations: attrition not justified, longer pain and lower baseline LBP scores in CBT arm (not compared statistically), <math>p</math> values not reported, inappropriate CG, IVN fidelity concern due to comm. skills/lack of qualified training (non-psych).</p> <p>Level: I</p> <p>Quality: B</p>
Lambeek, Van Mechelen, Knol, Loisel, & Anema 2010	RCT	Not Identified	<p>N = 134 n = 66 Integrated Care (IC) n = 68 UC Adult w/ LBP &gt; 3 mos, recently out of work from OP clinics in UK</p>	<p>IV = Graded activity w/CBT techniques by OT as part of IC and workplace IVN</p> <p>DV = PS and disability</p>	<p><b>VAS-PS</b></p> <p>TRR = 0.94 for literate, 0.71 for illiterate r = 0.62 to 0.9</p> <p><b>RMDQ-</b> Disability</p>	Longitudinal Mixed Model analysis	<p>Improvements in disability (<math>p = 0.001</math>) compared with UC at 12 mos. No difference in PS (<math>p = 0.67</math>)</p>	<p>Strengths: CBT enhances SM by PT in IC for LBP, stratified random assignment</p> <p>Limitations: Convenience sample, subjects/providers not blinded, effect of CBT alone unknown. Difficult to implement in PC, requires access to multiple disciplines.</p> <p>Level: I</p> <p>Quality: B</p>
McGillion et al., 2008	RCT	Not identified	<p>N = 130 n = 66 CASMP n = 64 UC Pt w/chronic stable angina (CSA) Cardiac OP program/ Community in Canada</p>	<p>IV = CBT based psychoeducation program by RN</p> <p>DV = health related quality of life (HRQL), angina frequency (AF), angina severity (AS) &amp; physical function (PF)</p>	<p><b>SAQ-</b> Anginal Pain</p> <p>IC = 0.83 for physical limitation (PL) 0.76 for AF &amp; 0.78 for disease perception (DP)</p> <p><b>SF-36-</b> HRQL PF subscale.</p>	ANOVA	<p>Improvements in general health (<math>p = 0.001</math>), PF (<math>p &lt; 0.001</math>), angina frequency (<math>p = 0.02</math>) and Angina severity (<math>p = 0.001</math>) compared to waitlist control. No difference in bodily pain, physical role, MH, DP or PL.</p>	<p>Strengths: Nurse led CBT based Ed effective in CSA, MANOVA prior to ANOVA to reduce type I error, refusals explained, a priori power analysis, 93% attended all sessions, 10% LTF, standardized IVN protocol, findings consistent w/current evidence.</p>

								Limitations: Acceptance rate 61%, 66% > HS education, participants and providers not blinded, short follow up (3 months) Feasible in community setting due to manualized protocol and delivery by RN. Requires access to certified trainer. Level: I Quality: A
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Legend: CP: Chronic pain, OP: Outpatient, IV: Independent variable, CBT: Cognitive Behavioral Therapy, DV: Dependent variable, RCI: Reliable Change Index, SD: Standard deviation, PCST: Pain Coping Skills Training, NDC: Non-directive Counseling, AP: Activity pacing, MPR: Mini-relaxation practices, PR: Progressive relaxation, PC: Primary care, OP: Outpatient, RN: Registered Nurse, NS: Non-significant, TRR: Test/Retest Reliability, ANCOVA: Analysis of CoVariance, IC: Integrated care, UC: Usual care, LBP: Low back pain, UK: United Kingdom, PT: Physiotherapists, OT: Occupational therapists, IVN: Intervention, SM: Self-management, CASMP: Chronic Angina Self-Management Program, CSA: Chronic stable angina, UNV: University, ANOVA: Analysis of Variance, MANOVA: Multivariate Analysis of Variance, LTF: Loss to follow up, AR: Acceptance rate, HS: High School, LTF: Loss to follow up,

**Scales:** **NRS:** **BPI:** Brief Pain Inventory (Cleeland & Ryan, 1994), reliability data from present study, **SF-36:** Short Form -36 General Health Survey (Ware et al., 1994), reliability data from (Jenkinson, Wright & Coulter, 1994; Von Korff et al., 2000), **NRS:** Numerical Rating Scale, (Jensen, Karoly, O’Riordan, Bland & Burns, 1978), reliability data compared with VAS from Hawker, Mian, Kendzerska and French (2011), **RMDQ:** Roland Morris Disability Questionnaire (Roland & Morris, 1983), reliability data from (Roland & Fairbank, 2000), **VAS:** Visual Analogue Scale (Woodforde & Murskey, 1972), reliability data correlation w/ NRS from Hawker et al. (2011); **EQ-5D:** EuroQoL-5 Dimension Health Survey (EuroQoL Group, 1987), reliability data from (Tran, Ohinmaa & Nguyen, 2012), **SAQ:** Seattle Angina Questionnaire (Spertus et al., 1995) reliability data from (Spertus et al., 1995), **NPDS:** Neck Pain Disability Scale (Wheeler, Goolkasian, Baird & Darden, 1999), reliability data compared w/Pain Disability Index (PDI) from (Wheeler et al., 1999).

**Appendix E**  
**Evidence Not Used in Data Synthesis**

Citation	Design Method	Frame-work	Sample Setting	Major Variables Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Worth to Practice
Arden, Fatoye & Yeowell, 2017	Retrospective Cohort Study	Not Identified	N = 41 Pt w/ non-specific low back pain (NSLBP) attending Rehab program in UK over 12 mos period	IV= Group Ex + CBT DV= General Health (GH) & Function	<b>BQ</b> (GH & Function) C $\alpha$ = 0.72 to 0.92	Wilcoxon Signed Rank Test	Improvements in BQ scores ( $p < 0.0001$ )	Limitations: Pop. not well defined, 16% pain > 6 months, PI, PS and GH are assessed in 1 OC measure, PS as co-factor not addressed. Short follow up (6 wks). CI not reported. No control. Level III Quality: C
Arnold et al., 2009	Quasi-Experimental Nested in Case Control	Not Identified	N = 65 n = 31 IVN n = 34 UC Pt w/ somatoform Disorder (SD) in PC in Netherlands	IV= 5 sessions of GP delivered CBT + UC DV= Physical symptom severity (PSS) & Quality of life (QOL)	<b>VAS</b> (PSS) TRR= 0.71 to 0.94 r = 0.62 to 0.9 (corr. w/ NRS) <b>SF-36</b> (QOL) TRR= 0.78 C $\alpha$ = 0.76 to 0.90	Independent <i>t</i> tests	No differences in PSS ( $p = 0.68$ ) or QOL ( $p$ values not reported)	Strengths: New Delivery model of GP delivered CBT in PC, CG Limitations: sample too small to detect small differences, IVN description not detailed, IG w/ more physical symptoms than CG ( $p = 0.02$ ). Level: II Quality: C
Hunt et al., 2013	RCT Pilot	Not Identified	N = 20 n =10 PCST + Ex n = 10 NDC + Ex Patients w/ OA of knee from Community in OP PT	IV = CBT based PCST + Ex by PT  DV = pain severity (PS) & disability	<b>NRS-PS</b> TRR = 0.96, r = 0.86 to 0.91 <b>WOMAC</b> -Disability	ANCOVA with baseline scores as covariate	Improvements in PS ( $p < 0.05$ ) and disability ( $p < 0.001$ ) from baseline in both groups. No difference between groups	Strengths: CBT + Ex no more effective than UC. Strengths: double blinded, psychological CG Limitations: Small, volunteer sample, no power analysis reported, no extended follow up, >age in CG, risk of injury with exercise Level: I Quality: C

Ikemoto et al., 2015	Pre-Experimental One Group Pre-Test/Post-Test	Not Identified	N = 121 Participant calling NPO pain service in Japan	IV = Telephone CBT for CP by NP  DV = Pain severity & QOL	<b>NRS</b> (Pain severity) TRR= 0.96 r = 0.86 to 0.91 (corr. w/ VAS) <b>EQ-5D</b> (QOL) C $\alpha$ = 0.85	Wilcoxon Signed Rank Test	Significant improvements in pain severity ( $p < 0.001$ , $d = 0.75$ ) and QOL ( $p < 0.01$ , $d = 0.67$ )	Strengths: Consecutive sample, long term follow up Limitations: Retrospective design, no CG, n = 37 analyzed for QOL; no standard dose of IVN. Level: II Quality: C
Monticone et al., 2012	RCT	Not Identified	N = 80 n = 40 CBT plus PT n = 40 PT only  Patients w/ CNP referred by GP, Ortho and Neuro in Italy	IV = Individual sessions of CBT plus exercises by physiotherapists,  DV = Disability, PS and QOL	<b>NPDS</b> - Disability Ca = 0.93, r = 0.80 <b>NRS</b> - PI  <b>SF-36</b> - QOL	Repeated Measures ANCOVA (covariates age and marital status for difference between IVN and CG)	NSD in disability ( $M = -16.5$ CBT group vs $M = -13.9$ in PT group), PI (MD = -2.02 in CBT group vs MD = -1.46 in PT group) or QOL subscales, except for improvements in physical activity in CBT group ( $p = 0.010$ ).	Strengths: Consecutive sample, partial subject blinding, neither group received other treatments. Limitations: All results not reported, dose of CBT varied between participants determined by PT, power calculated using large effect sizes. (not typical of CBT based interventions). Level: I Quality: C
Salveti et al., 2012	Pre-Experimental One Group Pre-Test/Post-Test	Not Identified	N= 133 Pt/ CNCP in outpatient (OP) Rehab Unit in Brazil	IV= RN led group multi-disciplinary (MD) CBT based Ed DV= Pain Severity (PS) & Disability	<b>NRS</b> (PS)  <b>ODI</b> (Disability) TRR= 0.99 C $\alpha$ = 0.87	Wilcoxon Signed Rank Test		Strengths: Effective RN-led MD IVN for CNCP in OP setting, consistent Limitations: Small sample size, absence of power analysis results, validity of selection bias, 36 % attrition rate, regression toward the mean due to high pre-test PS scores. Level: II Quality: C

Taloyan, Alinaghizadeh & Lofvander, 2013	Pre-Experimental One Group Pre-Test/Post-Test	Not Identified	N= 209  Young to middle adult immigrants with CBP in PC in Sweden	IV = Individual CBT by PCP in PC  DV = Pain intensity	<b>VAS</b> (0-100) Severe pain $\geq 50$ Non-severe pain $< 50$	McNemar Pairwise Test	Significant reductions in severe pain from 67.9% at baseline to 60.8% ( $p < 0.0001$ ).	Strengths: Delivery of CBT by PCP in PC. Consecutive Sample. Limitations: VAS analyzed as nominal data. IVN fidelity CBT method/training of PCP not reported Level: II Quality: C
Whitten & Stanik-Huitt, 2013	QI Project	Not identified	N = 22 Opioid treated Pt w/ CNCP in VA community based clinic	IV = Group CBT by family nurse practitioners (FNP) & Psychotherapist DV = Pain severity (PS), pain interference (PI) and quality of life (QOL)	<b>BPI-PS &amp; PI</b>  <b>SF-36-QOL</b>	Paired sample <i>t</i> tests	Improvements in global QOL ( $p = 0.02$ ) and mental health ( $p = 0.001$ ). no difference in pain ( $p = 0.116$ ) or PF ( $p = 0.102$ )	Strengths: FNP and MHP co-led CBT in PC, IVN fidelity to evidence in review; detailed IVN protocol, OC measures supported in evidence. Limitations: Unclear what profession delivered program, 28% of participants completed program, limited to VA Pt Level: V Quality: B

Legend: PC: Primary Care, GP: General practitioner, CBT: Cognitive Behavioral Therapy, IVN: Intervention, UC: Usual care, CG: Control group, IG: Intervention group, TRR: Test/Re-Test Reliability, CP: Chronic pain, Ed: Education, Ex: Exercise, CNCP: Chronic non-cancer pain, RN: Registered nurse, PCP: Primary care provider, FNP: Family Nurse Practitioner, MHP: Mental Health Professional, CNP: Chronic neck pain, Ortho: Orthopedic physician, Neuro: Neurologist, Ca: Cronbach's alpha, PDI: Pain Disability Index, MD: Mean difference

Instruments: **VAS**: Visual Analogue Scale (Woodforde & Murskey, 1972), reliability data from Hawker et al. (2011); **SF-36**: Short Form 36 General Health Survey (Ware et al., 1994), reliability data from (Jenkinson, Wright & Coulter, 1994; Von Korff et al., 2000); **NRS**: Numerical Rating Scale (Downie, Leatham, Rhind, Wright, Branco & Anderson, 1978), reliability data from Hawker et al.; **EQ-5D**: EuroQoL-5 Dimension Health Survey (Japanese Translation Team, 1998) reliability data from (Tran, Ohinmaa & Nguyen, 2012); **BQ**: Bournemouth Questionnaire (Bolton & Humphreys, 2002), reliability data from (Bolton and Humphreys, 2002); **ODI**: Brazilian Oswestry Disability Index (Vigatto, Alexandre & Correa-Filho, 2007), reliability data from (Vigatto et al., 2007), **RMDQ**: Roland Morris Disability Questionnaire (Roland & Morris, 1983), reliability data from (Roland & Fairbank, 2000)



## Appendix F

Data Synthesis Table for Outcomes of CBT by Non-Mental Health Professionals

Studies	Design	Sample	Provider	Setting	Outcome
Broderick et al., 2014	RCT	N= 256 OA hip/Knee	NP	PC/Rheumatology Clinics	↓ PS & Disability No (-) in HRQL between groups
Bair et al., 2009	RCT	N= 241 Chronic musculoskeletal pain	RN	PC	↓ PS & Disability
Kroenke et al., 2009	RCT	N= 250 Chronic musculoskeletal pain	RN	PC	↓ PS & Disability ↑ General Health
Lamb et al., 2010	RCT	N= 701 Chronic low back pain	Multi-Disciplinary RN/PT/OT/Psych	PC	↓ PS & Disability ↑ PF (HRQL)
Lamb et al., 2012	RCT	N= 395 Participants in Lamb et al. (2010)	Multi-Disciplinary RN/PT/OT/Psych	PC	↓ Disability No (-) between groups in PS or HRQL
McGillon et al., 2008	RCT	N= 130 Chronic stable angina U.K.	RN	Cardiac OP Unit	↑ General Health, PF ↓ AF & AS
Dysvik et al., 2010	Quasi-Experimental	N= 117 Chronic non-cancer pain	RN-Led +PT	OP Rehab	↓ PS & Disability ↑ General & MH
Dysvik et al., 2011	Quasi-Experimental	N= 117 Chronic non-cancer pain	RN-Led +PT	OP Rehab	No (-) in PS, dsability or general health from Dysvik et al. (2010)
Johnson et al., 2007	RCT	N= 234 Chronic low back pain	PT	OP PT Clinic.	No (-) in PS or disability between groups
Khan et al.,	RCT	N= 57 Chronic low back pain Pakistan	PT	OP PT Clinic	↓ PS & Disability
Lambeek et al., 2010	RCT	N= 134 Low back pain	PT	OP PT Clinic	↑ Disability

Legend: RCT: Randomized Control Trial, QI: Quasi-Experimental, OA: Osteoarthritis, RN: Registered Nurse, NP: Nurse Practitioner, OT: Occupational Therapist, PT: Physiotherapist, OP: Outpatient, PC: Primary Care, PS: Pain Severity, Pain Interference, HRQL: Health Related Quality of Life, PF: Physical function, AF: Angina frequency, AS: Angina severity, MH: Mental Health, (-): Difference

**Appendix F**  
**CBT Techniques Utilized for Chronic Pain**

Studies	Bair et al., 2015	Broderick et al., 2014	Kroenke et al., 2009	McGillon et al., 2008	Lamb et al., 2010/2012	Dysvik et al., 2010	Dysvik et al., 2011	Khan et al., 2014	Lambeek et al., 2010
Intervention									
<b>Goal Setting</b>			X	X	X	X	X	X	
Physical activity Education	X			X	X	X			X
Pain Education			X	X		X			
<b>Relaxation Techniques</b>		X	X	X	X	X			
<b>Coping Ed</b>			X	X	X	X			X
Self-Efficacy		X	X	X		X			
<b>Cognitive Restructuring</b>	X	X	X		X	X		X	
Guided Discovery					X				
Communication Techniques			X	X		X			
Activity Pacing		X	X	X	X				
Graded Activity					X			X	X
Pleasant Activity Scheduling					X				
Problem Solving	X		X	X	X			X	
Sleep Hygiene			X	X					
<b>Home Skills Practice</b>	X	X	X		X	X			

Legend: Relaxation Techniques: Progressive muscle relaxation, diaphragmatic breathing, visualization and distraction, Coping Education: Relapse prevention, flare up planning, fear and other negative emotions, Communication: Communicating with health care providers and employers