

**Implementing an Evidence-Based Depression Treatment Program for Adults with  
Comorbid Depression and Chronic Illness**

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N5624: Application Practice VI – DNP Practicum

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April 18, 2021

In Partial Fulfillment of the Doctor of Nursing Practice

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### Abstract

Depression is a prevalent problem globally and affects mental, emotional, and physical health. Multiple studies have shown that unrecognized or untreated depression strongly correlates with chronic illnesses. Understanding this phenomenon is crucial for appropriate and effective screening and treatment for depressive disorder and the physical illness. Screening guidelines must be put in place to improve the recognition of depression in primary care. This study implemented an evidence-based screening and treatment program for adults with comorbid depression and chronic illness, and then evaluated the program's effectiveness. Unique challenges were presented during this study, as the clinic closed before the initially planned end of the study, cutting the study short by two months. There was also the challenge of assessing depression during a pandemic, when quarantine measures were in place, causing many people to be isolated. Many appointments were also conducted via telehealth, making an adequate evaluation of depression difficult. There was an improvement in PHQ-9 scores, with a pre-intervention PHQ-9 mean score of 5.82 and a post-intervention PHQ-9 score of 4.64. Improving depression treatment will help increase control of chronic illnesses and improve quality of life.

*Keywords:* depression, chronic illness, depression screening, depression treatment, comorbid, primary care, PHQ-9

**Implementing an Evidence-Based Depression Treatment Program for Adults with Comorbid Depression and Chronic Illness**

Major depressive disorder (MDD) is a common diagnosis, both in the United States (US) and worldwide, affecting as many as 350 million people (Bentley et al., 2014; Cameron et al., 2014; Chakraborty et al., 2012; El-Den et al., 2018; Read et al., 2017; Smithson & Pignone, 2017). It is a leading cause of disability (Siu et al., 2016). However, often patients will present to primary care offices for somatic complaints rather than reporting specific depressive symptoms (Jha et al., 2019). Zhao et al. (2019) found that many patients were more likely to present to their primary care provider with somatic or medical complaints that mask depression than report depressive symptoms. Alderson et al. (2014) found that many patients did not consider depression to be a serious illness and would only consider treatment necessary if they began having suicidal thoughts. Alderson et al. (2012) found that patients were more likely to seek help from their primary care provider rather than seeking out a specialist for depression. This highlights the importance of depression screening for all adults presenting to their primary care providers (Gates et al., 2016; Maurer et al., 2018; Samples et al., 2020), regardless of the presenting complaint.

Associations between various chronic illnesses and depressive symptoms strongly correlate with significant declines in health making depression screening essential (Karakus & Patton, 2011; Maradiegue & Khan, 2013). Patients with depressive symptoms, with or without a depression diagnosis, have increased health care usage (Tusa et al., 2019). Undertreated and untreated depression leads to increased health care usage, increased primary care visits, and poorer overall health (Cameron et al., 2014; Jogerst et al., 2013; Maurer et al., 2018; Mausbach et al., 2018; Tusa et al., 2019).

Creating an appropriate and personalized treatment plan for depression is an essential component of patient care. Currently, a large percentage of patients that screen positive for depression never have a treatment plan prescribed (Moise et al., 2018). The plan must be one that the patient believes will be effective; otherwise, the likelihood that the patient will abandon the treatment plan is significant (Bentley et al., 2014; Magnani et al., 2016; Moise et al., 2018; Siu et al., 2016). The recommendation is to have some form of psychotherapy, pharmacotherapy, or a combination of both for those diagnosed with a depressive disorder (Loeb et al., 2012; Magnani et al., 2016). Research shows that combination therapy generates the best results (Loeb et al., 2012).

Effectively treating depression can ameliorate the control of comorbid chronic illness (Loeb et al., 2012; Park et al., 2019). Studies show that depression can increase the negative effects of chronic physical illness (Maradiegue & Khan, 2013; Mausbach & Irwin, 2017; Park et al., 2019; Read et al., 2017). Early treatment is strongly recommended to gain satisfactory control of depression and prevent future permanent physical and mental complications. (Oluboka et al., 2018). Effective depression management is associated with enhanced control of various chronic illnesses, which improves patient quality of life (Park et al., 2019; Read et al., 2017).

### **Significance**

Depression affects approximately 350 million people worldwide, according to the World Health Organization (El-Den et al., 2018; McCoy et al., 2019; Smithson & Pignone, 2017; Tshomo & Chaimongkol, 2019). The economic impact of depression in the US alone is around \$210 billion (Smithson & Pignone, 2017; Waitzfelder et al., 2018). Due to a lack of appropriate screening for depression in the primary care setting up to 50% of cases are missed (Beebe & Utley, 2018; Bentley et al., 2014). Many of these patients present with complaints of chronic

pain or other chronic medical conditions that may mask depression (Chakraborty et al., 2012; Maurer et al., 2018; Zhao et al., 2018). Screening for depression still lacks in many primary care practices (Samples et al., 2020). Increased screening for depression recommended by the United States Preventive Services Task Force is paramount to improving diagnosis and treatment of depression (Maurer et al., 2018; Samples et al., 2020).

Once the screening has been appropriately completed and a diagnosis has been made, prescribing the most appropriate evidence-based treatment is the next step in potential recovery or remission (Cameron et al., 2014). Many patients prefer pharmacotherapy to treat their depression, although compliance is a potentially significant issue (Jogerst et al., 2013). While many patients with depression are treated only with antidepressant medications, a combination of psychotherapy and antidepressant medication is the recommended treatment (Alson et al., 2016; McCoy et al., 2019; Weir, 2019).

### **Local Issue**

Sixty percent or more of the patients seen by the project preceptor have a diagnosis of depression (S. B., personal communication, June 9, 2020). This number is significantly higher than the national average of those experiencing depressive symptoms. According to the CDC, 21% of adults ages 18 – 29, 16.8% of adults ages 30 – 44, 18.4% of adults ages 45 – 64, and 18.4% of adults 65 and older experience depressive symptoms (CDC, 2020). Also, according to the CDC, women are more likely to experience depressive symptoms (CDC, 2020). This particular statistic is in line with the patient population seen at the project clinic.

### **Diversity Considerations**

The city, as of 2020, has a population of 115, 982 that is 79.63% non-Hispanic white, 7.96% black/African American, 3.04% two or more races, 1.45% Asian, 1.31% Native Hawaiian

or Pacific Islander, 0.46% Native American, and 6.15% other race ([worldpopulationreview.com](http://worldpopulationreview.com), 2020). Demographics for this clinic are 65% Caucasian, 35% African American, and 10% Asian. The clinic accepts insurance comprised of approximately thirty-five percent Medicare, sixty percent have some form of private insurance, and five percent are self-pay (S. B., personal communication, June 8, 2020). According to the CDC, 19.3% of non-Hispanic whites and blacks are more likely to experience depression symptoms (CDC, 2020), which is consistent with the patients seen at the clinic.

### **Problem, Purpose**

#### **Problem Statement**

As many as twenty-five percent of adults in the United States with chronic illness will experience depression (Bentley et al., 2014). Up to thirty percent will have symptoms refractory to treatment or have a recurrence of depressive symptoms after initial successful treatment (Bentley et al., 2014). Without the use of an evidence-based treatment plan, patients with comorbid depression and chronic illness are likely to experience high levels of treatment attrition or abandonment, increased levels of primary care usage, and a lower quality of life (Cameron et al., 2014; Jha et al., 2019).

#### **Purpose Statement**

The purpose of this project was to implement an evidence-based screening and treatment protocol for the adult patient population with comorbid depression and chronic illness. This project addressed a significant, widespread problem and was designed to improve the quality of life for patients. The purpose was to address the potential gaps between current practice and the best evidence-based guidelines. Addressing treatment was meant to augment the current practice by connecting patients with psychotherapy resources to enhance the effects of pharmacotherapy

treatment already prescribed. However, many patients were not open to the suggestion of psychotherapy. Those patients who were open to therapy voiced difficulty finding a therapist available to see within a short time frame. There were not many therapists in the area that could accept new patients. The project also introduced more frequent follow-up, whether it be an actual appointment or just a telephone call to check in, to allow the primary care provider to closely track potential issues with the prescribed treatment and address them quickly.

### **Barrier, Facilitators, Sustainability**

Patients and providers experience barriers when addressing mental health. The staff at check-in may be hesitant to ask patients to complete a depression questionnaire such as the PHQ-9. Reluctancy on the patient side to be completely honest on the PHQ-9 exists. The providers or nurse practitioner students at the clinic may not feel comfortable discussing depression with patients.

One major facilitator for this project included improving mental health screening and treatment by primary care providers, as indicated in HealthyPeople2020. The project preceptor was also passionate about improving mental health care at the clinic site. The project leader also included as many patient care staff members at the clinic as possible to encourage participation in the project.

This project was realistic, sustainable, and required minimal time by the health care providers. Once they received the necessary education, there was little effort required. The PHQ-9 can be completed by the patient on paper and then entered into the electronic health record (EHR), or the provider can ask the questions and enter the answers directly into the EHR. Ensuring that a PHQ-9 is completed at the prescribed intervals (at least yearly or sooner if the provider deemed appropriate), making sure that information was entered into the electronic

health record, and following the project treatment recommendations were the only proposed changes.

### **Inquiry**

In adult patients with chronic medical conditions and depression, does the implementation of an evidence-based guideline on the screening and management of depression improve screening and management of depression in a single primary care office during a three-month period?

### **Review of the Evidence**

#### **Literature Search Strategies**

Multiple search engines were used to identify studies in the search for the literature available on depression in chronic illness and depression treatment. Databases and search engines included PubMed, Ovid Medline, Google Scholar, and Cumulative Index of Nursing and Allied Health Literature (CINAHL). Practice recommendations from professional organizations and clinical practice guidelines, were included in the review. Studies represent meta-analysis, randomized control trials, quasi-experimental, quantitative or qualitative research designs, systematic reviews, expert opinions, and practice guidelines.

Keywords used in the literature search included depression, chronic illness, depression screening, depression treatment, comorbid, primary care, health care costs. The search also included the keywords used together in various combinations. The search was limited to full-text articles in English, published between 2012 and 2020, and adults (18 years of age or older). Some studies included adolescents, but information about adolescents was not included in the synthesis of evidence. Exclusion criteria included a focus on other psychiatric disorders, study

population consisting solely of adolescents or pregnant women, unpublished manuscripts, and not available in English.

### ***Study Evaluations, Data Extraction, and Analyses***

The search yielded 750 articles that were pertinent to the inquiry. Using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Appendix A), the articles were narrowed down after further review. Three hundred seventy-nine articles were evaluated using the PRISMA 2009 checklist to determine if the articles were included in the review (Moher et al., 2009). Forty-nine articles and six evidence-based guidelines were found that met criteria. After the literature review was selected, the level of evidence it provided was appraised. Melnyk's evidence criteria were used to determine the quality of the included studies (Melnyk and Fineout-Overholt, 2015). The studies were evaluated and assigned evidence levels as follows: Level 1: systemic reviews and meta-analysis of randomized controlled trials and clinical guidelines based on systematic reviews or meta-analyses, Level II: one or more randomized controlled trials, Level III: controlled trials without randomization, Level IV: case-control or cohort studies, Level V: systematic reviews of descriptive and qualitative studies, Level VI: single descriptive qualitative studies, and Level VII: expert opinion or expert committee reports (Melnyk, & Fineout-Overholt, 2015). The literature review yielded six evidence-based guidelines, eight Level I, ten Level II, one Level III, sixteen Level IV, one Level V, nine Level VI, and three Level VII studies. In addition to the level of evidence, the synthesis of evidence was divided into themes and compared by purpose, research design, samples, measures and reliability, results and analysis method, and limitations and usefulness (Melnyk, & Fineout-Overholt, 2015, Appendices B and C).

### **Synthesis of Evidence**

Four major themes emerged on this topic. The themes include increased health care expenditures in patients diagnosed with depression, depression screening in primary care, treating depression with medication, psychotherapy, or a combination of the two, and occurrence of comorbid chronic illness and depression. These four themes support the importance of developing, implementing, and following through with an evidence-based treatment program for depression in the primary care setting.

### ***Health Care Expenditures***

Patients with concurrent depressive symptoms and chronic physical illness have higher rates of health care utilization and health care costs than their counterparts that do not suffer from depression or depressive symptoms (Tusa et al., 2019). Patients with depressive symptoms (with or without a diagnosis of depression) consistently have more somatic complaints and physical health problems (Tusa et al., 2019; Twomey et al., 2015). Studies exploring illnesses including cancer, diabetes, heart disease, hypertension, arthritis, high cholesterol, and obesity show that there is a direct correlation with higher usage of health care services (inpatient and outpatient) (Maradieque & Khan, 2013; Mausbach et al., 2018; Twomey et al., 2015; Zhang et al., 2016). The studies also showed greater health care costs with elevated levels of depression, even when controlling for the usage and costs typically associated with the chronic illness (Maradieque & Khan, 2013; Mausbach et al., 2018; Twomey et al., 2015; Zhang et al., 2016).

Choi et al. (2015) found that patients with depression had 51% higher out of pocket costs per year for health care, which could be attributed to prescription costs or copayments. Zhang et al. (2016) also reported a significant economic burden in Beijing related to depression. Patients with comorbid cancer and depression that made twelve mental health visits had an annual reduction of \$27,829 in health care costs versus patients with the same comorbid diagnoses that

did not receive mental health care (Mausbach et al., 2018). Increased health care expenditures related to depression are also likely related to the link between depression and other chronic physical illnesses (Choi et al., 2015).

### ***Depression Screening***

Many primary care practices do not have a set standard in place for depression screening (Akincigil & Matthews, 2017; Gates et al., 2016; Maradiegue & Khan, 2013), despite evidence showing that many patients present to primary care for mental health assistance (Beebe & Utley, 2018). Weir (2019) estimates that primary care providers have missed around 50% of patients with depression due to lack of screening guidelines. The United States Preventative Services Task Force (USPSTF) has issued recommendations that all adults 18 years and older be screened for depression (Siu et al., 2016).

Currently, consensus lacks one specific screening tool for depression in any setting, including primary care practice (Christensen et al., 2019; El-Den et al., 2018; Indu et al., 2018). Various screening tools are used more frequently than others, including the Patient Health Questionnaire (PHQ-2 and PHQ-9), the Beck Depression Inventory (BDI and BDI-II), the Major Depression Inventory (MDI), and the Mini-International Neuropsychiatric Interview (MINI) (Christensen et al., 2019; El-Den et al., 2018; Indu et al., 2018; Maurer et al., 2018; Pettersson et al., 2018). The lack of standardization in a depression screening tool complicates depression screening in primary care practices (Bentley et al., 2014; El-Den et al., 2018).

The research revealed other screening tools used infrequently, such as the Generalized Anxiety Disorder (GAD-7), the Depression and Somatic Symptom Scale (DSSS), the Drug Abuse Screen Test (DAST-10), the Alcohol Use Disorder Test (AUDIT-10), and the Hospital Anxiety and Depression Scale (HADS) (Gates et al., 2016; Maurer et al., 2018; Mulvaney-Day et

al., 2018). Many of these tools are used to identify disorders other than depression, such as substance abuse, alcohol use or abuse, and anxiety. While these disorders can have strong associations with depression, these tests are not specifically addressing depression.

One specific screening tool preferred in the primary care setting is the PHQ-9 (El-Den et al., 2018; Indu et al., 2018). The PHQ-9 is a commonly used screening tool with a sensitivity of up to 95% and a specificity of up to 98% (El-Den et al., 2018). It is a self-report tool that assesses various depressive symptoms over the last two weeks (El-Den et al., 2018). It can be completed relatively quickly and easily by patients during or after the check-in process at the primary care office.

### ***Depression Treatment***

The evidence regarding depression treatment shows a consensus that some form of psychotherapy, antidepressant medication, or a combination is preferred (Cameron et al., 2014; Jha et al., 2019; Waitzfelder et al., 2018; Weir, 2019). While lifestyle management changes (diet, exercise, sleep, progressive muscle relaxation, relaxation imagery, and autogenic training) are also briefly mentioned (Bentley et al., 2014), most of the research focuses on psychotherapy and antidepressant medications. Magnani et al. (2016) and Moise et al. (2018) found that although patients voiced a preference regarding the type of treatment they received, remission rates were not affected by whether they received their preferred treatment.

Various types of psychotherapy are available, including interpersonal counseling (IPC), cognitive behavioral therapy (CBT), interpersonal therapy (IPT), behavioral activation, supportive counseling, and problem-solving counseling (Alson et al., 2016; Magnani et al., 2016; Santoft et al., 2019; Waitzfelder et al., 2018; Weir, 2019). A specific guideline was not identified regarding which type of psychotherapy to prescribe. Alson et al. (2016) provides a succinct

outline of the premises and descriptions of various types of psychotherapy, which gives a provider insight into which type of psychotherapy will work best for each patient. As psychotherapy results also depend primarily on the patient's perception and willingness to honestly participate, there will easily be variances in the rates of success. It is acknowledged that psychotherapy is an effective treatment for depression, the variances in these treatments make it difficult to measure the success of each one (Alson et al., 2016).

Cognitive behavioral therapy is widely accepted as an effective form of psychotherapy in treating depression (Santof et al., 2019). It has been recommended as a first-line treatment (Cameron et al., 2014). It teaches patients to recognize and understand maladaptive thoughts and behaviors and approaches to successfully change them to more positive thoughts and behaviors (Cameron et al., 2014). Cognitive behavior therapy is likely to be covered by most insurance companies as it has measurable outcomes (Bentley et al., 2014). This therapy appears to be most effective when in-person treatment is used. However, Moise et al. (2018) found that online-based CBT combined with weekly phone calls did improve patient use of CBT.

As many as 80% of primary care providers choose pharmacological interventions as first-line treatment for depression (Waitzfelder et al., 2018). These medications can be rapidly prescribed and managed by primary care providers and do not necessitate a referral, which delays treatment (Oluboka et al., 2018; Waitzfelder et al., 2018). A study by Zilcha-Mano et al. (2019) also showed that prescribing antidepressants can have a placebo effect on some patients, resulting in decreased depressive symptoms.

The drug classes of antidepressants include monoamine oxidase inhibitors (MAOIs), tricyclic antidepressants (TCAs), selective-serotonin reuptake inhibitors (SSRIs), and serotonin-norepinephrine reuptake inhibitors (SNRIs) (Bentley et al., 2014). The MAOIs and TCAs are

considered first-generation antidepressants and tend to have more dangerous side effects than SSRIs and SNRIs, which are considered second-generation antidepressants (Bentley et al., 2014). The SSRIs and SNRIs are the drugs of choice for first line treatment for depression, while TCAs are second line choices and MAOIs are third line choices (Cameron et al., 2014). Traditional antidepressant therapy alone does not bring satisfactory results, some providers will augment treatment with antipsychotic medications such as buspirone, lithium, olanzapine, aripiprazole, or quetiapine (Alson et al., 2016; McCoy et al., 2019).

When choosing a medication, several factors must be considered, such as potential interactions with medications the patient is already taking, side effect profiles, insurance coverage, and patient preference (Alson et al., 2016; Bentley et al., 2014; Oluboka et al., 2018). There is no guideline specific to whether an SSRI or SNRI should be chosen with these factors taken into consideration. The SSRIs appear to be the most frequently chosen class of drug for treatment initiation (Alson et al., 2016; Tyrer et al., 2020), up to 90% of the time. Regardless of the medication chosen, it is imperative that providers thoroughly educate the patient on potential side effects (Bentley et al., 2014; Cameron et al., 2014). Patients must be made aware that mood improvement will not happen instantaneously, and an increased risk of suicidal ideations might occur during the first few weeks of treatment (Alson et al., 2016).

Once a medication has been prescribed, careful and frequent monitoring of the patient is imperative to ensuring the best possible response (Alson et al., 2016; Bentley et al., 2014; Cameron et al., 2014; Oluboka et al., 2018). Maintaining frequent contact with the patient, including a follow-up visit to assess treatment response within two weeks of treatment initiation is recommended (Cameron et al., 2014; Oluboka et al., 2018), allowing for the provider to assess for any negative side effects and to titrate medication dosage (Cameron et al., 2014). Many

failures to respond to pharmacotherapy are attributed to subtherapeutic dosages, which can be easily adjusted with frequent, early follow up (Bentley et al., 2014; Cameron et al., 2014; Oluboka et al., 2018).

During frequent reassessments for response to medication, it is recommended that medications be changed or an adjuvant medication be prescribed (Bentley et al., 2014; Cameron et al., 2014; Oluboka et al., 2018). Working closely with each patient to ensure maximum treatment benefit improves treatment adherence (Cameron et al., 2014; Oluboka et al., 2018), which studies show to be a common problem when treating depression. More than 40% of patients stop taking the prescribed medication within 30 – 90 days of treatment initiation (Cameron et al., 2014; Oluboka et al., 2018).

### ***Comorbid Depression and Chronic Illness***

Multiple studies show strong correlations between depression and chronic physical illness or pain (Aragonès et al., 2019; Bekhuis et al., 2016; Chakraborty et al., 2012; Costa et al., 2016; Di Benedetto et al., 2014; Hung et al., 2019; Karakus & Patton, 2011; Mausbach & Irwin, 2017; Mausbach et al., 2018; Park et al., 2016; Park et al., 2019; Read et al., 2017; Tshomo & Chaimongkol, 2019). Untreated and undertreated depression is linked to higher severity of chronic illness (Maradiegue & Khan, 2013; Mausbach & Irwin, 2017; Park et al., 2019; Read et al., 2017). Read et al. (2017) also found that for each chronic medical condition of a patient, their risk of depression increases by 45%. Read et al. (2017) and Park et al. (2019) theorized that this link is bi-directional, with each condition contributing to the worsening and severity of the other. Chakraborty et al. (2012) found a significant correlation between somatic complaints and depression severity.

Tshomo and Chaimongkol (2019) found that the rate of depression was highest in the first year after being newly diagnosed with chronic obstructive pulmonary disease (COPD). Patients with cancer are two to three times more likely to be diagnosed with depression than the general public (Mausbach et al., 2018). Aragonès et al. (2019) reports that up to 66% of patients with chronic pain also suffer from depression. The presence of type II diabetes mellitus (DM) doubles the risk of a depression diagnosis (Karakus & Patton, 2011).

### **Evidence Discussion and Summary**

Depression is a prevalent problem worldwide that has a significant negative impact on quality of life. It is often unnoticed and undiagnosed by primary health care providers, the very professionals that are generally the first point of contact in health care. It may mask itself as a physical or bodily problem. Primary care providers may feel that they do not have the time or ability to screen for depression, and they may be uncomfortable discussing depression with patients. The assumption may be that patients are not depressed because they did not specifically report complaints traditionally considered depressive symptoms.

Missing a depression diagnosis in the primary care setting can significantly negatively impact a patient's mental, emotional, and physical health. In research studies, strong correlations between depression and chronic illness and chronic pain have been found. These conditions appear to feed into each other, each exacerbating the other. Implementation of depression screening at initial contact with the primary care provider and at regular intervals after that could increase the likelihood of recognizing of depressive symptoms allowing for proper evaluation, diagnosis, and treatment early on, providing a much-improved quality of life. This negative feedback loop can be slowed or stopped with timely and appropriate screening and evidence-based treatment.

Recognizing and appropriately treating depression early also has the potential to significantly decrease health care costs. The depression-chronic illness negative feedback loop leads to increased health care usage and health care costs. Multiple guidelines provide similar recommendations: early implementation of treatment, psychotherapy, pharmacotherapy, or a combination of the two. Working together, the primary care provider and the patient can choose their preferred treatment modality.

The lack of standardized depression screening contributes to the poor identification or depression. Multiple screening tools exist, but there is no clear recommendation for initial screening or interval screenings. Implementation of depression screening at initial contact with the primary care provider and at regular intervals could increase the likelihood of recognizing depressive symptoms. This would allow for proper evaluation, diagnosis, and treatment early on, providing an improved quality of life.

Recognizing and appropriately treating depression early also has the potential to significantly decrease health care costs. The depression-chronic illness negative feedback loop leads to increased health care usage and health care costs. Multiple guidelines provide similar recommendations: early implementation of treatment, psychotherapy, pharmacotherapy, or a combination of the two. Working together, the primary care provider and the patient can choose their preferred treatment modality.

Early and frequent reassessment of positive response to the chosen treatment modality is also vital to successfully treating depression. If the patient is experiencing negative side effects from the treatment or does not feel like the treatment is making any difference early in managing depression, the likelihood of remission is low. Many patients may simply abandon the treatment.

By staying actively involved, the primary care provider can modify the initial treatment plan, helping lower treatment attrition rates and increase successful treatment.

### ***Strengths, Limitations, and Gaps***

Limitations were noted during this review. One limitation is the lack of standardized depression screening. Multiple screening tools exist, but there is no clear recommendation for initial screening or interval screenings. Another limitation is the lack of one specific guideline for the treating depression. The literature is also limited as many studies included other mental health disorders.

Multiple studies with a high level of evidence were discovered during the literature review. Several concise, accurate depression screening tools were identified that distinguish those at risk of depression. Solid, proven depression treatment options exist and many are readily available.

### **Theory**

The Transtheoretical Model of Behavioral Change (TTM) (Appendix D) will guide this EBPI. It is a purposeful change model (Li et al., 2020). The Transtheoretical Model of Behavioral Change is composed of four parts: stages of change, process of change, decisional balance, and self-efficacy (Li et al., 2020). The provider must be open to changing current practice for this intervention to work. In addition, patients need to have positive expectations regarding a change in health-related behaviors for any provider-recommended interventions to be effective (Prochaska & DiClemente, 1982).

### **Rationale for Theory Choice**

Behavioral changes happen through a series of five steps: precontemplation, contemplation, preparation, action, and maintenance (Li et al., 2020). With each step, a person

moves closer to making a positive change in their behavior. While a patient is in the precontemplation stage (Li et al., 2020), appropriate education on the effects of untreated depression assists the patient in recognizing that there is a problem and a solution. This evidence-based performance improvement project (EBPI) emphasizes education and change to providers and patients, making TTM a clear theoretical guide.

### **Applicability and Appropriateness**

The TTM emphasizes the transition from cognitive to behavioral changes (Li et al., 2020). Every time a patient presents to a primary care provider with a problem, there is the necessity for change to solve said problem. The TTM spells out the model for change in five simple steps. Using the five steps of change presented in the TTM, change will be less daunting to both providers and patients, as it is a progression of change, not a complete change in a short time frame.

## **Methods**

### **Institutional Review Board Approval**

The primary Institutional Review Board (IRB) to approve this project was the University of Missouri-Kansas City. The internal medicine clinic where this project took place does not have an IRB. The project implemented best evidence-based practice guidelines for screening and treating of depression and chronic illness, to improve both conditions. It was a non-human subjects-based quality improvement project.

### **Site Approval**

The project leader obtained written approval for the use of the clinic from S. B., APRN-C, MSN. Mrs. B. also served as the project preceptor and mentor for this project.

### **Ethical Considerations**

This project aimed to improve quality of life and enhance the health care experience for patients. No patient was coerced into project participation and received treatment as usual for their depression. All identifying patient information was kept private according to HIPAA regulations.

### **Funding**

Funding for this project was not required. The clinicians already use the PHQ-9 as their depression screening tool. Pens and pencils were also provided for the patients to complete the PHQ-9. An informal discussion about evidence-based screening and treatment will occur with the project preceptor and other participating nurse practitioner students. (Appendix E).

### **Setting and Participants**

This evidence-based quality improvement project setting was a primary care setting in Missouri. The participating providers at the clinic were the nurse practitioner and nurse practitioner students that agreed to assist in the project. Patients asked to participate included adults 18 years of age and older, with at least one previously diagnosed chronic illness, and a documented diagnosis of depression. Exclusion criteria included patients under 18 years old, no documented diagnosis of depression, and non-English speaking. All patients who met criteria with a provider participating in the improvement project during the project period were included.

### **EBP Intervention**

#### ***Intervention***

This EBPI was designed to assess and improve the screening for and treatment of depression in patients with comorbid depression and chronic illness by further implementation of the evidence-based depression management and treatment guidelines. Depression screening using the PHQ-9 was initiated for all participants at the first visit if it had not already been

recently documented. Chart reviews were done to evaluate treatment modalities and changes to fit best evidence-based practice. Effectiveness was assessed during follow-up appointments. The first appointment was scheduled within two weeks of treatment initiation, with subsequent appointment intervals determined by individual patient response to treatment. Each patient went no longer than four weeks without assessment of treatment. A repeat PHQ-9 was obtained at the end of three months.

### ***Protocol***

This evidence-based project began with a short educational meeting between the project leader, project preceptor, and potential proxies regarding the proposed intervention. Each team member was educated regarding all intervention steps, from screening to treatment decisions to addressing potential patient attrition. Team members were encouraged to review the evidence-based guidelines regarding depression treatment. The project leader answered all questions about the intervention. The project leader provided each team member with contact information in case of any questions or concerns.

Chart reviews were conducted on patients presenting to the clinic with at least one chronic illness complaint. After identifying patients with a documented diagnosis of depression, the project leader, nurse practitioner provider, or other nurse practitioner nursing student explained the improvement of care to the patient. Once participation was confirmed, the PHQ-9 was administered with the score recorded in the EHR.

Current treatment of depression was reviewed after screening. Efficacy was assessed if the patient was already prescribed psychotherapy, pharmacotherapy, or in combination. Adjustments of the depression treatment were made if necessary. As previously stated, the first

follow-up contact was made within two weeks. After the two-week follow-up, the provider contacted the patient at least every four weeks, more often if deemed necessary.

After three months of evidence-based treatment, another efficacy assessment was conducted. A final PHQ-9 score was obtained from each participant and entered into the EHR. Once the data was collected, statistical analysis was performed to evaluate the EBPI. This data was also discussed with the patient. Once successful, the change incorporating the evidence-based guidelines would continue at the clinic, and the steps will be simple to replicate at other primary care clinics.

### **Change Process, EBP Model**

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care (Appendix F) were used to guide this EBPI project. This model was developed to assist providers in incorporating research findings into best practice for patient care (Buckwalter et al., 2017). There are seven steps the help guide inquiries into research and then into practice. Those steps include identifying triggering issues, stating the question or purpose, forming a team to conduct the research, performing and synthesizing the research, creating practice change, implementing the practice change, and propagating the results (Buckwalter et al., 2017).

### ***Sustainability***

The proposed intervention is sustainable after the EBPI. It builds upon practices already in place at the clinic. It would also be simple to share the information with other providers, so the intervention could be implemented at other clinics. Based upon the guidelines, screening for depression should already be taking place. The only change is following the treatment recommendations.

### **Project Design**

The quality improvement project incorporates a quasi-experimental, one cohort with pre- and posttest design. A PHQ-9 was completed to measure the level of depression experienced by each patient at the beginning of the project. Next, the intervention was implemented, with evidence-based depression treatment including pharmacotherapy, psychotherapy, or a combination, based on individual needs and preferences. Progress was monitored during appointments at the intervals previously discussed. At three months, a post-intervention PHQ-9 was conducted to measure the change in depression levels and assess the intervention's effectiveness.

## **Validity**

### *Internal*

Patients were not offered any compensation for agreeing participating in the EBPI. There was no retribution for declining to follow the prescribed treatment plan. Team member participation was also at-will.

### *External*

This project applies to any primary care practice that treats patients with comorbid depression and chronic illness. The treatment interventions are aimed to be utilized for any adult patient who was not receiving best evidence-based treatment.

## **Outcomes**

The primary outcome of this EBPI was to improve the level of depression experienced by patients with comorbid depression and chronic illness. This outcome was assessed by the PHQ-9 scores, anticipated to be lower after implementation of the intervention. A secondary outcome was to increase provider awareness of best evidence-based depression treatment measured through descriptive statistics.

## **Measurement Instruments**

The PHQ-9 (Appendix G) was the tool used to measure depression levels. This questionnaire is one of the most frequently used depression screening tools in primary care (Indu et al., 2018). It has a specificity of 91% to 94% (Maurer et al., 2018) for identifying depression. It is an expansion on the PHQ-2, a two-item screening tool frequently used to detect depressive symptoms.

The PHQ-9 can be conducted online or by paper and pencil. It is a free-to-use tool, available through Pfizer. Each item on this questionnaire was ranked on a four-point Likert scale: not at all (0), several days (1), more than half the days (2), or nearly every day (3). It classifies the level of depression as minimal or none (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27).

## **Quality of Data**

The small sample size of 22 limited the quality of the data. The project leader planned to enroll 30 or more patients in the project, which initially seemed achievable. However, getting that many patients to continue participating was not possible. Baseline PHQ-9 scores were obtained at the beginning of the project. Post-intervention scores were obtained after three months of evidence-based treatment.

## **Statistical Analysis**

Comparison data for the pre- and post-intervention PHQ-9 scores was obtained through a paired *t* test. (Appendix Q) Descriptive statistics was used to detail patient ages, chronic illnesses, gender, race, level of education, and insurance status. (Appendix P)

## **Results**

### **Setting & Participants**

All patients seen by the project leader or project preceptor were screened for depression using the PHQ-9, starting September 16, 2020, running through October 8, 2020. Any person that scored higher than zero and had at least one chronic condition was included in the project. Initially, forty-five participants were identified.

Thirty-three of the forty-five patients (73%) reported anxiety, making it the most commonly reported chronic condition. Twenty of the 45 patients (44%) reported hypertension (HTN), making it the second most commonly reported chronic condition. Other chronic conditions identified included obstructive sleep apnea (OSA), obesity, hypothyroidism, diabetes mellitus, hyperlipidemia, gastroesophageal reflux disease (GERD), vitamin D deficiency, and osteoarthritis (OA). Each patient had at least two chronic illnesses in addition to depression.

### **Actual Intervention Course**

As previously stated, 45 patients were initially identified as participants in the proposed intervention. Each patient was offered an antidepressant appropriate for their condition. The importance of counseling was emphasized. They were also given Comprehensive Mental Health Services information for counseling, although many patients voiced no desire to pursue counseling services.

A telephone call was attempted two to three weeks after the initial appointment, to assess the effectiveness of the current treatment plan. Thirty-three patients responded to this first call. The project leader was able to address progress or lack thereof. Some patients needed medication changes (increase dosage, changing medications, etc). Others reported they were doing well, with four patients reporting that they were participating in some sort of counseling (personal or group).

Follow-up time depended on the patient's progress. For those that reported they were doing "great" or "fantastic", contact was attempted again after a month. If the patient reported they were still struggling or if changes were made to their medication, contact was attempted again after two weeks to check in and see if there was any change. The project leader attempted multiple times to contact those patients that did not respond.

By the end of the project, 22 participants remained of the initial 45. Despite multiple phone calls and use of the clinic's patient portal, the remaining 23 participants were unable to be contacted resulting in a much smaller final group than initially anticipated.

### **Outcome Data by Subtopic**

#### **Healthcare Expenditures**

This topic could not be evaluated due to the short length of the intervention and lack of data regarding healthcare expenditures.

#### **Depression Screening**

This project increased provider knowledge of the importance of depression screening. The number of patients screened for depression also increased during the project. The depression screening tool was standardized, with each patient being screened using the PHQ-9. Using a standardized screening tool allowed for a better assessment of depression.

#### **Depression Treatment**

This project increased provider knowledge of evidence-based depression treatment. Patients also received evidence-based pharmacological treatment due to this project. However, patients that desired to seek out psychotherapy voiced difficulty finding treatment.

#### **Comorbid Depression and Chronic Illness**

This particular connection was unable to be further evaluated due to the short length of the project.

## **Discussion**

### **Study Strengths**

The staff at the clinic was highly supportive of the project. The project leader informed the project preceptor's collaborating physician about the project and attempted to involve her patients. All patients with comorbid depression and chronic illness were treated using evidence-based treatment. The project made each provider more aware of the need to conduct a PHQ-9 on each patient, regardless of the reason for visit. Many patients with depressive symptoms were identified that might otherwise have been missed if a standardized screening initiative had not been implemented.

### **Results compared to evidence in literature**

In this intervention, there were more women than men affected by depression, which aligns with the literature (Smithson & Pignone, 2017; Waitzfelder et al., 2018). According to Tyrer et al. (2020), patients that received a prescription for an antidepressant received an SSRI. Consistent with the literature, most patients in this project were most often prescribed an SSRI, such as sertraline, fluoxetine, or escitalopram.

## **Limitations**

### **Internal Validity**

The project was originally intended to last for five months. However, the clinic where the project was conducted shut down in January, cutting the intervention period short by approximately two months. The global COVID-19 pandemic also affected the study, as some patients that would normally have come to the clinic for appointments changed to telehealth

appointments. If the patients had attended an in-person appointment, they could have completed the PHQ-9 on paper, rather than answering the questions asked by a health care provider. This could have affected the patients' answers, as they may have been hesitant to answer the questions completely honestly. The pandemic also caused isolation, which has proven to worsen depression (Louie et al., 2021; Taylor et al., 2018).

### **External Validity**

The small number of participants threatens external validity. Another threat to external validity is that only 1 of the 22 participants was not Caucasian. Having a fairly homogenous racial sampling limits how this study can be applied to the general population. The COVID-19 pandemic may have affected the project's validity, as many participants chose to stay home due to mask mandates and fear of contracting the illness.

### **Efforts to minimize study limitations**

One major limitation of the project was lack of participation by patients in follow up care. The project leader attempted three avenues of communication with patients (in person, telephone calls, and using the patient portal) to improve involvement. One consideration is that patients may have been at work when the project leader attempted contact, which could have discouraged communication.

### **Interpretation**

#### **Expected & actual outcomes**

The project's expected outcome was to evaluate the effectiveness of evidence-based screening and treatment of adults with comorbid depression and chronic illness. The actual outcome did show an improvement in PHQ-9 scores over the three months of the project. Pre-intervention PHQ-9 mean score was 5.82. Post-intervention PHQ-9 mean score was 4.64.

### **Intervention effectiveness**

The project effectively educated health care providers about evidence-based screening and treatment for depression. It was also effective in increasing the number of adult patients screened for depression. Those patients that screened positive for depression were offered appropriate, evidence-based treatment.

### **Intervention Revision**

An intervention modification that would improve the project would be a longer time frame. Patients would benefit from a longer length of time for treatment to be effective. Also, being able to see patients more than once in the office would increase the effectiveness of treatment. Another intervention modification that would improve the project would be to have a counseling service where patients could be referred and quickly receive services.

### **Expected & Actual Impact to Health System, Cost, & Policy**

The intervention was expected to increase the effectiveness of depression treatment while decreasing each patient's health care expenditures. The intervention was also expected to increase each health care provider's knowledge of the importance of screening each adult patient for depression and knowledge of best evidence-based treatment of depression for those identified needing intervention.

There was no cost associated with this intervention, as the clinic already used the PHQ-9. Paper copies were provided to patients that were there for their yearly appointment and the information was entered into the EHR later. The clinic already had the paper copies, which were able to be made for just a few cents. Patients in the office for reasons other than depression were given the electronic version of the PHQ-9. The lack of cost for this project lends itself to the easy

sustainability of the intervention. The largest cost for this project would have been the project preceptor's hours, which she donated, and the project team leader's hours.

### **Conclusion**

Depression and chronic illness have a bi-directional negative relationship. As the first point of contact for many patients, primary care providers must recognize depressive symptoms. Screening must be implemented to assist primary care providers in identifying patients that need management of depression. Once depressive symptoms have been identified, primary care providers must adhere to the evidence-based guidelines to provide timely, appropriate treatment. Improving the quality of life for those with depression and chronic illness is possible if the provider and the patient are willing to work together, following the guidelines.

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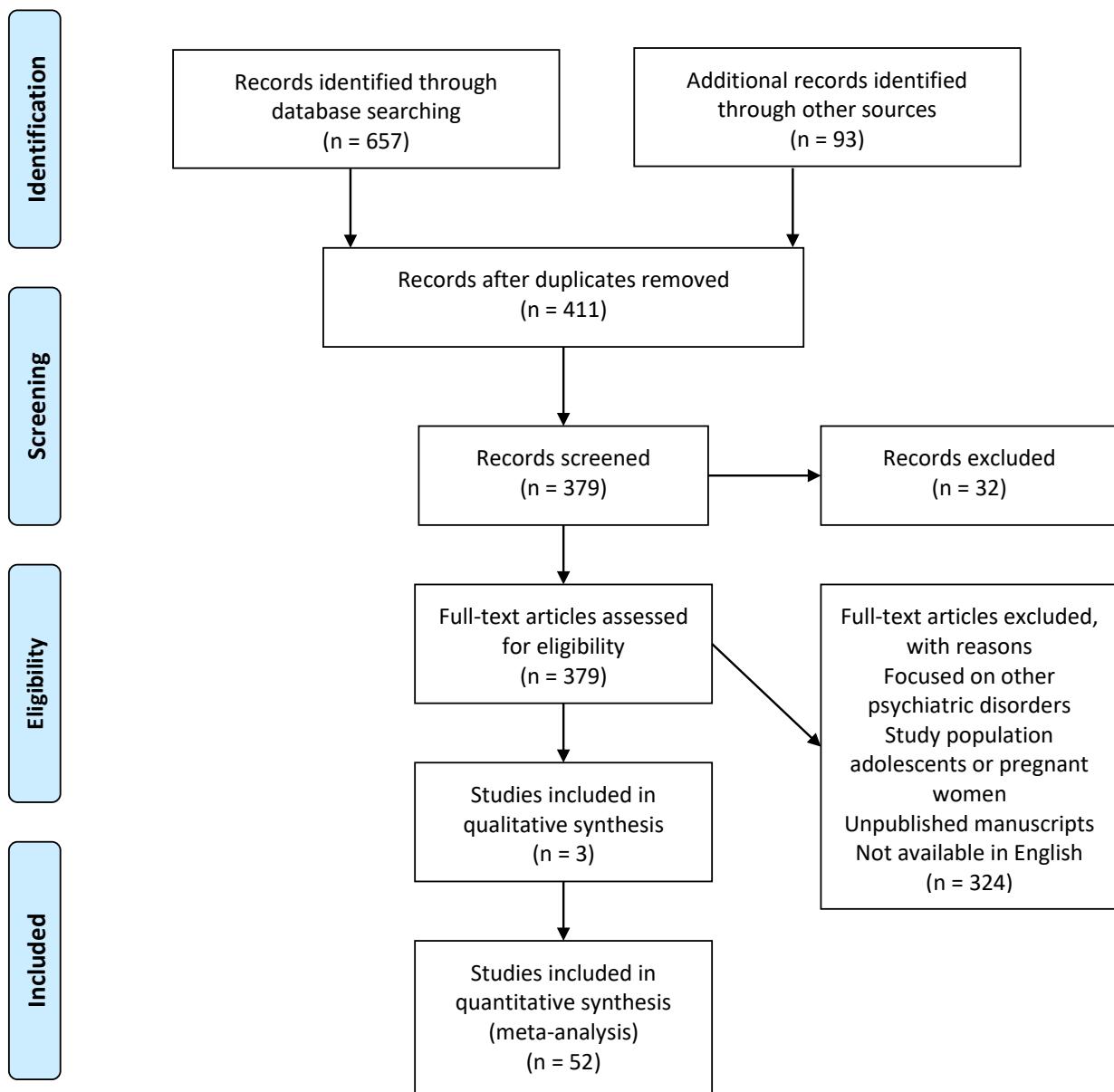
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**Appendix A****PRISMA 2009 Flow Diagram**

## Appendix B

First author, Year, Title, Journal	Purpose	Research Design <sup>1</sup> , Evidence Level <sup>2</sup> & Variables	Sample & Sampling, Setting	Measures & Reliability (if reported)	Results & Analysis Used	Limitations & Usefulness
<b>Increased health care expenditures in patients diagnosed with depression</b>						
Choi (2015). Effects of Depression on the Subsequent Year's Healthcare Expenditures Among Older Adults: Two-Year Panel Study. <i>Psychiatric Quarterly</i> .	Investigated changes in depression status over 2 years and examined whether having depression in Year 1 is associated with greater healthcare expenditures in Year 2 among community-dwelling older adults.	Cohort study, Level IV. Variables include depression status, healthcare and out of pocket expenditures, predisposing factors, enabling factors, and need factors.	1,740 older adults (65 years or older); Stratified, multistage, area probability sampling design with oversampling of ethnic minorities, and low-income families; Medical Expenditure Panel Survey.	Bivariate (characteristics by depression status; healthcare use and expenditure by depression status and service type) and multivariate (combined two-part models for the service types for which significant marginal effects of the depression status were found). 95% CI calculated with the STATA SVY commands.	People with depression spent more on health care than those without depression ( $p<0.01$ ).	Depression assessed only by PHQ-2 (self-report). No control for other mental health conditions or depression severity. Unable to assess extent or quality of depression services.  Realistic use related to depression persistence & economic burden.
Twomey (2015). A systematic review of the predictors of health service utilization (HSU) by adults with mental disorders in the UK. <i>BMJ Open</i> .	To identify variables that predict health service utilization (HSU) by adults with mental disorders in the UK, and to determine the evidence	Systematic review, Level I.	1,364 studies identified, 928 records screened after duplicates were removed, 133 full texts reviewed, leaving 28 studies.	n/a	The findings can help inform decisions about which variables might be used to derive mental health clusters in 'payment by results' systems in the UK. The findings also support the need to investigate	Limited to UK studies. Wide heterogeneity in the operationalization of health service utilization (HSU) by included studies, which limits the validity of

	level for these predictors.				whether combining broad diagnoses with care pathways is an effective method for mental health clustering, and the need for research to further examine the association between mental health clusters and HSU.	comparisons across studies. Quality of studies was mixed.  Structured checklists for assessments of study quality. 20% of abstracts were independently screened by another author in order to minimize bias and error.
Zhang (2016). Medication use patterns, health care resource utilization, and economic burden for patients with major depressive disorder in Beijing, People's Republic of China. <i>Neuropsychiatric Disease and Treatment</i> .	To investigate medication usage patterns, health care resource utilization, and direct medical costs of patients with major depressive disorder (MDD) in Beijing, People's Republic of China.	Retrospective analysis, descriptive, Level II. Treatment patterns, health care resource usage, direct medical costs, and major depressive disorder.	Deidentified random sampling of the Beijing Beijing Urban Employee Basic Medical Insurance claims database, 15,008 patients with MDD – 6,524 patients were excluded due to a diagnosis of schizophrenia, bipolar disorder, or cancer during the analysis period. A total of 8,484 patients were included in this study.	n/a	71.4% of patients were treated with antidepressant medications, with 45.4% non-adherence by the end of month 1 and 77% non-adherence by the end of month 2. The mean annual number of outpatient visits per patient was 31.5 for all causes. Descriptive statistics using SPSS 20.0 software.	Information on disease duration and severity, clinical effectiveness and reasons for changes to treatment, and side effects not available. Data specific to those enrolled in Beijing Urban Employee Basic Medical Insurance.  Emphasizes that short duration of appropriate treatment may contribute to high health care usage & costs.

Mausbach (2018). Mental health treatment dose and annual healthcare costs in patients with cancer and major depressive disorder. <i>Health Psychology</i> .	Evaluated the association between number of mental health visits and annual healthcare costs in patients with cancer and comorbid major depression.	Retrospective cohort study design, Level IV. Total charges served as the dependent variable and number of mental health visits was the primary independent variable.	182 individuals with an ICD-9 chart diagnosis of cancer in 2014 and with comorbid major depressive disorder identified through a retrospective electronic medical record (EMR) review of all patients within the University of California San Diego (UC San Diego) Health System with an ICD-9 chart diagnosis of cancer between January 1 and December 31, 2014.	Mean length of time between cancer diagnosis and depression diagnosis was 69.9 days (95% CI = 51.8–88.0 days). Majority of patients (n = 126; 69.2%) did not receive any mental health visits in the year following their cancer diagnosis. Significant association between number of mental health visits and annual healthcare charges ( $B = -0.03$ , Wald $\chi^2 = 4.11$ ; $p = 0.043$ ), with each additional visit associated with a 2.7% reduction in total healthcare charges.	A significant association was found between number of mental health visits and annual healthcare charges ( $\exp(B) = 0.973$ , 95% CI = 0.949–0.999; $p = .043$ ). Participants receiving 12 mental health visits had estimated mean annual healthcare charges of US \$71,244 (95% CI = \$38,586 - \$131,545), a difference of \$27,829 per patient in the first year after cancer diagnosis.	Small sample size. Relies on chart review, which could have misdiagnosis. Limited generalizability to the broader cancer population, particularly among those with less severe depression.  Realistic use. Encourages early detection and treatment of depression to decrease health care costs.
Tusa (2019). The profiles of health care utilization among a non-depressed population and patients with depressive symptoms with and without clinical depression. <i>Scandinavian Journal of Primary Health Care</i> .	To examine health service utilization profiles among a non-depressive population and patients with depressive symptoms with and without	Randomized control, Level II.	Control group: 414 patients without depression or depressive symptoms. 258 patients with depressive symptoms but no diagnosis of depression. 447	ANOVA, the Kruskal-Wallis test and a chi-square test. Bias-corrected and accelerated bootstrap estimation. Differences	Patients with DS regardless of their depression diagnosis used primary health care (PHC) services three times more than the controls ( $p<0.001$ ).	Population studied only included people 35 years of age & older. Unknown duration of symptoms prior to study.  Depression screening was

	clinical depression.		patients with diagnosis of depression. Central Finland Hospital District.	between means were tested by bootstrap-type ANOVA. 95% CI.		thorough and adequate. Able to assess primary and secondary health care services. Population geographically representative.
<b>Treating depression with psychotherapy and/or medication</b>						
Loeb (2012). Association of treatment modality for depression and burden of comorbid chronic illness in a nationally representative sample in the United States. General Hospital Psychiatry.	To explore the associations between both overall morbidity burden and individual chronic illness and treatment modality for depression.	Retrospective cross-sectional, Level IV. Dependent variables: no treatment (referent), psychotherapy only, antidepressant medication only, and both antidepressant medication and psychotherapy. Independent variables: morbidity burden and 5 specific chronic conditions (DM, CAD, CHF, HTN, & COPD/Asthma).	People over 16 years of age as of the end of the year 2008 with a self-reported diagnosis of depression. Sample consisted of 165,826 (Medical Expenditures Panel Survey) MEPS survey respondents from years 2004 to 2008.	MEPS person-level and variance adjustment weights using STATA 11. X2 tests were conducted to test for variation in rates of treatment modality across selected subgroups. Multinomial logistic regression. 95% CI.	The likelihood of any treatment for depression, specifically psychotherapy with medication, increased with the number of cooccurring illnesses.	Depression was only identified by 3-digit ICD-9 code, meaning severely depressed were likely not included. Lengths of therapy were not included. Many variables are based on self-report, including the diagnosis of depression  Excellent external validity provided by the nationally representative population- based sampling techniques used in the MEPS database.
Gallo (2013). Long term effect of depression care management on mortality in older adults: follow-up of	To investigate whether an intervention to improve treatment	Long term follow-up of a randomized control trial, Level II.	1,226 participants identified through two-stage, age	Linear & logistic regression with random effects. Cox proportional hazards regression.	Patients with major depression in intervention	Depression may have been downplayed by patients.

	cluster randomized clinical trial in primary care. BMJ.	of depression in older adults in primary care modified the increased risk of death associated with depression.	Major/minor depression vs. no depression, usual care vs. intervention.	stratified depression screening of randomly sampled patients. 396 had major depression, 203 had minor depression, 627 did not have depression. 20 primary care practices in New York City, Philadelphia, & Pittsburgh.	SAS version 9.1 and Stata version 12.0. $\alpha$ at 0.05.	practices were 24% less likely to die than were patients with major depression in usual care; hazard ratio 0.76.	Emphasizes the importance of integrating mental health care into primary care practices of managing chronic care.
Jogerst (2013). Predictors of Treatments Acceptable to Patients for Late-Life Depression. The Scientific World Journal.	Describe older patients' perceptions about depression and characteristics associated with acceptance of treatments.	Cross-sectional, Level IV. Attitudes about depression and depression treatment.	529 primary care patients from 3 primary care clinics in Iowa.	Depression screening tool (PHQ-9) and questionnaire including sociodemographic data, patient attitudes about depression, and acceptability of different treatments. 5-point Likert scale. Descriptive statistics. <i>t</i> -test and one-way ANOVA, chi-square. <i>P</i> value of 0.20 or less.	Accepting medications from primary physicians was strongly associated with a history of depression ( <i>P</i> < 0.01) and with agreeing that depression needs treatment ( <i>P</i> < 0.01). Counseling was not acceptable for those believing that they can control depression on their own ( <i>P</i> < 0.01). Older patients ( <i>P</i> < 0.001) and those with higher education levels ( <i>P</i> < 0.01) were less likely to accept herbs or	The sample was insured, lived in an area with accessible mental health resources, and did not report cost as a barrier to depression treatment.  Encourages depression screening in primary care among older people. Also encourages family involvement to help increase treatment acceptance & adherence.	

					supplements as treatment options.	
Alson (2016). Depression in primary care: Strategies for a psychiatry-scarce environment. <i>The International Journal of Psychiatry in Medicine</i> .	To present established guidelines for pharmacologic management of depression as part of a broader framework for depression treatment in the primary care office.	Expert opinion, Level VII.	n/a	n/a	n/a	Expert opinion only. Provides treatment options for treating depression effectively in primary care settings.
Magnani (2016). Treating Depression: What Patients Want; Findings From a Randomized Controlled Trial in Primary Care. <i>Psychosomatics</i> .	Compared the efficacy of SSRIS and interpersonal therapy in patients with MDD to highlight clinical & sociodemographic factors associated with patients' preference in depression treatment.	Randomized Control Trial, Level II. IPC vs. SSRI treatment, mild vs. moderate-severe depression.	170 patients recruited from university-based psychiatric consultation-liaison services dedicated to primary care physicians referred patients with depression	MINI Plus for diagnosis of depression, 21-item HDRS to assess severity. Chi-square test ( $\chi^2$ ) and t-test, Bonferroni correction for multiple comparison was applied to the significant level. SPSS version 22.0.	Patients were asked about their preference (IPC vs. medication) were randomized to treatment groups regardless. No advantage was found in those that were randomized to their preferred treatment. The remission rate for those in IPC was clinically significant ( $p=0.001$ ).	No record of previous treatments. No assessment of patient beliefs/opinions on depression treatment. Study excluded those with 2 or more previous depressive episodes. Study shows that improvement and/or remission is possibly even if not able to adhere to patient's preferential treatment.
Moise (2018). Interventions to Increase Depression Treatment Initiation in Primary Care Patients: a Systematic Review. <i>Journal of General Internal Medicine</i> .	To evaluate the recommendations for depression treatment.	Systematic review, Level I.	13,274 articles identified, narrowed down to 9,516 after removing duplicates. 156 full-text articles assessed. 142	Depression treatment initiation, treatment retention, and mean change in depressive symptoms.	Success of interventions (simple & complex), summary table	Only included English language studies, wide heterogeneity in outcome measurement, small number of trials within each strategy

			articles excluded for not meeting criteria. 14 qualitative synthesis articles reviewed.			Provides practical strategies for increasing depression treatment initiation in primary care.
Oluboka (2018). Functional Recovery in Major Depressive Disorder: Providing Early Optimal Treatment for the Individual Patient. International Journal of Neuropsychopharmacology.	To present recommendations for using a patient-centered approach to rapidly provide optimal pharmacological treatment to patients with major depressive disorder.	Literature review	Literature review from 2013 – 2018, 235 articles	n/a	n/a	Literature review only  Gives recommendations for early, optimized treatment of MDD. Advocates for patient-centered treatment approach.
Waitzfelder (2018). Treatment Initiation for New Episodes of Depression in Primary Care Settings. Journal of General Internal Medicine.	To describe patient characteristics associated with depression treatment initiation and treatment choice among patients newly diagnosed with depression in primary care settings.	Retrospective observational, Level II. Ethnicity, initiation of antidepressant medication, initiation of psychotherapy.	241,251 adult patients with new diagnosis of depression between 2010 & 2013 at primary care clinics over 5 health care systems in the US.	ICD-9 codes for depression. Treatment initiation was defined as a completed psychotherapy visit or a filled prescription for antidepressant medication within 90 days of diagnosis. PHQ-9 scores on the day of diagnosis. Measures include adjusted odds ratio (aOR) 95% CI, Charlson index, Wald tests to calculate the p	48% were NHW, 26% were Hispanic, 7% were non-Hispanic black, and 5% were Asian. aOR of treatment initiation 0.80 to 1.98 across all study sites. (35.7%) initiated treatment. Men had slightly higher odds for starting treatment than women (aOR 1.07, CI 1.05–1.09). depression is more common among women than men (8.2% vs. 4.6%).	Omission of any brief counseling provided by primary care physicians upon diagnosis. Little information about the reasons for failure to initiate treatment.  Collaborative care models can be cost effective and effective in improving depression management and outcomes. Collaborative care models are also effective for,

				values for the association between each variable and model outcomes. SAS version 9.4		including younger and older populations and racial minorities.
Santof (2019). Cognitive behaviour therapy for depression in primary care: systematic review and meta-analysis. Psychological Medicine.	To investigate the effect of CBT for patients with depression in primary care.	Systematic review and meta-analysis, Level I. CBT vs. control conditions, response rates, and remission rates. Individual therapy, group therapy, or therapist-guided self-help.	34 articles regarding CBT for depression treatment in primary care – 2,543 patients in CBT, 2,815 control patients. Studies were based in the US, UK, the Netherlands, Norway, and Spain, with 15% based in other unidentified countries.	CBT effect on depression in adult patients. 95% CI.	Pooled effect size was $g = 0.22$ [95% confidence interval (CI) 0.15–0.30] in favor of CBT. Analyses were done in R 3.4.4 with 50pprox.50 2.0-0. Controlled effect sizes on continuous measures were quantified as Hedges' $g$ .	Only 3 studies had low risk bias on all eligible bias criteria. Approximately half of the studies reported possible bias due to missing outcome data or inadequate handling of missing data, which may have distorted the outcome.  Indicates that CBT for depression is effective and sustainable in the primary care setting.
Zilcha-Mano (2019). Optimizing patient expectancy in the pharmacologic treatment of major depressive disorder. Psychological Medicine.	The first analysis to date of in-treatment expectancy during antidepressant treatment to identify its clinical and demographic correlates, typical trajectories, and associations with treatment outcome.	Two randomized control trials, Level II. Relationship of baseline patient characteristics with expectancy, Expectancy trajectories and their associations with clinical outcomes, Testing the relationships	128 patients, two antidepressant trials conducted at the Adult and Late Life Depression Research Clinic at the New York State Psychiatric Institute.	Decision tree analyses with the R 'party' package, using random forest variable selection and Monte Carlo simulation for multiple-testing adjustment. Cluster analysis, with the k-means common agglomerative clustering method,	Increased in-treatment patient expectancy significantly predicted decreased depressive symptoms at the following measurement ( $B = -0.45$ , $t = -3.04$ , $p = 0.003$ ). The greater the gap between expected treatment outcomes and actual depressive severity, the greater the	The range of in-treatment expectancy available for analysis was restricted to that naturally occurring in these trials. Relatively few number of baseline clinical and demographic variables available to predict pre-treatment and in-treatment

		between in-treatment expectancy and subsequent depressive symptom reduction, Identifying the optimal expectancy level for successful treatment as a function of symptom severity		using squared Euclidean distances. SAS PROC MIXED procedure, independent coefficients for within-patient and between-patients effects.	subsequent symptom reductions were ( $B = 0.49$ , $t = 2.33$ , $p = 0.02$ ).	expectancy. Limited by the relatively small sample size, the infrequency of expectancy assessment, the lack of sufficient data to test therapists' effect, and by the fact that the assessments are the result of secondary analyses of the combined data of two antidepressant trials.
Tyler (2020). Incidence of Depression and First-Line Antidepressant Therapy in People with Obesity and Depression in Primary Care. <i>Obesity</i> .	To describe age and gender specific incidence of depression, the dose-response relationship between BMI and risk of depression, and prescribing antidepressant	Retrospective cohort data analysis, Level II. Gender, BMI, and antidepressant class.	519,153 adult patients with overweight and obesity with no prior depression diagnosis in their records identified from a retrospective electronic health record	The study followed the Reporting of studies Conduct-ed using Observational Routinely-collected health Data (RECORD) statement check-list. Data was pulled from the Clinical Practice	Descriptive statistics for population characteristics and antidepressants prescribed. Incidence rate of depression per 1,000 person-years (and 95% Poisson CI) by age group and gender. Data was also stratified by obesity level	Relied on retrospective health records, which may have inaccurate coding/billing. Only explored relationship of BMI to depression. Study only included pharmacological interventions.

	medication in overweight/obese adults.		study using the Clinical Practice Research in the UK, followed up from 2000 to 2019.	Research Data-link, an electronic database of more than 11.3 million patients from 674 general practices in the UK, which is broadly representative of the national population in terms of age, gender, and ethnicity.	(overweight diagnosis or BMI 25-29; obesity diagnosis [obesity class I/obesity class I/obesity] or BMI 30-39; severe obesity diagnosis [obesity class III] or BMI 40+). A Cox proportional hazards model (using age as the time scale) was used to assess the dose-response relationship between BMI group and incident depression in relation to overweight (BMI 25-29; reference category).	Highlights relationship between elevated BMI & depression. Also highlights need for prescribing guidelines.
<b>Depression screening in primary care</b>						
Maradiegue (2013). Missed Opportunities in Primary Care: The Importance of Identifying Depression Through Screening, Family History, and Chronic Disease Management. Journal of Psychosocial Nursing & Mental Health Services.	Explored the adequacy of depression screening in a community health center.	Descriptive analysis, Level VI. Gender, relationship status, area of origin, education, occupation, family history, screening for depression, control of chronic illnesses, and missed	90 medical charts of individuals enrolled at a community health center in northern VA, randomly selected	Management of three chronic illnesses: type 2 diabetes, hypertension, and hyperlipidemia. <i>Control</i> was defined as an ideal blood pressure 120/80 mmHg, fasting blood glucose 100, and total cholesterol 200.	Family history information in the medical records was limited. No depression screening tool was noted in the medical records. 7 of the clients were given a diagnosis of depression and 44 had red flags for depression.	Small sample and lack of a control group limit generalizability. The reason for the failure to screen, despite having a system in place, is unclear.  Highlights need to focus on depression screening as part of preventative care and management of chronic disease.

		opportunities for preventive care.				
Gates (2016). You can't treat what you don't diagnose: An analysis of the recognition of somatic presentations of depression and anxiety in primary care. Families, Systems, & Health.	To quantify and compare the frequency of the diagnosis of depression and anxiety in patients with a somatic reason for visit among primary care physicians across disciplines.	Descriptive study, Level VI. Rates of anxiety, rates of depression, somatic symptoms (back pain, general pain, stomach pain, nausea, headache, chest pain, fatigue, digestive problems, & other unidentified complaints).	259,398 office visits. 15,934 visits were for a somatic complaint. Obtained data from National Ambulatory Medical Care Survey from 2002 to 2010.	Charts were evaluated for ICD-9 codes pertaining to depression or anxiety. They were also evaluated to determine whether or not depression screening was done.	Depression screening in primary care was low - .9 (.7–1.1) ref. It was also low in internal medicine clinics – 1.9 (1.4–2.5) p <.05. Across all primary care specialties, less than 2% of patients were screened for depression. Significance tests were calculated using Wald's chi-square tests adjusted for sample weights. This analysis was conducted with Stata 14.0.	Study included OB & pediatric offices. Results were limited due to data coming from chart reviews, as some providers are reluctant to include an ICD-9 code for mental health disorders.  Realistic use. Highlights potential gaps & under-diagnosis in mental health problems that present in primary care.
Siu (2016). Screening for Depression in Adults: US Preventive Services Task Force Recommendation Statement. JAMA.	Gives a summary of evidence and makes recommendations for depression screening.	Expert opinion, Level VII.	Adults 18 years and older, US	n/a	Screen for depression, with adequate systems in place to ensure accurate diagnosis, effective treatment, and appropriate follow-up. Grade: B	Expert opinion  Realistic use
Thombs (2016). Sample sizes and precision of estimates of sensitivity and specificity from primary studies on the diagnostic accuracy of depression screening tools: a survey of recently published studies: Sample size in diagnostic	Survey of recently published studies on depression screening tool accuracy to evaluate the percentage with sample size	Systematic review, Level I.	89 studies, most from Asia, Europe, or North America.	MEDLINE search from January 1, 2013 to March 27, 2015. Eligible studies were published in any language. Two investigators independently	Only seven (8%) mentioned a sample size calculation, and only three (3%) described a viable method for a precision-based sample size calculation. Only 30	Only MEDLINE was used in the study search. The included studies were published in many different journals and reported on a wide

	accuracy studies. International Journal of Methods in Psychiatric Research.			reviewed studies for eligibility. If either reviewer deemed a study potentially eligible based on title and abstract review, full text review was conducted. Any disagreements after full-text review were resolved by consensus.	studies (34%) provided reasonably accurate confidence intervals for estimates of sensitivity and specificity. For specificity, 45% of studies had 95% confidence intervals with widths of 10% or less, and only 7% had widths of more than 20%.	range of depression screening tools.  Realistic use. Emphasizes that the standard “cut off” scores for diagnosing depression may be skewed due to small samples.
Akincigil (2017). National Rates and Patterns of Depression Screening in Primary Care: Results From 2012 and 2013. <i>Psychiatric Services</i> .	Examined national rates and patterns of depression screening among visits to office-based primary care physicians.	Secondary analysis of data, Level II. Patients' age, sex, race-ethnicity, and number of chronic illnesses diagnoses, payment source, urban-rural differences in the prevalence of psychiatric disorders, and patients with more than one visit within the last 12 months and those presenting for care for the first time in 12 months.	131,203 visits were included in the 2012 and 2013 NAMCS, narrowed down to 33,653 visits, corresponding to a national estimate of 630 million visits.	Depression screening. 59-item checklist of medical services provided during the appointment, including depression screening. It was also presumed that a screening was done if there was a diagnosis of depression (since previously diagnosed depression was excluded from the study). Stata statistical software, using survey commands with Taylor-linearized variance estimation and correcting for the complex	Univariate statistics, bivariate differences in rates of depression screening by independent variables were tested by Pearson chi-square tests. Multivariate logistic regression. 4.2% of adults were screened for depression. A total of 47% (N=679) of visits in which screening took place resulted in a new depression diagnosis. Screening rates varied significantly by race-ethnicity, age, and the practice's use of I. Medically complex patients were screened	The NAMCS data include only a dichotomous indication of depression screening, making it impossible to know how screening was subjectively defined by providers. Amount of depression screening may have been underestimated. Unable to make causal inferences.  Highlights areas where depression screening can be significantly improved. Also demonstrates that EHRs can be very

				sampling design. An alpha of .05 was used to indicate significance.	more often: each additional chronic condition increased the odds of screening (AOR=1.51).	helpful in depression screening.
Goldberg (2017). Screening for anxiety, depression, and anxious depression in primary care: A field study for ICD-11 PHC. Journal of Affective Disorders.	Testing the usefulness of two five-item screening scales for anxiety and depression to be administered in primary care settings.	Cross-sectional descriptive, Level IV. Dep5 scale, Anx5 scale, country, gender, age.	1488 patients that PCPs felt might be psychologically distressed in primary care settings in Brazil, the People's Republic of China, Mexico, & Pakistan.	Dep5 score, Anx5 score, Cutoff scores were selected by using the Youden index using R statistical software Version 3.1.3.	A score of 3 or more on one or both screening scales predicted 89.6% of above-threshold mood or anxiety disorder diagnoses on the CIS-R. Anxious depression was the most common CIS-R diagnosis among referred patients. However, there was an exact diagnostic match between the screening scales and the CIS-R in only 62.9% of those with high scores. Chi-square analyses. SPSS software Version 19 and STATA.	Participants were only screened if the PCP suspected psychological distress. Not a representative population sample. Realistic use. Shows that even simple screening tools can help guide judgement for further evaluation and need for treatment.
Beebe (2018). Primary Care Depression Screening: Relationship to Chronic Pain and Gender. The Journal for Nurse Practitioners.	Evaluated annual depression screening in a rural primary care clinic and relationships among depression, chronic pain, and gender.	Qualitative study, Level VI. Patient's depression screening scores, age, gender, psychotropic medication use, current psychotherapy, pain medication use,	Convenience sample of 53 men and 49 women were screened for depression, 29 patients scored positive. Primary care clinic in Midwest town of 55	Descriptive design was used to answer the following research questions: How effective is depression screening using the PHQ-9? What is the relationship among depression, chronic pain, and gender	Implementing depression screening in this rural primary care clinic resulted in a depression detection rate of nearly 30%, and 10% of these patients had not been previously diagnosed with depression. For	Researchers were not familiar with the clinic & its workflow. Inconsistency in data collection. PHQ-9 was self-administered. Small sample size. Highlighted frequent comorbidity of

		pain intensity score, change in depression treatment, and change in pain medication on the patient data collection sheet.	approximately 9,000.	in patients screened with the PHQ-9?	patients with positive PHQ-9 scores, 82.7% were receiving treatment for chronic pain, either prescription opioid or non-opioid medications. More than half (55.2%) were receiving both psychotropic medication and chronic pain treatment.	chronic illness, particularly pain, & depression. Also highlighted the importance of screening ALL patients, as staff reported surprise at some of the positive screens.
El-Den (2018). The psychometric properties of depression screening tools in primary healthcare settings: A systematic review. Journal of Affective Disorders.	Aimed to explore the psychometric properties of depression screening tools.	Systematic review, Level I.	60 publications, which included 48,234 adults spanning 24 countries and 18 languages.	Records were retrieved by searching MEDLINE, PubMed, EMBASE and PsycINFO and through automatic alerts, from 1995 to October 2015.	The Patient Health Questionnaire-9 was the most evaluated tool with 14 studies evaluating its psychometric properties. Fifty-four studies reported on at least one measure of receiver operating characteristics. Sensitivity and specificity values ranged from 28% to 100% and 43% to 100%, respectively. Cronbach alpha values ranged from 0.56 to 0.94.	Including studies regardless of methodological quality or design may have limited generalizability.  Had tight inclusion & exclusion criteria. Supports the need for a standardized depression screening tool to allow for stronger, standardized treatment recommendations across various primary care practices.
Indu (2018). Reliability and validity of PHQ-9 when administered by health workers for depression screening among women in	To estimate the reliability and validity of PHQ-9, when administered by health workers, a	Descriptive, Level VI. Age group, family type, marital status, education level.	238 women between 18 & 60 years of age. Family welfare sub-centers and the outpatient	Internal consistency reliability of PHQ-9 measured by Cronbach's alpha was 0.898. Inter-	PHQ-9 has good reliability and at cut off score >9, it has good validity to identify depression in primary care.	PHQ-9 had to be translated to Malayalam. Small sample size. Only women up to age 60

primary care. Asian Journal of Psychiatry.	cadre of public health staff, posted in primary health centers.		clinics of Medical College Health Unit, Pangappara, attached to Govt Medical College, Trivandrum.	rater reliability determined by intra-class correlation coefficient was 0.945 (95% CI of 0.865-0.978).	Sensitivity of 82.5%, (95% CI, 72.4-92.6), specificity of 90.1% (95% CI, 84.5-95.6%), positive predictive value of 73.4% (95% CI, 62.4-84.4%) and negative predictive value of 93.9% (95% CI, 90.2-97.6%).	were included in this study.  Realistic use. Highlights the validity and sensitivity of the PHQ-9 to detect depression.
Maurer (2018). Depression: Screening and Diagnosis. American Family Physician.	To advocate for more depression screening across all age groups.	Expert opinion, Level VII.	n/a	n/a	n/a	Expert opinion only.  Highlights economic burden of depression. Highlights the serious lack of depression screenings being conducted in primary care. Details somatic symptoms that may present with depression.
Mulvaney-Day (2018). Screening for Behavioral Health Conditions in Primary Care Settings: A Systematic Review of the Literature. Journal of General Internal Medicine.	To identify and evaluate publicly available, psychometrically tested tools that primary care physicians can use to screen adult patients for common mental and substance use disorders.	Systematic review, Level I.	24 screening tools (13 with 5 or less items, 11 longer tools).	Limited to articles published in English from 2000 through 2015.	Multiple-disorder tools may uncover behavioral health conditions and information about psychological functioning not detected by single-disorder tools. Shorter, single-disorder tools provide the flexibility to assess conditions	Some tools may have been missed, as new ones are continually being developed. Due to study design, information about the tools' psychometrics with particular subgroups may have been missed.

					most often encountered and give brief protocol tailored to specific needs.	Provides information about various screening tools that can be implemented into primary care.
Pettersson (2018). The Mini-International Neuropsychiatric Interview is useful and well accepted as part of the clinical assessment for depression and anxiety in primary care: a mixed-methods study. BMC Family Practice.	To explore the experiences of and perceptions of the paper-and-pencil version of the MINI among staff and patients for patients with problems suggestive of depression or anxiety disorders in Swedish primary care centers (PCCs).	Mixed-methods study, Level V.	125 patients, three primary care clinics in Stockholm from February 2014 to March 2015.	Patient perceptions of the MINI.	The median satisfaction among patients (n = 124) was 80 (IQR 64 to 92), with a range from 0 to 100. For the interviewers (n = 115 assessments), the median satisfaction was 86 (IQR 75 to 95), with a range from 25 to 100.	Very small sample size. Concerns for validity.  The MINI helped to obtain a complete picture and to identify psychiatric comorbidities, including stigmatizing disorders.
Christensen (2019). Diagnosing depression in primary care: a Rasch analysis of the Major Depression Inventory (MDI) in a clinical sample of primary care patients.	To assess the measurement properties of the Major Depression Inventory (MDI) in a clinical sample of primary care patients.	Descriptive statistics, Level VI.	350 total records (363 respondents with 13 excluded for various reasons), 50 general practice offices in Central Denmark	The overall fit to the Rasch model, individual item and person fit, and adequacy of response categories were tested. Statistical tests for local dependency, unidimensionality, differential item functioning, and correct targeting of the scale were performed. The person separation reliability index was calculated. All	The overall fit was evaluated using the total chi-square item-trait interaction statistics for the MDI. Adequacy of the response categories: Threshold maps and category probability curves were examined to identify disordered thresholds as a potential cause of misfit. Standardized fit residual values; Individual item chi-square fit statistics	Participants limited to 18 – 65 years old, may not be fully representative.

				analyses were performed using RUMM2030 software.	were also assessed using a Bonferroni-adjusted alpha level. Paired t tests were performed to compare the scores on the two subsets of items for each person in the sample. DIF was examined for each item with respect to age (dichotomized at a median of 55 years) and gender using analysis of variance with a Bonferroni-adjusted alpha level.  Likelihood ratio test ( $p < 0.05$ )	
Samples (2020). The Role of Screening in Depression Diagnosis and Treatment in a Representative Sample of US Primary Care Visits. Journal of General Internal Medicine.	To examine depression screening patterns and the role of screening in depression diagnosis and treatment in the outpatient primary care setting.	Cross-sectional analysis, Level IV. Descriptive characteristics of sample participants, depression screening, depression diagnosis, depression treatment.	Sample included the first visit in the past year to a primary care provider by patients 12 years and older (N = 16,887), 2005 to 2015 National Ambulatory Medical Care Survey (NAMCS), a cross-sectional survey of outpatient	Visits were included if the reason for the visit was for a new problem or preventive care. One to three diagnoses were recorded for each patient visit and an additional item asked, "Regardless of the diagnoses previously listed, does the patient now have depression?"	Visits were associated with higher odds of depression screening if a depressive symptom was the primary complaint (OR = 5.32, $p < 0.001$ ). Visits were associated with higher odds of depression diagnosis if screening was conducted (OR = 4.20, $p < 0.001$ ) or if a depressive symptom was the primary	Very limited information on provider or practice characteristics were available. Lifestyle factors or the patient's affect may influence the provider's decision to use depression screening. Inability to determine the specific screening method used or the results of screening.  Realistic use. Highlights the significant impact of

			visits to physician offices.		complaint (OR = 7.63, p < 0.001). Visiting providers who screened at higher rates was associated with increased odds of depression diagnosis (OR = 1.99, p < 0.001) and treatment (OR = 1.61, p = 0.001), corresponding to a 4.8 percentage-point higher probability of depression diagnosis (95% CI = 2.9–6.8, p < 0.001) and a 5.3 percentage-point higher probability of depression treatment (95% CI = 3.1–7.5, p < 0.001) compared to visits to providers with lower screening rates. Syv suite of commands in Stata statistical software, Version 15.	screening in the primary care setting.
<b>Occurrence of comorbid chronic illness and depression</b>						
Karakus (2011). Depression and the Onset of Chronic Illness in Older Adults: A 12-Year Prospective Study. The	To evaluate the relationship between depression at baseline and new onset of chronic	Descriptive cohort study, Level IV. Dependent variables: heart problems,	3,645 participants age 50 – 62 at the start of the study with no chronic medical	Coefficient alpha for the CES-D was found to be 0.86, Ordinal logistic regression, RAND HRS	Having depression increases the probability of reporting arthritis by 10.0%, the probability of	Loss of a large number of subjects from baseline, selecting individuals based on this health status

Journal of Behavioral Health Services & Research	illnesses including cancer, heart problems, arthritis, and diabetes.	arthritis, diabetes, or cancer. Independent variable: depression status at baseline	conditions, but were at risk for arthritis, heart problems, diabetes, and cancer.		reporting heart problems by 8.8%, and the probability of reporting diabetes by 5.0%. Older adults with depression (but without any of the four chronic illnesses) at baseline are 1.77 times more likely to have an additional chronic illness.	may result in an underestimation of the association between depression and chronic illness since there may be more individuals among the excluded sample with poor health.  Realistic use. Shows clear relationship between depression and the development of some chronic illnesses.
Alderson (2012). How patients understand depression associated with chronic physical disease – a systematic review. BMC Family Practice.	To understand people's beliefs about depression, particularly in the presence of chronic physical disease.	Mixed method systematic review, Level I.	65 reviews from January 1950 – December 31 <sup>st</sup> , 2010.	Nvivo8	A range of clinically relevant beliefs was identified from 65 studies including the difficulty in labeling depression, complex causal factors instead of the biological model, the roles of different treatments and negative views about the consequences of depression. Other important themes less related to ideas about illness: the existence of a self-sustaining 'depression spiral'; depression as an existential state; the ambiguous status of	Limiting the scope of this review to primary care may have meant that potentially relevant studies were missed. Absence of established methodological consensus.  Comprehensive search strategy, the development of themes from methodologically robust studies, the systematic approach to synthesis and the integration of both qualitative and quantitative data.

					suicidal thinking; and the role of stigma and blame in depression.	
Chakraborty (2012). Psychological and clinical correlates of functional somatic complaints in depression. International Journal of Social Psychiatry.	To examine the clinical and psychological correlates of functional somatic complaints in patients with first episode depression.	Descriptive study, Level VI. Gender, marital status, education level, occupation, income, religion, family type, locality. Age at illness onset, length of illness, melancholic symptoms, suicidality, family medical and psych history, depression treatment.	50 patients of first-episode unipolar depression aged 18 to 50 years, with duration of depression of more than one month, with no comorbid psychiatric disorders and comorbid medical illnesses, and at least one symptom on Bradford Somatic Inventory, North India.	Descriptive analyses, correlation analysis was done for the inferential analysis. Pearson's product moment correlation analysis was done between parametric variables, Spearman's rank order correlation analysis, multivariate regression analysis Statistical Package for the Social Science Version 14.	A significant positive correlation (Pearson's product moment value = 0.362, $p < 0.01$ ) was found between severity of depression and number of functional somatic complaints. The most commonly reported functional somatic complaints were a lack of energy (weakness) much of the time (98%) and feeling tired when not working (82%).	Small sample size and study setting (outpatient in a tertiary care hospital). Realistic use. Highlights that functional somatic complaints are more prevalent in patients with higher severity of depression.
Alderson (2014). Patients understanding of depression associated with chronic physical illness: a qualitative study. BMC Family Practice.	Explored patient beliefs about the nature of depression associated with physical illness, as patient beliefs may affect detection and subsequent engagement with management.	Qualitative study, Level VI. Gender, age, ethnicity, employment status, chronic disease, history of low mood, HAD score.	26 patients with coronary heart disease and/or diabetes were systematically sampled from two urban general practices in Leeds, UK.	Six main themes were developed reflecting how participants described depression. They fit into two categories of beliefs; those that fit with conceptualizing depression as an illness, and those that do not.  Nvivo8	Recognizing a problem, complex causality, role of primary care, responsibility for depression, resilience, and understanding the life-story.	Not a representative sample. Only focused on DM & CHD for chronic illnesses.  Using open-ended questions allowed patients to really share their personal experience, versus yes/no questions.

<p>Choi (2014). The relationships among depression, physical health conditions and healthcare expenditures for younger and older Americans. <i>Journal of Mental Health.</i></p>	<p>Examined the paths and the extent to which depression in conjunction with a physical health problem is associated with an increase in healthcare expenditures and how that is different between younger and older adults.</p>	<p>Retrospective analysis, Level II. Age, income, and education as continuous variables. Four dichotomous variables (yes/no): having Medicare, Medicaid, and private insurance, and being uninsured for all of the past 12 months. Total all-cause healthcare expenditures served as the main dependent variable.</p>	<p>16,384 individuals including 13,207 younger adults (18–64) and 3177 older adults (65+). 2007 Medical Expenditure Panel Survey.</p>	<p>Depression status and physical health conditions were identified through ICD-9 codes. The multiple group structural equation modeling (SEM) was employed to examine the moderated mediation effects. Multiple group structural equation modeling. Chi-square test, Comparative Fit Index (CFI; good model =/<math>&gt;0.95</math>), and Root Mean Square Error of Approximation (RMSEA; good model =/<math>&lt;0.06</math>). SEM analyses were conducted using M-Plus.</p>	<p>ICD-9 codes and the Charlson Comorbidity Index (CCI) was employed to account for the severity of physical health conditions per participant. 11.3% of the U.S. adult population is estimated to have clinical depression based on the ICD-9 criteria. Depressed individuals had greater health care expenditures when compared to those without depression (\$7829 versus \$3917 for younger group, <math>p&lt;0.001</math>; \$17 147 versus \$8794 for older groups, <math>p&lt;0.001</math>).</p>	<p>Utilization of the CCI to examine physical health conditions and its severity among the study sample. Depression measure in this study was based on self-report and did not capture symptom severity.</p> <p>Realistic application. Findings of this study suggest that proper detection and treatment of depression is beneficial in reducing overall healthcare expenditures, especially among older adults.</p>
<p>Di Benedetto (2014). Comorbid depression and chronic illness related to coping and physical and mental health status. <i>Psychology, Health &amp; Medicine.</i></p>	<p>To evaluate the role of coping resources, depression, diet and exercise on mental and physical health status.</p>	<p>Partial latent structural regression analysis &amp; cross-sectional, Level IV.</p> <p>Demographic and lifestyle variables, depression, mental health, physical health, coping resources</p>	<p>59 females and 54 males over the age of 18 that wanted to make a lifestyle behavior change and had any of the following: DMII, high cholesterol, hypertension or</p>	<p>Self-report measure of demographic and lifestyle behavior, HAD scale IC .82 – .90, CRI, SF-36 Cronbach alpha for depression, coping, mental health and physical health were .79, .93, .92 and .91, respectively.</p>	<p>Mental and physical health statuses were both strongly correlated with each other. All the parameters were statistically significant at <math>p &lt; .05</math>. Higher levels of depression predicted lower levels of mental and physical</p>	<p>Causality cannot be assumed due to cross-sectional data and all measures used were subjective. Small sample size.</p> <p>Realistic use. Highlights the importance of appropriate coping mechanisms to</p>

		(cognitive, social, spiritual, physical, emotional).	recent heart attack or stents. Victoria, Australia.	PASW statistics version 17.	health after controlling for the direct effect of coping (standardized coefficient = $-.53$ , [SE = $.09$ ], $p < .001$ and standardized coefficient = $-.51$ , [SE = $.08$ ], $p < .001$ , respectively).	improve physical, mental, & emotional health.
Alderson (2015). Understanding depression associated with chronic physical illness: a Q-methodology study in primary care. British Journal of General Practice.	To identify socially shared viewpoints of comorbid depression, and characterize key overlaps and discrepancies.	Q-methodology study, Level VI. Gender, age, ethnicity, employment status, chronic physical illness, HAD score.	31 patients who had depression within the previous 5 years and one or both of CHD or diabetes from three practices and community clinics in Leeds, UK.	Participants ranked a Q-set of 57 statements developed from a systematic review and an interview study, which explored patients' understanding of depression associated with chronic illness.  Q-sorts were entered into Q-methodology software (PQMMethod, version 2.09).	Overwhelmed resources, something medical or within me, shameful weakness, part of who I am, recovery oriented.	Limited generalizability.  Realistic use.
Bekhuis (2016). The impact of somatic symptoms on the course of major depressive disorder. Journal of Affective Disorders.	This study examines the impact of somatic symptoms on MDD prognosis and aims to determine whether this effect can be explained by	Cohort study, Level IV. Age, gender, marital status, education level, employment status, cardiopulmonary somatic symptoms,	463 patients selected with a diagnosis of MDD in the six months prior to the second interview with valid data on somatic symptoms from	Self-report somatization scale of the Four-Dimensional Symptom Questionnaire, the current severity of depressive symptoms was assessed with the	The cardiopulmonary, gastrointestinal, and general cluster significantly predicted the two-year persistence of MDD, but only when two or more of these clusters were present	Assessment of somatic symptoms did not include their duration, while this is strongly associated with the course of MDD. The assessment of most baseline factors was based on self-report

	psychiatric characteristics, somatic diseases, lifestyle factors, and disability.	musculoskeletal somatic symptoms, gastrointestinal somatic symptoms, general somatic symptoms.	the Netherlands Study of Depression and Anxiety.	16-item Quick Inventory of Depressive Symptomatology Self-Report	(OR 2.32, 95% CI 1.51– .57,p= <0.001). The presence of multiple somatic symptom clusters remain a significant predictor after considering all potentially underlying factors (OR 1.69,95% CI 1.07–2.68,p=0.03). SPSS version 22.0	questionnaires, which might have resulted in recall and social desirability bias.
Costa (2016). Illness perceptions are the main predictors of depression and anxiety symptoms in patients with chronic pain. Psychology, Health & Medicine.	To investigate the predictive value of pain variables, marital adjustment and illness perceptions on depression and anxiety in patients with chronic pain.	Cross-sectional study, Level IV. Age, gender, marital status, level of education and work status, medical diagnosis, other health problems, health status, duration of pain, pain intensity and pain-related disability.	200 participants were recruited from a Hospital Pain Unit in Northern Portugal.	Descriptive analysis, mean and standard deviation, absolute and relative frequencies, <i>t</i> -tests, Chi-square tests, Pearson product-moment correlation coefficients, hierarchical regression analyses, four-point Likert scale (internal consistency	Women have more depressive symptoms; $r = -.260$ ; $p < .01$ . Pain intensity/disability and illness perceptions were the most important predictors of depression and anxiety symptoms. Predictors for depression and anxiety to be the same for both genders. Pain disability index IC	Cross-sectional nature what makes it difficult to make causal inferences. Findings are limited by the validity of the self-reported data. Data was only collected in Portugal. Small sample size.

				was between .88 and .90).	.93. Revised dyadic adjustment scale IC .96. Illness perception questionnaire (brief) IC .88-.90.	depression and anxiety in chronic pain patients. Realistic use.
Park (2016). Factors associated with depression among elderly Koreans: the role of chronic illness, subjective health status, and cognitive impairment: Associated factors of elderly depression. Psychogeriatrics.	To investigate the relationship between depression in elderly individuals and chronic illness, subjective health status, and cognitive impairment.	Cross-sectional study, Level IV.	10,674 participants, 65 & older, randomly selected from the dataset of the Survey of Living Conditions and Welfare Needs of Korean Older Persons.	Chronic illness, subjective health status, and cognitive impairment were significant factors associated with depression.	Subjective health status showed the highest OR (OR for bad subjective health status = 4.290, $P < 0.001$ ), followed by chronic illness (OR for three or more chronic illnesses = 1.403, $P < 0.01$ ) and cognitive impairment (OR = 1.347, $P < 0.001$ ) in the final model. Interestingly, the significant association between chronic illness and depression was attenuated (OR for three or more chronic illnesses = 1.403, $P = 0.01$ ) or even disappeared (OR for two chronic illnesses = 1.138, $P = 0.274$ ; OR for one chronic illness = 0.999, $P = 0.996$ ) after adjustment for subjective health status.	Did not investigate the onset age or duration of chronic illness, subjective health status, cognitive impairment, and current depressive episode. Missing data may lead to selection bias and limit the generalizability of our findings.  Large representative sample using household sampling procedures, the robust response rate, and the sizable sample of elderly subjects aged 65 years and older as well as over the age of 80.
Mausbach (2017). Depression and healthcare service utilization in	To determine the impact of depression on	Retrospective cohort study, Level IV. Age,	5,055 patients with an ICD-9 diagnosis of	Extracted demographics included patient	Depressed patients had significantly more annual non-	Only included visits inside the UC San Diego healthcare

patients with cancer: Depression, cancer, and healthcare utilization. Psycho-Oncology.	overall healthcare utilization among patients with cancer.	gender, race/ethnicity, insurance type, medical comorbidities, length of time with cancer, & metastatic status.	cancer diagnosed between Jan 1 and Mar 31, 2011 at University of California San Diego Healthcare System	age, gender, and race/ethnicity. Number of visits with non-mental health healthcare providers in the UC San Diego healthcare system in the year 2011. Charlson Comorbidity Index score. Private insurance carrier, Medicare, or Medi-Cal (California's Medicaid program), and Self-pay.	mental health provider healthcare visits (aRR = 1.76, 95% CI = 1.61–1.93), and were significantly more likely to have an ED visit (OR = 2.45; 95% CI = 1.97–3.04), overnight hospitalization (OR = 1.81; 95% CI = 1.49–2.20), and 30-day hospital readmission (OR = 2.03; 95% CI = 1.48–2.79) than non-depressed patients with cancer. T-tests, Cohen's d effect size, Mann-Whitney U tests, Negative binomial regression was used to evaluate the adjusted incidence rate ratio (aRR) of depression.	system. Did not have information on reason for ED visits or hospitalizations.  Large sample size. Realistic use.
Read (2017). Multimorbidity and depression: A systematic review and meta-analysis. Journal of Affective Disorders.	To investigate the relationship between multimorbidity and depression.	Systematic review and meta-analysis, Level I. Multimorbidity, no health problems, risk of depressive disorder with chronic medical conditions, relationship between number	40 full-text peer-reviewed studies in English	A variety of depression measures were used. Measurement of chronic physical conditions also varied considerably.	The risk for depressive disorder was twice as great for people with multimorbidity compared to those without multimorbidity [RR: 2.13 (95% CI 1.62–2.80) p<0.001] and three times greater for people with multimorbidity	Most studies used self-report methods. Studies varied in the number of chronic medical conditions assessed. All studies were cross-sectional, so causality cannot be established. Shows that depression is two to three times more likely in people with

		of chronic medical conditions and depressive disorder			compared to those without any chronic physical condition [RR: 2.97 (95% CI 2.06–4.27) p<0.001]. There were 45% greater odds of having a depressive disorder with each additional chronic condition compared to the odds of having a depressive disorder with no chronic physical condition [OR: 1.45 (95% CI 1.28–1.64) p<0.001]. A significant but weak association was found between the number of chronic conditions and depressive symptoms [ $r = 0.26$ (95% CI 0.18–0.33) p<0.001].	multimorbidity compared to people without multimorbidity or those who have no chronic physical condition. Raises awareness of the relationship between multimorbidity and depression.
Mausbach (2018). Health care costs of depression in patients diagnosed with cancer. Psycho-Oncology.	To estimate the added cost of depression in cancer patients in the first year after cancer diagnosis.	Quasi-experimental, Level III. Cancer patients with and without depression, age, sex, comorbid diseases, race/ethnicity, and presence of metastatic disease.	2,051 depressed and 11,182 nondepressed patients diagnosed with cancer during 2014 in the UC San Diego Healthcare System.	Depressed cancer patients incur significantly higher health care charges across multiple cost categories including ambulatory care, emergency department visits, and hospital visits.	Depressed cancer patients had total annual health care charges that were 113% higher than nondepressed cancer patients ( $B = 0.76$ ; $P < .001$ ). The estimated mean charges for depressed patients were \$235 337 compared with \$110 650 for	Could not ascertain true prevalence, incidence, and severity of depression based on ICD - 9 code. Unable to ascertain critical information regarding cancer severity. Unable to determine causality of higher total healthcare costs for patients with cancer.

					nondepressed patients. Depressed cancer patients incurred greater charges than nondepressed patients in ambulatory care ( $B = 0.70$ ; $P < .001$ ), emergency department charges ( $B = 0.31$ ; $P < .001$ ), and hospital charges ( $B = 0.39$ ; $P < .001$ ).	Realistic use. Large sample size and the use of EMR.
Zhao (2018). Somatic symptoms vary in major depressive disorder in China. <i>Comprehensive Psychiatry</i> .	To investigate the clinical characteristics of somatic symptoms of patients in China who suffer from major depressive disorder (MDD).	Descriptive study, Level VI.	3273 patients recruited between August 2014 to February 2015 from 16 psychiatric hospitals and 16 general hospitals in China.	The major somatic symptoms in patients with MDD in China were insomnia (64.6%), pre-verbal physical complaints (46.9%), weight loss (38.5%), low appetite (37.6%), circulatory system complaints (31.3%), headache (31.3%), hyposexuality (31.0%), gastrointestinal symptom complaints (29.6%), and respiratory system complaints (29.6%).	Female patients with MDD exhibited a higher probability of having pre-verbal physical complaints ( $z=2.1$ , $p=.0386$ ), low appetite ( $z=3.5$ , $p=.0004$ ), and insomnia ( $z=3.1$ , $p=.0020$ ) than male patients, and a lower prevalence of urinary symptom complaints than male patients ( $z=4.7$ , $p < .0001$ ). SPSS23 was used for analyses of the NSSD questionnaire. Fisher's z test of proportions and chi-square tests were used to examine associations among categorical data.	Sample sizes in each age group varied greatly. Only analyzed physician reported data.  Realistic use. Emphasized that some somatic symptoms may conceal symptoms of depression.

Aragonès (2019). Effectiveness of a collaborative care intervention for managing major depression and chronic musculoskeletal pain in primary care: A cluster-randomised controlled trial. <i>Journal of Affective Disorders</i> .	The objective of this study was to assess the effectiveness of the DROP (DepRessOn and Pain) programme designed for the management of major depression and chronic musculoskeletal pain in primary care.	Cluster-randomized controlled trial, Level II. Measurement of depression, pain severity and pain interference, depression response and remission rates, and pain response rates. DROP intervention vs. usual care.	328 patients with major depression and chronic musculoskeletal pain, randomly allocated to either intervention arm or usual care arm between June 2015 and December 2017, eight primary care facilities in Spain.	Measurement of depression, pain severity and pain interference, depression response and remission rates, and pain response rates. Multi-level logistical regression models with mixed effects, adjusted by cluster to evaluate the effects of the intervention on the dichotomous variables, with an estimation of the Odds Ratio (95% CI) of the intervention arm compared to the control arm to measure the effect. Linear regression models with random effects (cluster) to measure the effect on the continuous variables, estimating the differences in adjusted averages (95% CI) for the intervention arm versus the	After 12 months, 274 patients were evaluated (83.5% participation). The severity of depression (Hopkins Symptom Checklist score) was 0.23 points lower in the intervention arm [1.11 vs. 1.34; CI95%=-0.42 to -0.04]. Intervention arm's response rate to antidepressant treatment was 18.9% higher [39.6% vs. 20.7%; OR=2.74; CI95%=1.12–6.67] and its remission rate for depression was 9.0% higher [20.1% vs. 11.1%; OR=2.13; CI95%=0.94–4.85] compared to the usual care arm. There were no significant differences between the two arms in terms of pain severity (Brief Pain Inventory severity score) [6.23 vs. 6.66; difference=-0.39; CI95%=-1.13–0.35] or pain response rate 18.7% vs. 18.5%; OR=1.02; CI95%=0.46–2.26].	Poor adherence to the program by patients and physicians. Sample includes patients who were not requesting medical care at the time of recruitment, who may presumably be less likely to accept and adhere to the therapeutic interventions proposed. DROP does not allow us to separate the nonspecific effects.  Realistic use. Sample size had statistically significant power. Accurately representative sample.
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				control arm. The ICC was also calculated for the main outcome variables. Five different imputation datasets were created using the MICE package of program R, version 3.4.3.		
Hung (2019). Persistent depressive disorder has long-term negative impacts on depression, anxiety, and somatic symptoms at 10-year follow-up among patients with major depressive disorder. Journal of Affective Disorders.	To investigate the impacts of persistent depressive disorder (PDD) and pharmacotherapy on depression, anxiety, and somatic symptoms among patients with major depressive disorder (MDD) over a ten years.	Longitudinal descriptive correlational study, Level IV. Dependent variables: HAMD, SS, HADS-A. Independent variables: PDD (yes or no), pharmacotherapy (yes or no), married (yes or no), HAMD (one-point increment), educational years (one-year increment), visit (one-visit increment).	290 outpatients with MDD were enrolled, including 117 with PDD, at baseline from outpatient clinics of the psychiatric department of Chang Gung Memorial Hospital at Linkou, Taiwan.	SPSS for Windows 20.0 was used for statistical analyses. The Chi square test, Mann-Whitney U test, independent t test, Spearman's correlation, and Pearson's correlation were used appropriately. Bonferroni correction was used to control the type I error rate resulting from multiple tests.	MDD patients with PDD had greater severities of depression, anxiety, and somatic symptoms at the three follow-up points. These results were of statistical significance only in patients without pharmacotherapy. MDD patients with PDD had a longer duration of pharmacotherapy and a lower remission rate as compared with those without. PDD was independently associated with more severe depression, anxiety, and somatic symptoms.	At the ten-year follow-up, approximately half of the subjects were lost to follow-up. The follow up intervals were unequal, and the impacts of PDD on prognosis between two and 10 years might be underestimated. Pharmacotherapy was not controlled at follow-up.  Realistic use. Highlights the importance of early detection and treatment of depression.
Kunzmann (2019). Negative Emotions and Chronic Physical Illness: A Lifespan Developmental	To test the idea that the link between negative	4 wave longitudinal study, Level IV.	1,002 participants from two age groups	Negative emotions (4-point Likert scale), Cronbach's	Among older adults the association between changes in negative emotions	May provide only limited information about the associations

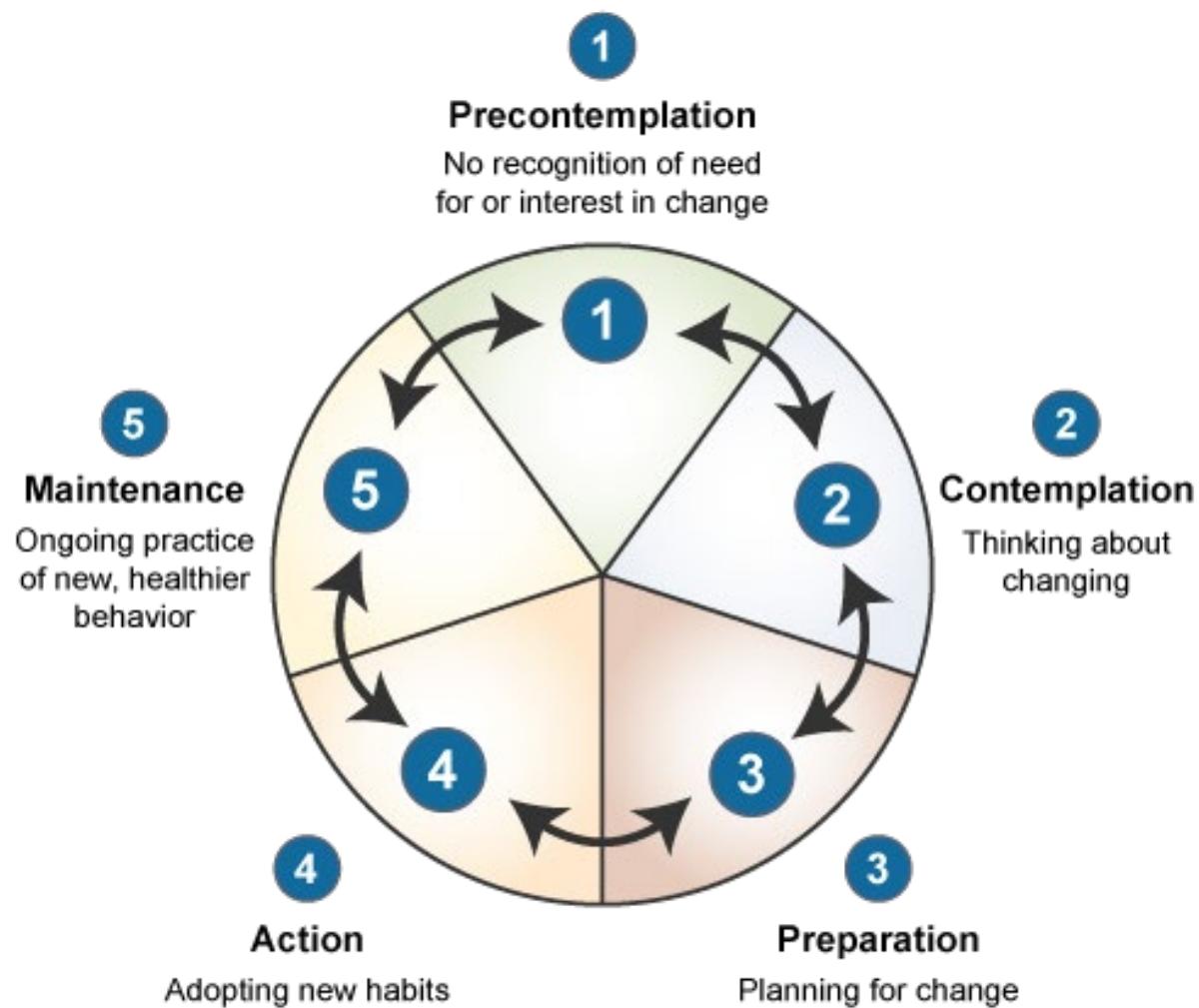
Perspective. Health Psychology.	emotions and chronic physical illness will become stronger as individuals age and their resources become increasingly limited.		randomly selected, Heidelberg & Leipzig	alpha ranged from .71 to .74., chronic illness severity,	and changes in physical illness status emerged over time (first retest interval: $r = .02$ ; $p = .42$ ; second interval: $r = .11$ ; $p = .01$ ; third interval: $r = .22$ ; $p < .01$ ). Negative emotions and chronic physical illness increased over time in the older subsample.	between age-normative declines in physical health and negative emotions. Relied on self-report measures of physical health problems.  Realistic use.
Park (2019). Effect of comorbid depression on health-related quality of life of patients with chronic diseases: A South Korean nationwide study (2007–2015). Journal of Psychosomatic Research.	The objective of this study was to investigate the effect of depression on HRQoL compared with that of other chronic diseases (i.e., asthma, diabetes, cancer, hypertension, and arthritis).	Cross-sectional study, Level IV.	50,844 respondents (19 years & older) participated in the Korean National Health and Nutrition Examination Survey (2007–2015).	Presence of depression incrementally worsened individual's HRQoL when comorbid with other physical diseases. Especially, depression showed substantial negative effect on HRQoL level in patients with 2 or more physical diseases. SAS software version 9.4	HRQoL score decreased when depression was concomitant. HRQoL score of respondents who had 3 or more chronic diseases with concomitant depression (mean=0.83, SE=0.010) were significantly lower ( $p=0.002$ ) than those of respondents who had $\geq 3$ chronic diseases but no concomitant depression (mean=0.87, SE=0.007). Moreover, respondents with 3 or more chronic diseases comorbid with depression showed the largest	Due to study design, information regarding the causal relationship or underlying mechanism between depression, chronic diseases, and HRQoL was not available. Study may have been biased due to self-report of illness diagnosis (individuals may not have sought care for a condition).  Realistic use. Strongly emphasizes importance of care for patients with comorbid chronic illness & depression.

					negative association (coefficient=-0.133, p < 0.001) with HRQoL among all disease status groups.	
Tshomo (2019). Prevalence of depression and its associated factors among persons with chronic medical illness in Bhutan. Archives of Psychiatric Nursing.	To determine the prevalence of depression and factors associated with the depression among persons with chronic medical illness.	Descriptive correlational predictive study, Level IV. Age, gender, number of illnesses, duration of illness(es), physical activity, social support, prevalence and severity of depression.	120 adult (ages 18 – 65) patients diagnosed with chronic medical illness from a medicine OPD hospital in Bhutan. Randomly sampled.	41% of the prevalence rate of depression in persons with chronic medical illness in Bhutan. Patients' age ≤40 years, being a female, and those with low level of physical activity and low social support were significantly associated with depression. Minitab (version 18) statistical software program.	Patients' age 40 years or younger were more likely to have depression than those who are over 40 years of age with adjusted odds ratio (aOR=0.24, p < .01, 95% CI=0.091–0.631). Being a female was associated with depression (aOR=0.26, p < .0, CI=0.097–0.700). The prevalence of depression in the sample was 41%. The total mean score for physical activity was 2315.8 (SD=1764.1) with a range of 0–7680, indicating a moderate level of physical activity in the sample. The total mean score for social support was 63.51 (SD=13.69).	Sample parameters limited generalizability.  Realistic use.

### Appendix C

	<b>Depression screening in primary care</b>	<b>Treating depression with psychotherapy and/or medication</b>	<b>Occurrence of comorbid chronic illness and depression</b>	<b>Increased health care expenditures in patients diagnosed with depression</b>
<b>Article</b>				
Akincigil, 2017	x			
Alderson, 2012			x	
Alderson, 2014			x	
Alderson, 2015			x	
Alson, 2016	x	x		
Aragonès, 2019		x	x	x
Beebe, 2018	x		x	
Bekhuis, 2016			x	
Bentley, 2014	x	x	x	
Cameron, 2014		x		
Chakraborty, 2012			x	
Choi, 2014			x	x
Choi, 2015				x
Chou, 2017	x		x	
Christensen, 2019	x			
Costa, 2016			x	
Di Benedetto, 2014			x	
El-Den, 2018	x			
Gallo, 2013		x		
Gates, 2016	x		x	
Goldberg, 2017	x			
Hung, 2019			x	

Indu, 2018	x			
Jogerst, 2013		x		
Karakus, 2011			x	
Kunzmann, n.d.			x	
Loeb, 2012		x	x	
Magnani, 2016		x		
Maradieque, 2013	x			
Maurer, 2018	x			
Mausbach, 2017			x	x
Mausbach, 2018			x	x
McCoy, 2019		x		
Moise, 2018		x		
Mulvaney-Day, 2018	x			
Oluboka, 2018		x		
Park, 2016			x	
Park, 2019			x	
Park, 2019	x	x		
Pettersson, 2018	x			
Read, 2017			x	
Samples, 2020	x			
Santoft, 2019		x		
Siu, 2016	x			
Smithson, 2017	x	x		
Thombs, 2016	x			
Tshomo, 2019			x	
Tusa, 2019				x
Twomey, 2015			x	x
Tyrer, 2020		x		
Waitzfelder, 2018		x		
Walker, 2017	x			
Zhang, 2016				x
Zhao, 2018			x	
Zilcha-Mano, 2019		x		

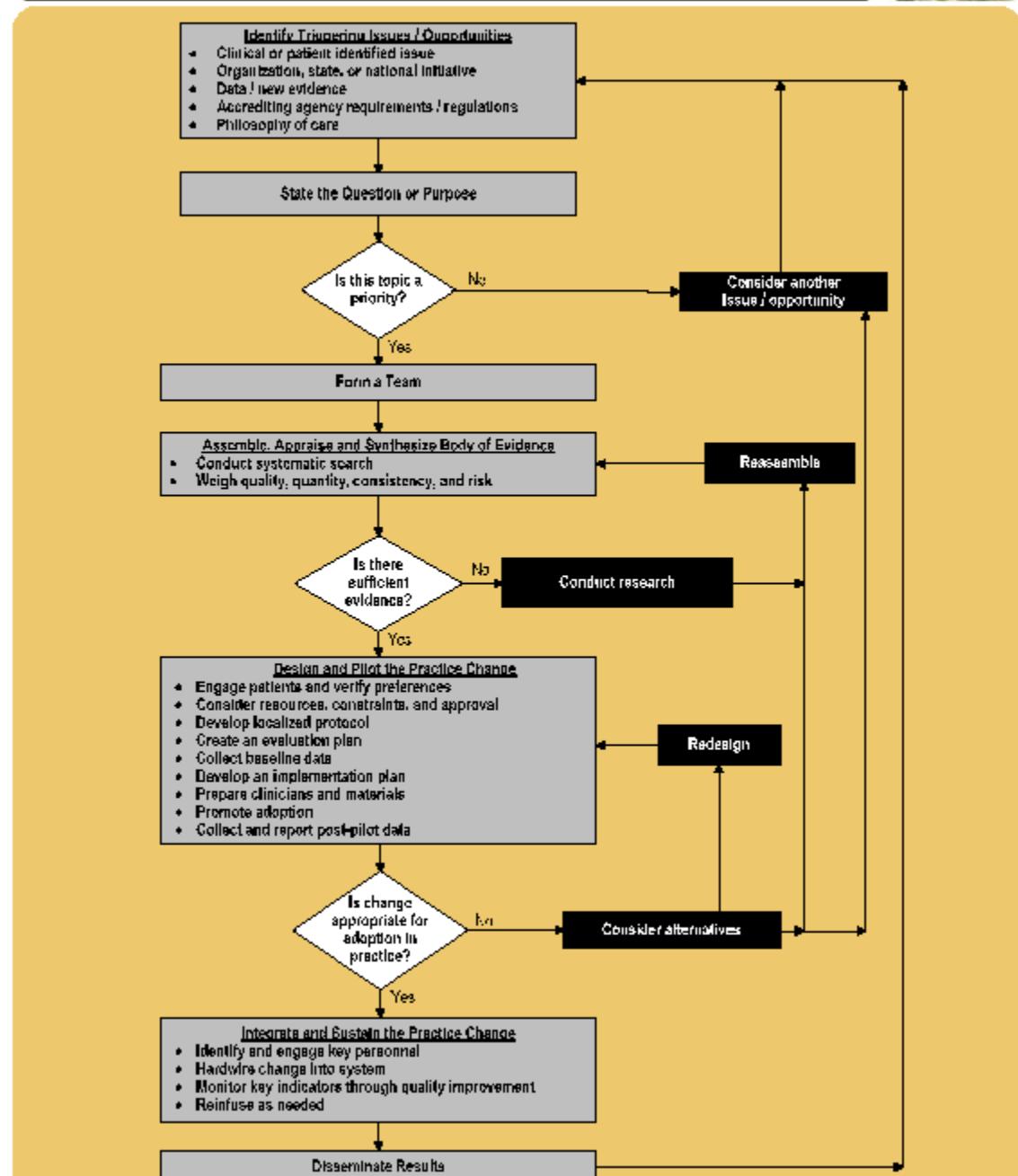
**Appendix D**

## Appendix E

<b>Item</b>	<b>Item Description</b>	<b>Quantity</b>	<b>Cost per Unit</b>	<b>Anticipated Cost</b>
Equipment	Laptops for chart reviews and inputting the scores in the EHR	5	In-kind (already provided by the clinic)	\$0
Project Leader	Time spent developing intervention, conducting chart reviews, compiling results	330 hours	In-kind	\$0
Project Team	Time spent administering PHQ-9, discussing treatment options and plans with patients, inputting information into the EHR	2-3 hours/week	In-kind	\$0
<b>Total</b>				<b>\$0</b>

## Appendix F

### The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care



◆ = a decision point

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## Appendix G

### PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

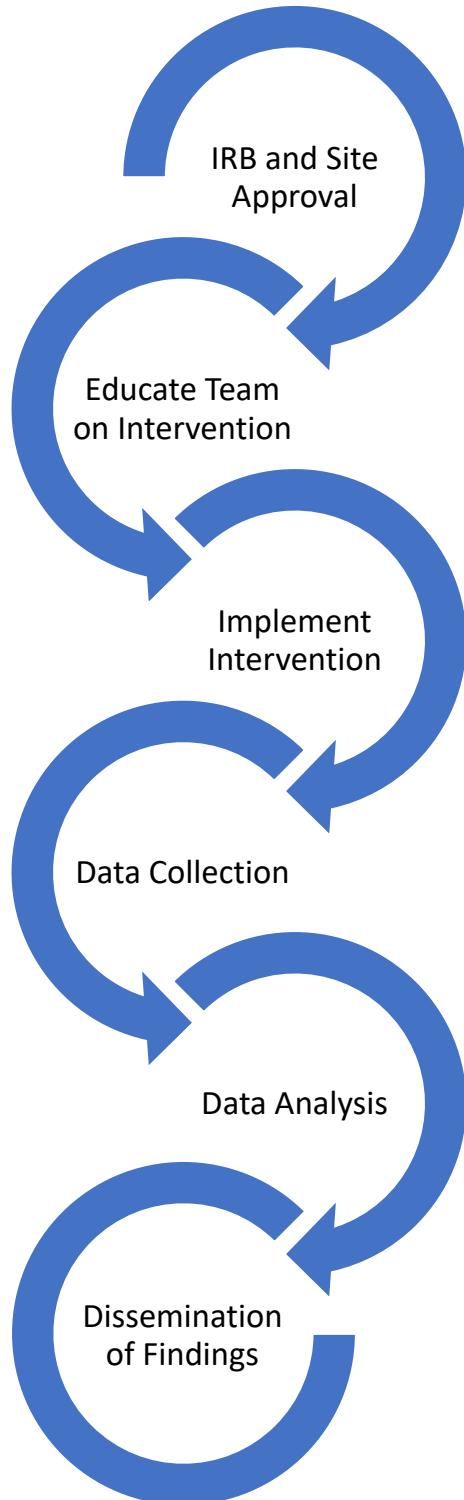
Over the <b>last 2 weeks</b> , how often have you been bothered by any of the following problems? (Use "✓" to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING   0   +    +    +     
 =Total Score:       

If you checked off **any** problems, how **difficult** have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all <input type="checkbox"/>	Somewhat difficult <input type="checkbox"/>	Very difficult <input type="checkbox"/>	Extremely difficult <input type="checkbox"/>
---	---	---	--

**Appendix H**  
**Project Flow Diagram**



### **Appendix I**

### **Intervention Flow Diagram**

#### **Preparation**

- Research evidence-based guidelines
- Discuss current treatment with project preceptor and project team
- Educate team members about best evidence-based treatment

#### **Intervention**

- Administer baseline PHQ-9
- Prescribe treatment based on guidelines

#### **Analysis**

- Administer post-intervention PHQ-9
- Compile, analyze, and synthesize data

**Appendix J**  
**Data Collection Template**

Patient Number	Baseline PHQ-9	Post-Intervention PHQ-9

Patient Number	Treatment Pre-Intervention	Treatment Post-Intervention	Pharmacotherapy	Psychotherapy	Combination

Type of Chronic Illness

Patient Number	Age Range	Gender	Education Level	Employment Status	Insurance Type

**Appendix K**  
**Statistical Analysis Template**

	State	Measurement Instrument Name	Tool validity and reliability	Permission Need	Statistical Analysis
Primary Outcome	Improvement of PHQ-9 scores in patients with comorbid depression and chronic illness	PHQ-9	Yes, consistent in literature	No, on public domain	Pre/post cohort
Demographics	<ul style="list-style-type: none"> <li>- Gender</li> <li>- Education level</li> <li>- Age</li> <li>- Employment status</li> <li>- Insurance type</li> </ul>	Not applicable	Not applicable	Not Applicable	Descriptive statistics
Participant Completion of the Measurement Tool (Procedure): Patients with comorbid depression and chronic illness will complete pre- and post-intervention PHQ-9 questionnaires.					

## **Appendix M**

### **Definition of Terms**

**Comorbid:** existing simultaneously with another medical condition

**Evidence-based:** an approach to medicine, education, and other disciplines that emphasizes the practical application of the findings of the best available current research

**Patient Health Questionnaire 9 (PHQ-9):** depression screening tool developed by Pfizer

**Pharmacotherapy:** treatment of disease and mental illness with drugs

**Psychotherapy:** treatment of mental disorder by means of psychology

**Somatic:** relating to the body

## Appendix N



**Institutional Review Board**  
University of Missouri-Kansas City

5319 Rockhill Road  
Kansas City, MO 64110  
816-235-5927  
[umkcirb@umkc.edu](mailto:umkcirb@umkc.edu)

Dear Lyla Jo Lindholm,

A member of the UMKC Research Compliance Office screened your QI project #2028602-QI entitled "Implementing an Evidence-Based Depression Treatment Program for Adults with Comorbid Depression and Chronic Illness" and made the following determination:

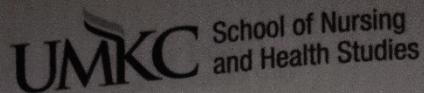
**QI Determination: The project has been determined to be a quality improvement activity not requiring IRB review.**

If you have any questions regarding this determination, please feel free to contact our office at 816-235-5927, [umkcirb@umkc.edu](mailto:umkcirb@umkc.edu), or by replying to this notification.

**Note Regarding Publications:** It is appropriate to disseminate and replicate QI/program evaluation successes, including sharing the information external to an organization. This may include presentations and publications. The mere intent to publish the findings does not require IRB review as long as the publication does not refer to the activity as research.

Thank you,  
UMKC Institutional Review Board

## Appendix O



August 1, 2020

UMKC DNP Student, Heather Vieth

Congratulations. The UMKC Doctor of Nursing Practice (DNP) faculty has approved your DNP project proposal, *Evidence-Based Depression Treatment Program for Adults with Comorbid Depression and Chronic Illness*.

You may proceed to IRB or QI approval.

Sincerely,

A handwritten signature in cursive script that appears to read "Lyla Lindholm".

Lyla Lindholm, DNP, RN, ACNS-BC  
Clinical Assistant Professor, DNP Faculty  
MSN-DNP Program Coordinator  
UMKC School of Nursing and Health Studies  
[lindholml@umkc.edu](mailto:lindholml@umkc.edu)

A handwritten signature in cursive script that appears to read "Cheri Barber".

Cheri Barber, DNP, RN, PPCNP-BC, FAANP  
Clinical Assistant Professor  
DNP Program Director  
UMKC School of Nursing and Health Studies  
[barberch@umkc.edu](mailto:barberch@umkc.edu)

DNP Faculty Mentor Name, DNP  
UMKC School of Nursing and Health Studies

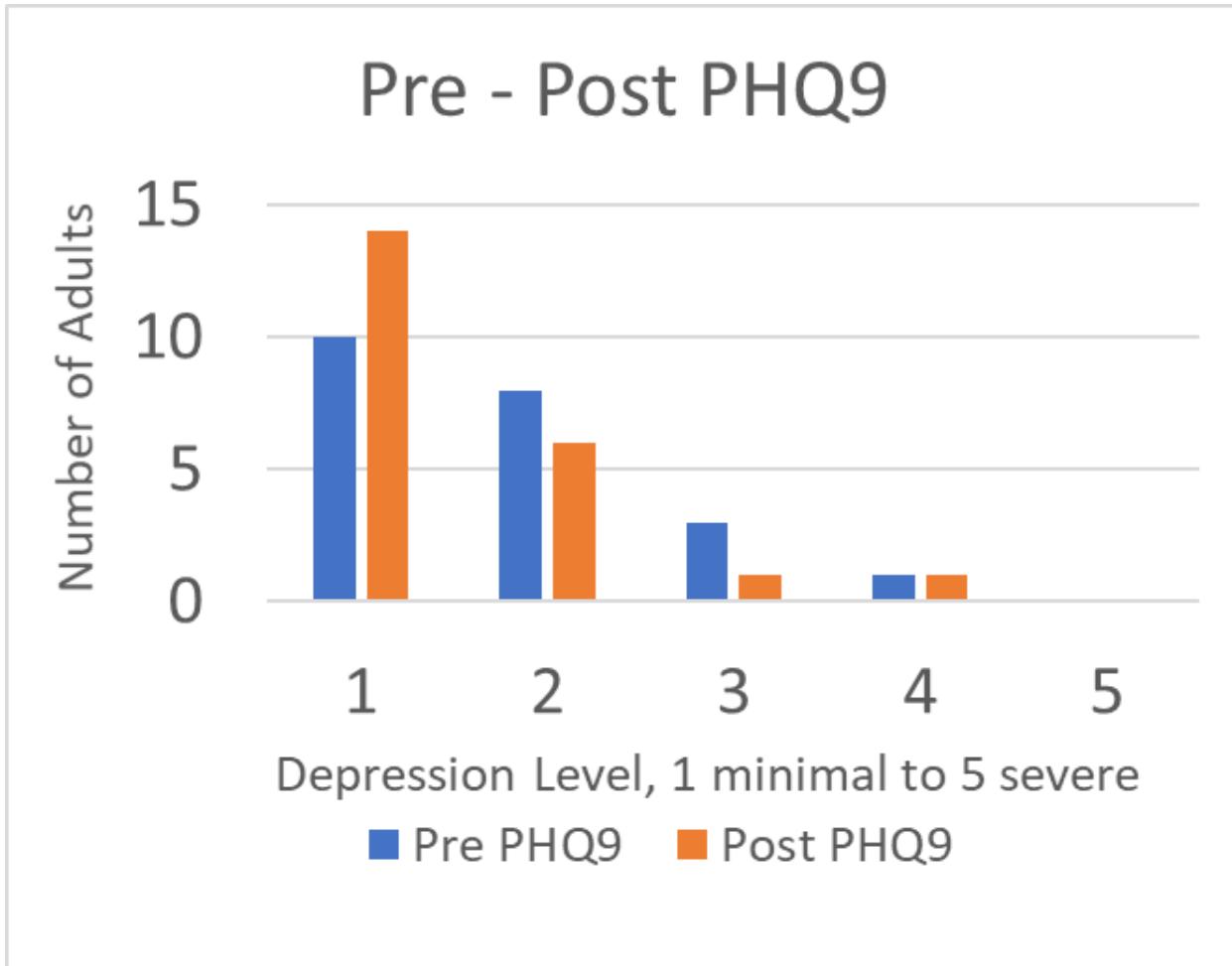
## Appendix P

### Results

Age	Gender	Race	Ed Lvl	Employ	Ins	Mar Stat	Pre PHQ	Post PHQ
62	M	C	HS	Disabled	Com	Si	6	7
60	F	C	HS	Retired	Com	M	2	2
80	F	C	HS	Retired	Medicare	M	2	2
38	F	C	HS	Employed	Com	M	1	1
61	F	C	Master's	Employed	Com	M	3	3
45	M	C	HS	Employed	Medicaid	M	10	14
64	F	AA	HS	Retired	Com	W	5	4
50	F	C	HS	Employed	COM	D	6	3
57	M	C	GED	Disabled	com	M	2	2
44	F	C	HS	Employed	com	M	5	8
64	F	C	HS	Employed	com	D	9	7
23	F	C	college	Employed	com	Si	2	0
41	M	C	GED	Employed	com	M	2	2
20	F	C	some college	Employed	self pay	Si	9	2
43	F	C	HS	Employed	Com	Si	15	5
25	M	C	HS	Employed	Com	Si	14	6
25	F	C	HS	not	Com	Si	3	19
65	M	C	some college	Retired	Medicare	Si	13	5
67	F	C	HS	Retired	Com	M	8	3
54	F	C	HS	Employed	Com	M	2	2
44	F	C	some college	Employed	Com	Si	5	2
59	F	C	HS	Employed	Com	M	4	3

## Appendix Q

### Results



#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PrePHQ9	5.82	22	4.239	.904
	PostPHQ9	4.64	22	4.435	.946