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Preparing the Workforce for Integrated Healthcare

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Preparing the Workforce for Integrated Healthcare

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DEDICATION

This dissertation is dedicated to my husband, David L. Black, who has been a constant source of support and encouragement throughout this journey. To my parents and grandparents who provided an example of courage and strength to face the challenges of life. To my children and grandchildren, may this dissertation be a symbol of your heritage and potential as you continue your own journey.

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ABSTRACT

Integrated healthcare is recommended to deliver care to individuals with co-occurring medical and mental health conditions. Identifying the knowledge necessary for behavioral health providers to practice in integrated settings, and determining whether a computer application is an effective strategy to disseminate this knowledge, are essential steps to transitioning these individuals to integrated healthcare delivery systems. A literature review of U.S. based publications from 1999 to 2015 identified 68 articles that met inclusion criteria and identified specific knowledge for integrated healthcare settings. A survey completed by 154 behavioral health providers working in integrated healthcare settings examined the extent to which respondents agreed the specific domains of knowledge identified in the systematic review were necessary for practice in integrated healthcare settings. An internet based computer application was developed and tested through a rapid prototyping method with two focus groups and 5 individual interviews. Nielson's usability heurstics were used to evaluate data from focus groups and interviews and changes were incorporated in development of the computer application. The computer application was evaluated through an experimental pre-test/post-test design in which the knowledge of screening measures of 15 masters level social work students was tested. The results of the literature review provided evidence that behavioral health providers require specific knowledge of medical diagnoses, psychiatric diagnoses, screening instruments and intervention skills. A first-order, four-subscale model of this knowledge was confirmed by a CFA model in the survey sample. The computer application developed through the focus groups and interviews is an introduction to integrated healthcare concepts, reinforces the integrated nature of physical and behavioral health, and puts evidence-based knowledge at the point of care. When compared to an asynchronous training session in the experimental investigation, ANCOVA results revealed no significant differences on post-test knowledge of screening measures between the two groups.

Outcomes of training on an integrated healthcare topic using a computer application are comparable to those using an asynchronous instructional method. Further research is needed to evaluate the impact of computer application use in real-world practice settings.

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INTRODUCTION

The U.S. health care delivery system fails to provide high quality care to all people. Gaps in quality are especially evident in the management of mental illness. The lifetime prevalence of psychiatric disorders in the adult population in the United States is an estimated 50% with less than 40% receiving treatment (Kessler et al., 1994, 2005). Despite the fact that medical and mental health conditions are connected, the health care systems are separated. Hence, treatable mental and medical conditions are neither detected nor properly treated (Unutzer, Schoenbaum, Druss, & Katon, 2006). According to Kuramoto (2014), 50-60% of psychiatric diagnoses go unrecognized in primary care, 33-50% of individuals with mental health problems refuse referrals to specialty care, and healthcare expenditures are 46% higher for comorbid chronic conditions that include a behavioral health condition. Individuals with severe mental illness treated in specialty care settings have significant medical comorbidities resulting in a life expectancy of 25 years less than the general public, with 60% of these deaths due to preventable medical conditions (Parks, Svendsen, Singer, Foti, & Mauer, 2006).

Current trends in healthcare recommend the transformation to an integrated delivery system. Integrated healthcare is defined as "the systematic coordination of physical and mental health care" (Lopez, Coleman-Beattie, Jahnke, & Sanchez, 2008, p. 7). Integrated healthcare achieves higher quality of care for individuals with comorbid conditions through the co-location of primary care and mental health providers, population-health screening for comorbid conditions, and comprehensive evidence-based interventions (Berkman, 1996; Epping-Jordan, 2005; Strosahl, 1998). According to the Center for Integrated Health Solutions Standard Framework for Levels of Integrated Healthcare, services at the highest level have the following characteristics: they are team-based, share practice space, use evidence-based practices, use medical and behavioral health screening, operate from a single treatment plan, involve a

seamless response to healthcare needs, and focus on meeting all patient health needs (Heath, Wise, & Reynolds., 2013). Integrated healthcare is supported by the Affordable Care Act with incentives for accountable care organizations, patient-centered medical homes and preventative services (Fisher & Shortell, 2010; U.S. Preventative Health Force, 2014).

Despite recommendations for fundamental redesigns of the U.S. healthcare system and incentives introduced by the Affordable Care Act, the current workforce is not prepared for change of the healthcare system from an uncoordinated disease management system to integrated care (Richardson et al., 2001). A significant barrier to implementing integrated care is the lack of a skilled workforce. Preparing behavioral health consultants to practice in primary care settings is particularly challenging. There is a lack of evidence identifying essential knowledge and skills to deliver care given the variation in integrated models implemented in agencies based on philosophy and staff (Aitken & Curtis, 2004). Simply transitioning specialty care clinicians to the primary care setting is ineffective due to poor skills fit (Blount & Miller, 2009). According to Strosahl (2005), behavioral health specialists working in integrated settings require training in population care, evidence-based care, medical conditions, psychopharmacology, behavioral medicine, health psychology, and use of screening tools. Specifically, Horevitz and Manoleas (2013) identified the following competencies for a social worker in integrated care settings: stepped care (use of behavioral algorithms for care), motivational interviewing, curbside consultations (brief impromptu consultations with healthcare professionals), and cognitive-behavioral interventions. However, this study was limited to a focus on interventions without a confirmation of employment in an integrated care setting. In a theoretical paper, Blount and Miller (2009) suggested consultants need training on screening instruments, evidence-based

therapies, common medical conditions (e.g., asthma, diabetetes, heart disease, irritable bowel syndrome), care management, and medications.

Beyond identifying the knowledge content needed for behavioral health providers to practice in integrated settings, it is essential to determine the most effective and efficient strategies for developing these skills in the current workforce. Innovative technology may hold the key to improving the dissemination and implementation of research findings. Computers have the ability to change the way we think. In using different computerized systems, we are absorbing the content on the screen and learning new ways to think and understand (Turkle, 2004). Healthcare providers are using smartphones for the following functions: timely access to evidence-based decision support systems, accurate documentation, and efficient work practices (Mickan, Tilson, Atherton, Roberts, & Heneghan, 2013). In a systematic review by Mosa, Yoo, and Sheets (2012), 66 computer applications for healthcare professionals were identified: 57 healthcare professional applications that focused on diagnosis of specific diseases, drug references, medical calculators, literature search, clinical communications, medical training, and general healthcare; and 11 for medical or nursing students focusing on healthcare provider education. The advantages of using smart-phone applications include access to up-to-date evidence-based clinical resources at the point of care. The study was limited to applications for medical or nursing providers and contained only one application related to behavioral health consultants- a HCIT smoking cessation application. According to Mickan, Atherton, Roberts, Heneghan, and Tilson (2014), healthcare professionals using handheld computers had improved information-seeking and adherence to clinical guidelines resulting in improved knowledge compared to their peers using paper resources. The results of this systematic review were limited by the inclusion of only 7 randomized studies addressing computer application use by medical or

nursing staff, evaluating only one medical condition in analysis, and comparison to paper-based guidelines.

This dissertation will provide further evidence concerning the knowledge necessary for behavioral health providers to practice in integrated care settings and determine if a newly created computer application can contribute to disseminating this knowledge. This is achieved by four individual studies: 1) a systematic review of integrated healthcare models to determine specific knowledge and skills needed for the behavioral health consultant to practice in integrated healthcare settings; 2) evaluation of a model of essential integrated healthcare knowledge derived from the systematic review through a survey of providers practicing in integrated healthcare settings and a confirmatory factor analysis of the results of this survey; 3) development of a computer application through focus groups and interviews with experts and end-users; and 4) an experimental study of the effectiveness of the computer application for behavioral health providers to develop integrated healthcare knowledge of screening measures.

CHAPTER 1

Preparing the Workforce for Integrated Healthcare: A Systematic Review

Abstract

Integrated healthcare is recommended to deliver care to individuals with co-occurring medical and mental health conditions. This literature review was conducted to identify the knowledge and skills required for behavioral health consultants in integrated settings. A review from 1999 to 2015 identified 68 articles. Eligible studies examined care to the U.S. adult population at the highest level of integration. The results provide evidence of specific knowledge of medical and mental health diagnoses, screening instruments, and intervention skills in integrated primary care, specialty medical, and specialty mental health. Further research is required to identify methods to develop knowledge/skills in the workforce.

Keywords: Integrated, healthcare, primary care, mental health, interventions, screening.

Healthcare in America is in the process of a dramatic change. The Affordable Care Act has introduced incentives for accountable care organizations, patient-centered medical homes, and preventative services to develop a system of care that is coordinated, accountable, and patient centered (U.S. Preventive Task Force, 2014; Pickett & Batia, 2015; Planner, Gask, & Reilly, 2014). These changes are directly related to failure of the health care system to provide high-quality care to all people. Gaps in quality of care are due to the failure to effectively translate scientific knowledge into processes, increased prevalence of multiple chronic conditions, and care provided in uncoordinated silos (Institute of Medicine, 2001). Interventions effective in health services research are not translated to patient care processes to improve outcomes (Brownson, Colditz, & Proctor, 2012; Damschroder et al., 2009)

The quality concerns and impact of poor coordination of care are particularly evident in the management of mental illness. Despite the fact that medical and mental health conditions are connected, the health care systems are separate. Treatable mental health and medical conditions are neither detected nor properly treated in the current system (Correll et al., 2010; Druss, Bradford, Rosenheck, Radford, & Krumholz, 2001; Unutzer, Schoenbaum, Druss, & Katon, 2006). According to Kuramoto (2014), 50-60% of psychiatric diagnoses go unrecognized in primary care, 33-50% of individuals identified with mental illness refuse referrals to specialty mental health care, and medical healthcare expenditures are 46% higher for comorbid chronic conditions that include a behavioral health condition. Individuals with severe mental illness treated primarily in specialty mental health care settings have significant unmanaged medical comorbidities resulting in life expectancy 25 years less than the general public, with 60% of these deaths due to preventable medical conditions (Parks, Svendsen, Singer, Foti, & Mauer, 2006). In general, poorly coordinated care results in poor outcomes, higher utilization of

healthcare services, and increased cost (Petterson et al., 2008; Simon, Ormel, VonKorff, & Barlow, 1995).

Current trends in healthcare recommend a transformation to an integrated model to address these competing demands and improve quality. The World Health Organization (WHO) defines an integrated delivery system as, "the organization and management of health services so that people get the care they need, when they need it, in ways that are user-friendly, achieve the desired results and provide value for the money" (WHO, 2008). Integrated care moves beyond co-location of providers to a population-based delivery model, which incorporates public health and epidemiological views in service delivery to address risk factors and improve outcomes for populations (Strosahl, 1998). Screening measures and proactive care strategies are focused on prevention versus treatment of acute conditions (Berkman, 1996; Epping-Jordan, 2005). According to the Center for Integrated Health Solutions Standard Framework for Levels of Integrated Healthcare, services at the highest level have the following characteristics: team-based, shared practice space, evidence-based practices, medical and behavioral health screening, single treatment plan, seamless response to healthcare needs, and meeting all patient health needs (Heath, Wise Romero, & Reynolds, 2013).

A key barrier to implementing integrated care and achieving the aims of the Affordable Care Act is developing a behavioral health workforce capable of providing care in primary care settings. Blount and Miller (2009) characterize this as a "work force crisis", indicating that simply transitioning specialty care clinician to the primary care setting is ineffective due to poor skills fit. Further evidence by Scharf et al. (2013) report recruiting and retaining qualified staff as a common barrier to integrating primary care in behavioral health programs. Developing the

workforce is further complicated by the variation of skills required in different models implemented in agencies based on philosophy and staffing (Aitken & Curtis, 2004).

An essential first step in developing the behavioral health work force is to specify skills necessary to deliver integrated care (Patel et al., 2013). In general, Strosahl (2005) suggests that behavioral health consultants require training in population care, evidence-based care, medical conditions, psychopharmacology, behavioral medicine, health psychology, and use of screening tools. Specifically, Horevitz and Manoleas (2013) identified the following competencies for social workers in integrated care settings: stepped care (use of behavioral algorithms for care), motivational interviewing, curbside consultations (brief impromptu consultations), and cognitive behavioral interventions. However, this study was limited to a focus on interventions without a confirmation of employment in an integrated care setting. In a theoretical paper, Blount and Miller (2009) suggested that consultants need training on screening instruments, evidence-based therapies, medical conditions (asthma, diabetes, heart disease, irritable bowel syndrome), care management, and medications. Current evidence is insufficient to specify the required skills. The purpose of the present study is to conduct a systematic review focused on specifying skills needed for the behavioral health consultant to effectively practice in an integrated healthcare setting. The following research questions will be addressed: (a) Which physical health diagnostic categories are essential for behavioral health consultants to know in integrated care? (b) Which screening tools will a behavioral health consultant need to utilize to monitor physical and mental health conditions in an integrated setting? (c) Which evidence-based intervention skills are necessary to effectively provide care in these settings?

Methods

Identification of Studies

A comprehensive literature search was conducted in May-June 2015 using the databases

PubMed, PsychINFO, Social Services Abstracts, SCOPUS, Web of Science and Google Scholar,

to identify publications from 1999 to 2015. The search strategy included various combinations

of the following keywords: integrated, healthcare, primary care, mental health, screening,

interventions, physical health, lifestyle interventions, depression, severe mental illness,

behavioral healthcare, and mental healthcare. The reference list of systematic reviews identified

on the topic and book chapters were closely reviewed for potentially relevant studies not

identified in the literature search. Eligible studies included those focused on integrated care

models/studies in adult primary or specialty care outpatient locations that met or were associated

with models that included all of the criteria for the highest level of integration: co-located,

population-based screening for physical and/or mental health conditions, and physical and/or

mental health interventions. Only U.S.-based studies were included due to the differences in

health care systems that can impact the design and implementation of care models. A total of 68

journal articles met the inclusion criteria. These articles were reviewed for information on

diagnostic categories, screening measures, and interventions essential to the role of behavioral

health consultant in integrated care.

Results

The identified articles included studies conducted in primary care (57), specialty medical

care (7), and specialty mental health (4) locations. Each location was evaluated separately. The

type of study and population characteristics are provided. Tables related to primary care studies

were separated by randomized controlled trials (19) and quasi experimental/ qualitative/ descriptive studies (38).

Primary Care

Studies and limitations.

There were 7 (19 articles) randomized, controlled trials of integrated care in primary care: Prospect, IMPACT, Pathways, PRISM-E, Integration Management of Hypertension and Depression, Integration Management of Depression and Diabetes, and Collaborative Care with Depression and Chronic Illness (see Table 1-1). Several studies contained multi-site, multi-state

<Insert Table 1-1 here>

locations with large sample sizes. Many of these were conducted with the Department of Veterans Affair (VA) or large health care organizations such as Kaiser Permanente or Group Health Cooperative (Levkoff et al., 2004; Unutzer et al., 2001). Earlier studies focused specifically on the elderly population and a diagnosis of depression (Alexopoulos et al., 2005; Unutzer et al., 2001). Although integrated into primary care, one study did not evaluate the impact of the intervention on physical health (Alexopoulos et al., 2005). Only three physical health conditions were addressed in the studies: diabetes, hypertension, and coronary heart disease (Bogner & de Vries, 2008; Bogner, Morales, de Vries, & Cappola, 2012; Katon et al., 2010). Specific lifestyle interventions to improve physical health functioning were not addressed in these studies.

An additional 38 studies that were not randomized, controlled trials are listed in Table 1-2. Details on specific screening measures and interventions were outlined. Thirteen studies

<Insert Table 1-2 here>

represent programs in the VA and seven were conducted with active duty Air Force members with predominantly male populations. Descriptive studies were represented in 11 of 38 studies. One study did not include details of the interventions (Begley et al., 2008).

Diagnoses.

The following medical conditions were identified in the studies: diabetes (7/57), hypertension (3/57), irritable bowel syndrome (1/57), pain (8/57), sexual dysfunction (3/57), and cancer (2/57). Several studies listed the medical conditions generally as chronic medical conditions (4/57) (Auxier et al., 2012; Funderburk, Dobmeyer, Hunter, Walsh, & Maisto, 2013; Kearney, Post, Pomerantz, & Zeiss, 2014; Pomerantz et al., 2010). Other health-related issues commonly addressed in this setting include insomnia (10/57), obesity (5/57), and smoking (7/57).

Mental health conditions treated in primary care included: depression (56/57), anxiety (31/57), substance abuse (21/57) and post-traumatic stress disorder (PTSD) (12/57). Robinson and Strosahl (2009) elected to monitor overall functioning and did not specify a diagnostic category. Knowledge of PTSD was generally limited to populations involving Veterans. Only two studies with non-Veteran populations were included in this diagnostic category (Bauer, Chan, Huang, Vannoy, & Unutzer, 2013; Collins, 2009). A working knowledge of bipolar disorder (7/57) and schizophrenia/psychosis (4/57) were included in the studies as diagnoses that are screened for referral to specialty care locations and not managed in primary care ("A New Direction in Depression Treatment in Minnesota," 2010; Williams, Angstman, Johnson, & Katzelnick, 2011). Additional disorders that were encountered in primary care include dementia (4/57), attention-deficit hyperactivity disorder (ADHD) (4/57), and adjustment disorder (3/57).

Screening.

Screening measures in primary care were used for initial identification of symptoms and ongoing monitoring. Measurement for physical health conditions included: glycated hemoglobin (A1c) (4/57), blood pressure (3/57), cholesterol (2/57), and body mass index (BMI) (2/57). Additional measures identified in primary integrated care settings include Independent Activities of Daily Living scales (1/57), Sheehan Disability Scale (2/57), Insomnia Severity Index (1/57) and McGill Pain Questionnaire (1/57). The Health Status Questionnaire is a measure of the health-related quality of life and most commonly used in randomized trials. Several non-randomized studies included this measure (Pomerantz et al., 2010; Price, Beck, Nimmer, & Bensen, 2000; Sadock, Auerbach, Rybarczyk, & Aggarwal, 2014; Tew, Klaus, & Oslin, 2010). Depression screening instruments were used in 38 of 57 studies with 7 using more than one measure. The identified depression screening measures were: Patient Health Questionnaire (PHQ) 2 or 9 (25/57), Center for Epidemiologic Studies Depression Scale (CESD) (8/57), Beck Depression (3/57), and Symptom Checklist (SCL) (9/57). The CESD was limited to only randomized trials and not included in other studies. Alcohol use was measured by the Alcohol Use Disorders Identification Test (Audit-C) (5/57), Short Michigan Alcoholism Screening Test (SMAGT) (3/57) or CAGE Questionnaire (CAGE) (2/57). Anxiety was measured by the Generalized Anxiety Disorder (GAD) 7 (5/57), Beck Anxiety Inventory (1/57), or State Trait Anxiety Scale (1/57). PTSD was screened using the PTSD Checklist (5/57). Several studies used global assessment measures such as the A Collaborative Outcomes Resource Network questionnaire (ACORN) (2/57), Behavioral Health Measure (BHM) 20 (5/57), or General Health Questionnaire (4/57) (Bridges et al., 2014; Corso et al., 2012; Levkoff et al., 2004).

Interventions.

Interventions in this setting were described as: immediate, via warm handoffs, brief (20-30 minutes), limited in number, and evidence-based (Barber, Frantsve, Capelli, & Sanders, 2011; Beehler, Funderburk, Possemato, & Vair, 2013; Bridges et al., 2014; Bryan et al., 2012). Case management was the most common intervention and includes patient education, monitoring, support, and adherence (34/57) (Katon et al., 2003). Stepped care was identified in 37% (21/57) of the studies and entailed principles of escalating intensity of services based on treatment response (Bauer, Chan, Huang, Vannoy, & Unutzer, 2013; Unutzer et al., 2001) to include medication monitoring, crisis interventions, and specialty referrals. In addition to these care coordination skills, skills included brief therapeutic interventions: problems solving therapy (16/57), interpersonal therapy (4/57), cognitive behavioral therapy (19/57), behavioral activation (22/57), motivational interviewing (8/57), and relaxation training (11/57). Lifestyle interventions were additional skills required in the primary care setting and include smoking cessation (5/57), weight management (4/57), and sleep hygiene (7/57).

Specialty Medical Care

Studies and limitations.

There were 6 published articles reporting on 3 randomized controlled trials of integrated care models in specialty medical care locations: Multi-faceted Oncology Depression Program, Alleviating Depression among Patients with Cancer, and Integrated Hepatitis C Program (see Table 1-3). These studies were conducted in oncology and hepatitis C clinics. There was one

<Insert Table 1-3 here>

cohort study conducted in a human immunodeficiency virus (HIV) clinic. Two of the 7 studies were limited by small sample sizes (Dwight-Johnson, Ell, & Lee, 2005; Winiarski, Beckett, & Salcedo, 2005).

Diagnoses.

Diagnostic categories in specialty medical care locations included the primary condition, comorbid medical conditions, and associated mental health comorbidities. In a Hepatitis C clinic, this included mental health conditions of depression (2/2) and substance abuse (2/2). Substance Abuse is also identified as a comorbid condition addressed in an HIV clinic (Winiarski et al., 2005). In an oncology clinic setting, pain (3/4) was identified as a comorbid physical health condition monitored with comorbid depression (4/4) and anxiety (3/4).

Screening.

Screening measures for physical health conditions in specialty medical locations were specific to the medical condition. In a hepatitis clinic, the Hepatitis Quality of Life Measure (HVP) is utilized in comparison to the HIV symptom checklist in the HIV clinic (Groessl, Sklar, Cheung, Brau, & Ho, 2013; Winiarski et al., 2005). In contrast, the Karnosfsky Performance Status Scales (4/4) and Functional Assessment of Cancer Therapy Scale (4/4) were incorporated into integrated care in oncology clinics. Depression screening instruments common to primary care were similar in specialty medical care locations: PHQ 2 or 9 (4/7) and Beck Depression Inventory (2/7). The PHQ was used in oncology clinics, whereas the Beck was used in hepatitis clinics. Other screening measures included the Audit/C (5/57) for alcohol use and Brief Symptom Inventory Anxiety Scale (2/7) for anxiety. Global evaluation scales were not identified in specialty medical locations.

Interventions.

Interventions were similar to that of primary care. Case management (7/7) and stepped care (4/7) approaches were included in oncology and hepatitis clinics. The following brief therapeutic interventions were identified: problems solving therapy (4/7), cognitive behavioral therapy (1/7), behavioral activation (4/7), and motivational interviewing (2/7). Lifestyle interventions were not specifically identified in specialty medical care locations.

Specialty Mental Health Care

Studies and limitations.

There were a limited number of published articles of integrated care in specialty mental health locations: 2 randomized trials, 1 program description (Washtenaw model), and 1 cohort study (The Serious Mental Illness Primary Care Clinic) (see Table 1-4). The randomized trials

<Insert Table 1-4 here>

completed in specialty mental health locations are over 9 years old. Two studies were completed with veterans and predominantly male populations (Druss, Rohrbaugh, Levinson, & Rosenheck, 2001; Pirraglia et al., 2012). Three studies were limited to small sample sizes (Boardman, 2006; Druss et al., 2001; Pirraglia et al., 2012). The studies provided limited detail or did not include specific interventions.

Diagnoses.

The following diagnostic categories were identified in mental health specialty care locations: major depression (4/4), bipolar disorder (4/4), substance use (2/4), and schizophrenia (4/4). The comorbid medical conditions associated with this population included: hypertension (2/4), cardiovascular disease (4/4), diabetes (3/4), pulmonary disease (3/4), irritable bowel

syndrome (1/4), hypercholesterolemia (2/4), cancer (1/4) and obesity (1/4). Smoking (1/4) was the only health lifestyle issue addressed in this setting.

Screening.

Screening instruments were identified for physical health conditions only and include the following instruments: hemoglobin A1c (3/4), blood pressure (1/4), cholesterol (1/4) and BMI (2/4).

Interventions.

According to the findings from these studies, this model of care was described as nurses or family practitioners integrated into the specialty care clinics and medical orientation of psychiatric evaluations (Boardman, 2006; Druss et al., 2001). The intervention skill identified within integrated care in specialty mental health was case management (1/4) (Boardman, 2006). Lifestyle interventions were not specifically identified in specialty mental health care.

Discussion

Behavioral health consultants working in integrated primary care settings will require knowledge of both mental and physical health conditions. The following medical conditions were identified in the extant literature: diabetes, cardiovascular disease, hypertension, cancer, pain, sexual dysfunction, and irritable bowel syndrome. The health lifestyle issues included smoking, sleep, and obesity/diet. Although not identified in the review, knowledge of asthma, thyroid disease, gastroesophageal reflux, chronic obstructive pulmonary disease, hepatitis, and HIV/AIDS have been recommended (Hunter, Goodie, Oordt, & Dobmeyer, 2009; Kolbasovsky, 2008; Panagioti, Scott, Blakemore, & Coventry, 2014). According to James et al. (2014), hypertension is the most common condition seen in primary care. Mental health conditions that

are frequently treated in primary care include depression, anxiety disorders, and substance use. Data on the prevalence of these diagnoses in primary care are supported by the literature: panic disorder 6-13% (Katon et al., 1986), depression 5-13% (O'Connor, Whitlock, Beil, & Gaynes, 2009; Phillips, Miller, Petterson, & Teevan, 2011), generalized anxiety disorder 2.8-8.5% (Roy-Byrne & Wagner, 2003), and alcohol use disorders 12% (Buchsbaum, Buchanan, Lawton, & Schnoll, 1991).

Screening for physical and mental health conditions was common in integrated primary care locations and an essential component of a behavioral health consultant's knowledge content. Several measures for depression were identified with the PHQ being the most prevalent. The PHQ is highly correlated with the Beck Depression Inventory, has evidence of external validity across cultural groups, is shorter, and free (Chen, Huang, Chang, & Chung, 2006; Kung et al., 2013). Specific measures of bipolar disorder were not identified. However, the PHQ9 requires the physician to rule out bereavement or history of mania prior to making a diagnosis (Kroenke, Spitzer, & Williams, 2001). Although the research demonstrates knowledge and use of the CAGE or SMAGT for alcohol use, the Audit/Audit C or single question screening is recommended over these screening measures by the U.S. Preventative Task Force due to the optimal balance of sensitivity and specificity of the measure (Moyer, 2013).

Interventions provided in this setting mirror the primary care model by being brief, action oriented, first-line interventions (Hunter et al., 2009; Strosahl, 1998). Stepped care protocols assign sequential levels of care based on patient preference, clinical status, and outcomes (Von Korff & Tiemens, 2000). Although not specifically outlined in the research, these principles would require knowledge in psychopharmacology and levels of specialty mental health care: inpatient, partial hospitalization, or outpatient. Based on the number of reviews, there appears to

be less support for development of skills in interpersonal therapy. However, Wolf and Hopko (2008) found interpersonal therapy equally effective to problem solving therapy for the treatment of major depression in primary care. Brief 3-session motivational interviewing was identified as the intervention for alcohol use.

Behavioral health consultants provide integrated healthcare in specialty medical care locations. This review identified the locations of hepatitis clinics, HIV clinics, and oncology. Atherholt and Fann (2012) confirm the knowledge content provided in the oncology clinics: depression and anxiety are common comorbid mental health conditions, screening completed with the PHQ, and effective interventions of problem solving therapy, cognitive behavioral therapy, and behavioral activation. Although not indicated in the present review, Aitkens and Curtis (2004) have included obstetrics and cardiology. Elderon and Whooley (2013) recommend an integrated model in cardiology for comorbid depression, utilizing the PHQ, with behavioral activation, cognitive behavioral therapy, interpersonal therapy, or problem solving therapy. These recommendations are based on the prevalence of depression in people with cardiovascular disease (1 in 5).

Individuals with severe mental illness (major depression, bipolar disorder, and schizophrenia) receive integrated care in specialty mental health settings. According to Alakson (2010), this location is a point of contact for this population and an appropriate location for a medical home. A behavioral health consultant in specialty mental health care locations will require diagnostic information related to the primary psychiatric conditions and associated medical comorbidities. The identified medical diagnoses and lifestyle patterns encountered in this setting are supported in the research. Individuals with SMI have increased prevalence of diabetes, hypertension, cardiovascular disease, chronic obstructive pulmonary disease, obesity,

and nicotine dependence, (Bartels, 2004; Bartels & Desilets, 2012; Carney, Jones, & Woolson, 2006; Castilla-Puentes, 2007; De Leon & Diaz, 2005). Premature death in the SMI population from cardiovascular disease and metabolic syndrome is associated with smoking, obesity, sedentary lifestyles, and use of second generation antipsychotics (Bartels & Desilets, 2012; Clark, 2004; Newcomer & Hennekens, 2007).

Screening as a part of integrated specialty mental health care includes those for physical health conditions only. Given the metabolic and cardiovascular problems of individuals with severe mental illness, knowledge of the critical ranges for medical screening measures of hemoglobin A1c, body mass index, cholesterol, and blood pressure are essential. Metabolic and physical health screening has been recommended as part of routine clinical practice (Bartels, 2004; Citrome & Yeomans, 2005). However, the recommendation is for fasting plasma glucose instead of the hemoglobin A1c and inclusion of waist circumference. Although not identified in this research, screening measures of mental health can be used in the specialty care settings to address the trend in data collection and quantitative evaluation of outcomes (Volland, Berkman, Phillips, & Stein, 2003). The Beck Depression Inventory and PHQ have demonstrated validity for evaluating change in clinical symptoms and signs (Furukawa, 2010).

There is evidence of integration in specialty mental health, but limited detail on the interventions other than case management. Given the focus of integration on evidence-based medicine, it is recommended that interventions supported by evidence be included in these interventions. Although not identified in this review, lifestyle interventions such as advice on physical activity, diet, and smoking cessation are recommended for the SMI population (Cabassa, Ezell, & Lewis-Fernández, 2010; Daumit et al., 2013; De Hert et al., 2011; Dickerson et al., 2013; Richardson et al., 2005; Tsoi, Porwal, & Webster, 2013). The U.S. Preventative

Services Task Force has included smoking cessation interventions as a covered preventive service and suggests the "5-A" framework for an intervention-ask, advise, assess, assist, and arrange (U.S. Preventive Services Task Force, 2014).

Limitations

Several limitations should be noted. Identification and review of the included studies was completed by one researcher. Studies were limited to those published and completed in the United States, so the findings are not generalizable to other countries. Published studies were limited in the details of the entire system and focused on the integrated component to their care. Therefore, studies completed in primary care did not include details on medical screening measures and interventions. Specialty mental health care review studies failed to include details on evidence- based protocols or screening measures used to monitor the mental health condition. Further, there may be additional knowledge constructs related to integrated healthcare that were not identified in this review.

Future Direction

This review provides a starting point for preparing the workforce by identifying the specific knowledge base from the research. Further work is needed to confirm how this knowledge base translates to patient outcomes. Clarification of the interventions included in specialty care integrated settings and further details of step care knowledge content will ensure accuracy in training programs. Given the minimal number of available studies in specialty care locations, additional research in these locations is necessary. In addition to focusing on the content of integrated care knowledge and skills, there is a need to determine the most effective strategies to develop these skills in the current workforce.

CHAPTER 2

Examining the Validity of a Model of Integrated Healthcare Knowledge

Denise R. Black and William Nugent

Abstract

Identifying the knowledge for behavioral health providers to practice in integrated healthcare settings is an essential step to transitioning these individuals to integrated healthcare delivery systems. This study uses a survey design to examine the extent to which specific domains of knowledge related to medical and psychiatric diagnoses, screening measures, and interventions are validated by 154 behavioral health providers working in integrated healthcare settings using confirmatory factor analysis (CFA) models. The first-order, four-subscale model as well as the individual knowledge domain models were confirmed by the CFA models in the sample. The results provide further evidence of the specific diagnostic categories, screening measures, and interventions that constitute integrated healthcare knowledge for these providers.

Keywords: integrated healthcare, behavioral health, primary care, screening, interventions

The U.S. healthcare system with separate settings for mental and physical healthcare fails to provide high quality care to individuals with comorbid mental health and physical health conditions. With this approach to care, individuals with severe mental illness treated primarily in specialty mental healthcare settings have significant untreated medical comorbidities resulting in life expectancy 25 years less than the general public, with 60% of these deaths due to preventable medical conditions (Parks, Svendsen, Singer, Foti, & Mauer, 2006). Mental health care provided by physicians in primary care settings results in 50-60% of psychiatric diagnoses unrecognized by physicians and 46% higher healthcare expenditure for chronic conditions that include a behavioral health diagnosis (Kuramoto, 2014). With approximately 17% of the U.S. adult population having comorbid mental and physical health conditions within any 12-month period (Druss & Walker, 2011), an uncoordinated system of separated mental and physical health care results in poor outcomes, higher utilization of health related services, and increased cost (Petterson et al., 2008; Simon, Ormel, VonKorff, & Barlow, 1995).

In order to improve quality of care, the U.S. healthcare delivery system is transitioning from separated mental and physical care systems to an integrated healthcare delivery system. Integrated healthcare is a coordinated system of physical and mental health care that goes beyond co-location of providers and coordination of acute care services (Berkman, 1996; Epping-Jordan, 2005; Lopez, Coleman-Beattie, Jahnke, & Sanchez, 2013; Strosahl, 1998). In integrated delivery systems, screening measures and proactive care strategies are focused on early identification of comorbid conditions and secondary prevention strategies that slow the progression of these diseases (Berkman, 1996; Epping-Jordan, 2005). According to the Center for Integrated Health Solutions Standard Framework for Levels of Integrated Healthcare, services at the highest level have the following characteristics: they are team-based, have shared practice space, use

evidence-based practices, use both medical and behavioral health screening, and develop a single treatment plan, thereby ending up with a seamless response to all health care needs (Heath, Wise Romero, & Reynolds, 2013). This patient-centered, population-health delivery model provides care that is immediate, preventative, comprehensive, and evidence-based. Further, health care policy in the form of the Affordable Care Act provides support for integrated care through incentives for accountable care organizations and health homes (Fisher & Shortell, 2010; US Preventive Serivces Task Force, 2014).

Despite current incentives to transform the healthcare delivery system, workforce barriers impact the transition to integrated care. Simply transitioning specialty care behavioral health clinicians to integrated settings is ineffective due to lack of knowledge essential to practice in integrated settings and poor skill fit of specialty care practices to primary care settings (Blount & Miller, 2009; Richardson et al., 2001). Further complicating this transition is limited evidence identifying the essential knowledge and skills needed to deliver care given the variation in current integrated models and settings (Aitken & Curtis, 2004).

Efforts to identify the competencies necessary for integrated healthcare settings have emerged from expert recommendations, coalitions, conferences, and research. According to Strosahl (2005), behavioral health specialists working in integrated settings require training in population care, evidence-based care, medical conditions, psychopharmacology, behavioral medicine, health psychology, and the use of screening tools. Blount and Miller (2009) suggest consultants need training on screening instruments, evidence-based therapies, common medical conditions (e.g., asthma, diabetetes, heart disease, irritable bowel syndrome), care management, and medications. The SAMHSA-HRSA Center for Integrated Health Solutions (CIHS) identified the need for competency in the following: interpersonal communication, collaboration

& teamwork, screening & assessment, care planning & care coordination, intervention, cultural competence & adaptation, systems oriented practice, practice-based learning & quality improvement, and informatics (Hoge, Morris, Laraia, Pomerantz, & Farley, 2014). Specific to primary care settings, the Colorado Consensus Conference identified the following competencies: the ability to identify and assess behavioral health need, engage and activate patients in their care, implement care plans that address behavioral health factors, improve care team function, communicate effectively, provide efficient and effective population care delivery, provide culturally responsive care, and adapt to the culture of an integrated care team (Miller et al., 2016). In a survey of social workers in integrated care settings, Horevitz and Manoleas (2013) identified the following competencies: stepped care (use of behavioral algorithms for care), motivational interviewing, curbside consultations (brief impromptu consultations with healthcare professionals), cognitive-behavioral interventions, knowledge of psychotrophic medications, and knowledge of chronic illness. While providing general guidance on team based practices and behavioral interventions, these recommendations lack specific knowledge on diagnostic categories and screening measures.

Results of a recent systematic review of models of integrated healthcare identified content on diagnostic categories, screening measures, and interventions in primary care, specialty medical care, and specialty mental health as necessary knowledge (Black, in preparation). The results of this systematic review suggested the model of essential knowledge for practicing in an integrated healthcare setting shown in Figure A-1. This model proposes that the second-order latent construct *integrated healthcare knowledge* can be explained by the four first-order latent

<Insert Figure A-1 here>

constructs of *knowledge of medical diagnoses*, *knowledge of psychiatric diagnoses*, *knowledge of screening measures*, and *knowledge of interventions*. Latent constructs are indicated in the model with ellipses. The first order latent constructs are indicated by observed variables, represented by rectangles in the figure. The single-headed arrows emanating from the latent constructs and leading to specific domains of knowledge, such as the arrow emanating from the second-order latent construct *integrated healthcare knowledge* and leading to the first-order latent construct *knowledge of medical diagnoses* indicates the latent construct *knowledge of medical diagnoses* causes changes in *knowledge of medical diagnoses* in the sense that changes in *integrated healthcare knowledge* lead to changes in *knowledge of medical diagnoses* (Brown, 2015). According to this model, behavioral health providers working in integrated healthcare settings require knowledge of psychiatric diagnoses (e.g., depression, generalized anxiety disorder), medical diagnoses (e.g., cardiovascular disease, diabetes), medical and psychiatric screening measures (e.g., PHQ 9, Hemoglobin A1c) , as well as evidence based behavioral interventions (e.g., medical medications, lifestyle interventions).

Further research is needed to provide evidence supporting the model in Figure A-1 derived from the systematic review. One potential form of evidence would be a test of the extent to which the domains of knowledge identified in, and the relationships between the domains in, Figure A-1 are validated by data obtained from behavioral health providers currently working in integrated healthcare settings. Confirmatory factor analysis is a hypothesis testing approach in which "the researcher imposes the structure of the hypothesized model on the sample data, and then tests how well the observed data fit this restricted structure" (Byrne, 2010, p. 7), thereby providing further statistical evidence for the plausibility of the model. The objective of the

current study was to test the validity of the model of integrated healthcare knowledge derived from the systematic review and shown in Figure A-1.

Methodology

Research Design

The current study entailed administering a single session on-line survey between October 2016 and December 2016. Participants received an initial and follow-up invitation to participate in the survey through their agency or association electronic mailing list. The email described the research rationale, expected time commitment, and survey link. In order to maintain confidentiality, email information from participants was not recorded. Participants were required to review and "Accept" the informed consent in order to proceed to the survey. Prior to conducting the research, IRB approval was obtained from the University of Tennessee Institutional Review Board.

Study Population

Participants included behavioral health providers working in integrated primary care, specialty medical (e.g. cancer centers or HIV clinics), or specialty behavioral health settings. These participants were identified and recruited through their employment in an integrated healthcare organization or through membership in an integrated healthcare association. Behavioral health providers were eligible to participate if they met the following inclusion criteria: 1) he or she was a non-physician provider in an adult integrated healthcare system, 2) he or she provided services as part of a co-located physical and mental health team, and 3) he or she was part of a healthcare team that conducted screening for physical and/or mental health conditions. Participants were identified and recruited from three organizations: 1) A multi-site

healthcare system in the southeastern United States that provides integrated care through behavioral health consultants in primary care as well as specialty care settings, 2) a membership organization that promotes comprehensive and cost-effective models of healthcare, and 3) a funded program to support integration of primary care service into behavioral health settings.

Measurement

The survey was conducted using a 36-item self-report questionnaire developed by the first author from constructs identified in a systematic review of integrated care models (Black, 2016, Manuscript in Preparation). The systematic review evaluated 68 journal articles published between 1999 and 2015. Eligible studies examined integrated primary or specialty care to U.S. adult populations. Inclusion criteria required evidence of outpatient care that met the highest level of integration: co-located, population-based screening for physical and/or mental health conditions, and physical and/or mental health interventions. Results from the systematic review were incorporated into the survey in order to evaluate how closely practitioners in the field agreed with the knowledge elements identified in the systematic review.

Each item was scored using a 6-item Likert-type scale with categories ranging from 1(strongly disagree) to 6 (strongly agree). Behavioral health providers rated their level of agreement with item statements about knowledge required in their work environment. The following 4 subscales were on the survey instrument: *knowledge of medical diagnoses* (items 1-13), *knowledge of psychiatric diagnoses* (items 14-20), *knowledge of screening measures* (items 21-27), and *knowledge of interventions* (items 28-36).

Data Analysis

SPSS version 22 and Amos version 24 were used for analyses. Results from the survey were downloaded through Qualtrics (an online survey system) into an SPSS file to screen data, complete descriptive statistics of participants and items scores, evaluate patterns of missing data, and calculate scale reliability scores (Cronbach alpha).

Amos was used to conduct confirmatory factor analyses (CFA; Brown, 2015) to test the relationship of individual items to subscales as well as the subscales to the construct *integrated healthcare knowledge*. Maximum likelihood estimation was used to test the CFA model. Multivariate normality was evaluated in Amos by reviewing the Assessment of Normality Multivariate for a value greater than 5 (Byrne, 2010). Large values of this statistic indicate kurtosis, which can impact tests of statistical significance. Outliers were evaluated through the Mahalanobis d-squared for observations that stand distinctively apart from other values. Model goodness of fit was evaluated with the chi-square statistic; the comparative fit index (CFI); the root mean squared error of approximation (RMSEA); the 90% confidence interval for RMSEA; the p-value for RMSEA less than .05 (PCLOSE); the Tucker -Lewis Index (TLI); and the standardized root mean squared residual (SRMR). The following values for the fit indices were considered indicative of a good fit: CFI greater than .95; RMSEA less than .05; PCLOSE greater than .50; the TLI greater than .95; and SRMR less than .08 (Byrne, 2010; Hu & Bentler, 1999). The following values for fit indices were considered an adequate fit: CFI greater than .90; RMSEA less than .08 (Byrne, 2010, p. 79-80). Factor loadings that were statistically significant were retained in the final model. Evidence suggesting the model closely fit the data would provide additional evidence to support the model of knowledge needed for working in integrated healthcare settings created based on the systematic review and shown in Figure A-1.

Results

Participant Characteristics

The final sample consisted of 154 participants. The data from seven participants (4.5%) were removed for the following reasons: 1 declined consent, 4 completed only the demographic information items, and 2 completed less than 25% of one or more scale items. Table 2-1 describes the demographic characteristics of the 154 participants. The sample consisted of 113

<Insert Table 2-1 here>

females (73.9%) and 40 males (26.1%). The average number of years working in integrated healthcare was 5.75 years (SD = 5.82) with 4.34 years (SD = 5.92) on the current healthcare team. Integrated healthcare settings included 66.2 % primary care, 1.9 % specialty medical, 22.7 % specialty mental health, and 9.1% other. Other locations included both primary care/behavioral health, inpatient, and sleep center locations. The ethnicity of the participants were 77.3 % white, 7.1 % African American, 1.3 % Native American or Alaskan Native, 6.5 % Hispanic or Latino, 3.2 % Asian, and 4.5% other.

Item and Scale Analysis

A missing values analysis found the maximum number of missing scores for any of the 36 scale items was 2 (1.3%). The mean item score for each subscale per person with missing data was used to impute missing item scores (Roth, Switzer III, & Switzer, 1999). This method was applied for missing values based on previous research that missing items that are part of a subscale are moderately to highly correlated.

Univariate skew and kurtosis were evaluated in individual items. These results were important for assessing assumptions upon which confirmatory factor analyses were based. High levels of kurtosis were observed in 12 items in the following subscales: *knowledge of psychiatric diagnoses* [items on depression (kurtosis = 17.87), panic disorder (23.57), generalized anxiety disorder (10.48), substance use (8.76), post-traumatic stress disorder (7.69)], *knowledge of screening measures* [items on mood disorder screening (9.66), anxiety disorder screening (6.60), substance use screening (4.68)], and *knowledge of interventions* [items on case management (6.10), lifestyle interventions (9.52), brief substance use interventions (8.60), and brief therapeutic interventions (7.86)].

Mean and standard deviations for each item and scale, along with estimated reliabilities of scores on subscales, were calculated (Table 2-2). Individual items within each subscale

<Insert Table 2-2 here>

were collapsed from ordinal to dichotomous categories of agreement or disagreement that the specific knowledge identified in the item was essential to the participant's role in an integrated healthcare setting. Item agreement was computed by the combination of the following response options: somewhat agree, agree, and strongly agree. Item disagreement was computed by the combination of the following responses: somewhat disagree, disagree, and strongly disagree. Subscale agreement was determined by calculating the mean agreement of the individual items for each subscale. Subscale agreement ranged from 88.3% to 99.4% with the following results for each subscale: 88.3% medical diagnoses, 99.4% psychiatric diagnoses, 90.9% screening measures, and 99.4% interventions.

Reliability of scores (Cronbach alpha) from each subscale were as follows: medical diagnoses .95, psychiatric diagnoses .90, screening measures .88, and interventions .87. Item level scores demonstrated participant agreement with all items above 80%. Agreement for medical diagnosis items ranged from 81.8% for metabolic syndrome to 96.9% for obesity, while agreement for psychiatric diagnostic categories was either 99.4% or 100%. Agreement with screening measure items ranged from 87% for cholesterol and hemoglobin A1c to 98.7% for mood disorder, anxiety disorder and substance use measures. Interventions agreement ranged from 90.3% for medical medications to 100% for brief therapeutic interventions.

CFA Models

CFA model of knowledge of medical diagnoses.

A CFA was performed to examine the relationship between the 13 medical diagnoses and the single latent factor *knowledge of medical diagnoses*. The model was modified by adding the covariance between error variances (Brown, 2015) on several of the items based on available research: obesity/insomnia (Hargens, Kaleth, Edwards, & Butner, 2013), pain/insomnia (M. Smith & Haythornthwaite, 2004), diabetes/obesity (Astrup & Finer, 2000), sexual dysfunction/HIV (Asboe et al., 2007), cancer/COPD (Houghton, Mouded, & Shapiro, 2008), sexual dysfunction/irritable bowel syndrome (Fass, Fullerton, Naliboff, Hirsh, & Mayer, 1998), irritable bowel syndrome/metabolic syndrome (Guo et al., 2014), and cardiovascular disease/COPD (Maclay & MacNee, 2013). Fit indices for the final model in Figure A-2 indicated an adequate fit: CFI = .92, RMSEA = .13, RMSEA CI [.11, .15], PCLOSE <.001,

<Insert Figure A-2 here>

TLI = .89, and SRMR = .06. Although the chi-square test of model fit was found to be significant (χ^2 = 209.281, df = 57, p< .001), it is widely known that this test is sensitive to sample size and number of parameters in a CFA model (Byrne, 2010). The loadings of the observed variables on the first-order factor were statistically significant for all items. Multivariate kurtosis was observed in the scores from the following items: diabetes, obesity, and insomnia. There was no evidence of multivariate outliers. Based on the observed squared values, the proportion of variance in each item explained by *knowledge of medical diagnoses*, ranged from 29% (HIV) to 88% (cardiovascular disease).

CFA model of knowledge of psychiatric diagnoses.

A second CFA was performed to examine the relationship between the 7 psychiatric diagnosis items and the single factor *knowledge of psychiatric diagnoses*. The model was modified by adding a covariance between the error variances (Brown, 2015) of two items based on the following research: bipolar/psychosis (Craddock, O'Donovan, & Owen, 2005) and depression/generalized anxiety disorder (Moffitt et al., 2007). Fit indices of the final model in Figure A-3 indicated a good fit: CFI = .98, RMSEA = .09, RMSEA CI [.04, .14],

<Insert Figure A-3 here>

PCLOSE = .07, TLI = .97, and SRMR = .03. The chi-square test of model fit was found to be significant (χ^2 = 26.869, df = 12, p = .008). The loadings of the observed variables on the first-order factor were statistically significant for all items. Multivariate kurtosis was observed in the following items: depression, panic disorder, generalized anxiety disorder. There was one multivariate outlier identified, but there was no statistically significant difference in results with the outlier removed. The proportion of variance in each item explained by *knowledge of*

psychiatric diagnoses, ranged from 28% (psychotic disorders) to 76% (post-traumatic stress disorder).

CFA model of knowledge of screening measures.

A third CFA was performed to examine the relationship between the 7 screening measure items and the latent construct *knowledge of screening measures*. The model was modified by adding covariances between error variances (Brown, 2015) for several of the items based on research associated with the comorbidity of mood/anxiety, blood pressure/cholesterol and cardiovascular disease risk (Williams, 2002), and substance use comorbidity with anxiety/mood disorders (Grant et al., 2004). Fit indices of the final model in Figure A-4 indicated a good fit: CFI = .99, RMSEA = .09, RMSEA CI [.04, .14], PCLOSE = .09, TLI = .97, and SRMR = .04.

<Insert Figure A-4 here>

The chi-square test of model fit was found to be significant (χ^2 = 22.274, df = 10, p = .014). The loadings of the observed variables on the first-order factor were statistically significant for all items. There were no significant outliers and multivariate kurtosis was observed in mood disorder screening. The proportion of variance in each item explained by *knowledge of screening measures* based on the present model, ranged from 5% (anxiety disorder screening) to 92% (hemoglobin A1c).

CFA model of knowledge of interventions.

A fourth CFA was performed to examine the relationship between the 9 intervention items and the single factor *knowledge of interventions*. The model was modified by adding covariances between error variances (Brown, 2015) for several of the items based on previous research of interventions in integrated care models to address both psychiatric and medical

comorbid conditions: medical diagnoses/medical levels of care, brief substance use interventions/brief therapeutic interventions, medical medications/psychiatric medications, lifestyle interventions/brief substance use, lifestyle interventions/brief therapeutic interventions, medical levels of care/case management, medical levels of care/psychiatric levels of care (Boardman, 2006; Pomerantz et al., 2010; Unützer et al., 2002).

Fit indices of the model in Figure A-5 indicate an adequate fit: CFI = .95, RMSEA = .11,

<Insert Figure A-5 here>

RMSEA CI [.08, .15], PCLOSE < .001, TLI = .91, and SRMR = .07. The chi-square test of model fit was found to be significant (χ^2 = 58.541, df = 20, p < .001). The loadings of the observed variables on the first-order factor were significant for all items. There were no significant outliers, but multivariate kurtosis was observed in the items for psychiatric diagnoses, substance use levels of care, case management, lifestyle interventions, brief substance use interventions, and brief therapeutic interventions. The proportion of variance in each item explained by *knowledge of interventions* based on the present model, ranged from 20% (medical medications) to 97% (substance use levels of care).

CFA model of integrated healthcare knowledge.

The most comprehensive evaluation of the relationship between individual items along with the relationship between the first-order constructs and *integrated healthcare knowledge* would have been a second-order confirmatory factor analysis. However, the complexity of the hypothesized model, the high levels of kurtosis among some of the items, the covariances between the error variances across the latent constructs, given the small sample size precluded the use of a second order CFA. Therefore, the sums of item scores for each of the subscales

were calculated from the individual item scores to create overall scale scores. A final CFA model was performed to examine the relationships between the total scores on the subscales and the extent to which these scores loaded on the latent construct *integrated healthcare knowledge*. Fit indices of this single factor model, shown in Figure A-6, initially indicated an adequate fit:

<Insert Figure A-6 here>

CFI = .94, RMSEA = .25, RMSEA CI [.16, .35], PCLOSE = < .001, TLI = .81, and SRMR = .06. The chi-square test of model fit was found to be significant ($\chi2 = 10.926$, df = 2, p< .001).

Further modification of this model by adding the covariance between the error variances between psychiatric diagnoses and interventions as seen in Figure A-7 resulted in a good fit:

<Insert Figure A-7 here>

CFI = 1.0, RMSEA < .001, RMSEA CI [<.001, .21], PCLOSE = .44, TLI = 1.00, and SRMR = .01, with the chi-square test of model fit nonsignificant ($\chi2 = .852$, df = 1, p = .36). The loadings of the observed variables on the single latent were statistically significant. Multivariate kurtosis was observed in the measures for psychiatric diagnoses and interventions which would attenuate regression coefficients. Based on the observed squared values, the proportion of variance in each scale explained by *integrated healthcare knowledge*, ranged from 12% (psychiatric diagnoses) to 79% (screening).

Discussion

The study findings are consistent with previous literature on integrated healthcare and the results identified in the systematic review. While previous research has suggested that behavioral health providers required knowledge of chronic medical conditions (e.g., asthma,

diabetes, heart disease, and irritable bowel syndrome) (Strosahl, 2005; Horevitz & Manoleas, 2013; Hoge, Morris, Laraia, Pomerantz, & Farley, 2014), the results of this study provide further evidence that the knowledge needed includes that of specific diagnoses (e.g., diabetes, cardiovascular disease, and metabolic syndrome). These results are consistent with current knowledge of prevalent chronic medical conditions (Centers for Medicare and Medicaid Services, 2012), along with conditions for which behaviors impact risk, behavior change is essential for prevention, and psychological factors impact management of the chronic disease (Smith, Kendall, & Keefe, 2002).

While it is assumed that behavioral health providers working in integrated settings would require knowledge of mental health diagnoses, it is essential to understand whether knowledge of specific diagnostic categories are required in all integrated settings. Previous research has suggested that individuals with severe mental illness (e.g. bipolar, schizophrenia, and major depressive disorders) are served primarily in specialty mental health locations (Druss, Rohrbaugh, Levinson, & Rosenheck, 2001) with less serious conditions treated in primary care (Druss & Rosenheck, 2000). The results of the current study indicated 99-100% agreement by participants that knowledge of serious psychiatric conditions "such as bipolar disorder and psychosis" are required in both integrated primary care and specialty behavioral health settings. Whether providing direct therapeutic services for these conditions in some models of integrated care (Pirraglia et al., 2012) or identifying conditions for referrals to alternative treatment settings (Unützer et al., 2002), knowledge of serious mental health conditions appears to be important.

Screening is an essential population health approach incorporated into integrated health care models (Druss et al., 2001; Robinson & Strosahl, 2009). Knowledge of screening measures with specific alcohol (CAGE) and depression measures (PHQ-9) have been supported in

previous research (Blount & Miller, 2009;Strosahl, 2005). The current study extends these results to provide further support that behavioral health providers require knowledge of screening tools for both psychiatric as well as medical conditions. More than 85% of participants agreed that knowledge of body mass index, cholesterol, blood pressure, and hemoglobin A1c screening measures constitute knowledge of screening measures in integrated health care.

The current study provides further evidence of behavioral interventions essential for practicing in integrated settings. Brief therapeutic interventions (i.e., cognitive behavioral therapy, motivational interviewing, and case management) have been identified by previous research (Blount & Miller, 2009; Horevitz & Manoleas, 2013) and was supported in the current study. In addition, lifestyle interventions (e.g., sleep, relaxation) along with knowledge of psychiatric medications identified in previous research were also supported by the current findings (Blount & Miller, 2009; Horevitz & Manoleas, 2013). However, findings of the current study extend previous research by including additional lifestyle interventions (e.g., diet, physical activity, and smoking cessation), medications for medical conditions, and levels of care (psychiatric, substance, and medical) as essential intervention knowledge for behavioral health providers in integrated setting.

Limitations

This study had several limitations. The final analysis was restricted to a first-order CFA of subscale scores due to the small sample size. The measurement instrument was limited by items identified in the systematic review and did not provide enough variability, resulting in univariate and multivariate kurtosis, along with positive skew. Further, the measure did not include the names of specific mental health screening instruments, lifestyle interventions, or brief substance use/therapeutic interventions due to variability of selected measures and interventions

in practice. However, specific information regarding measures and approaches would provide more substantive information. Finally, the survey assessed only provider opinion of whether or not knowledge of selected items was essential, but did not specifically measure clinician knowledge. This type of analysis would also lend itself to identifying what aspects of diagnoses, screening measures, and interventions are essential.

Conclusions

The study findings provide further support that behavioral health providers working in adult integrated healthcare settings require knowledge of specific medical diagnoses, psychiatric diagnoses, medical and mental health screening measures, medications, levels of care, lifestyle interventions, and brief substance abuse and therapeutic interventions. Future research based on a larger sample size that includes a measure of clinician knowledge can extend the results presented in this study. The inclusion of a qualitative research approach may be essential to further identify knowledge required to practice in integrated healthcare settings that was not identified in the systematic review.

CHAPTER 3

Developing a Computer Application to Prepare Social Workers for Integrated Healthcare:

Integrated Healthcare v. 1.0.

Denise R. Black, Mary L. Held, and Tami H. Wyatt

Abstract

Integrated healthcare is a proposed change to the U.S. healthcare system in order to address healthcare disparities for individuals with mental and physical health conditions. Computer applications may provide an effective strategy to prepare social workers for the transition to integrated healthcare. An internet-based tool, Integrated Healthcare v 1.0, was developed and tested through rapid prototyping to access knowledge required for behavioral health providers to practice in integrated healthcare settings. Two focus groups (N=5 group 1; N=7 group 2) and individual interviews (N=5) were conducted with social work professors and students. Nielson's usability heurstics were used to evaluate data from focus groups and interviews, and changes were incorporated in development. The final computer application is an introduction to integrated healthcare concepts, reinforces the integrated nature of physical and behavioral health, and puts evidence based knowledge at the point of care.

Key words: Integrated healthcare, usability testing, technology

In the current U.S. healthcare delivery system with separate systems of mental and physical healthcare, comorbid behavioral and physical health problems are not effectively detected nor properly treated (Unutzer, Schoenbaum, Druss, & Katon, 2006). Although mental health conditions are common in primary care populations, especially those with comorbid chronic medical illnesses (Croghan & Brown, 2010), approximately 50-66% of these psychiatric diagnoses are unrecognized (Kuramoto, 2014). Individuals with severe mental illness, commonly seen in specialty behavioral health settings, die 25 years earlier than the general public due to preventable medical conditions (Parks et al., 2006; Unutzer, Harbin, Schoenbaum, & Druss, 2013). Changes are urgently needed to address these poor outcomes and to provide high quality healthcare to individuals with both mental and physical health conditions.

Integrated healthcare, "the systematic coordination of physical and mental healthcare" (Lopez, Coleman-Beattie, Jahnke, & Sanchez, 2008, p. 7), is a proposed solution to addressing these health disparities and improving outcomes. Integrated care goes beyond the coordination of mental and physical health services to a patient-centered, population-health delivery model focused on immediate, preventative, and comprehensive care (Berkman, 1996; Epping-Jordan, 2005; Kirk Strosahl, 1998). Within integrated healthcare delivery systems, mental and physical health providers share practice space, population-based physical and mental health screening measures are incorporated into practice, a single treatment plan is used, and evidence-based interventions are implemented across disciplines (Heath, Wise Romero, & Reynolds, 2013). Prior research has demonstrated improved outcomes with integrated healthcare in primary care, specialty medical care (e.g., cancer and HIV clinics), and specialty behavioral healthcare settings. Katon et al. (2004) demonstrated improvement in depression outcomes for individuals with diabetes when mental healthcare was integrated into primary care settings. Further,

integrated care provided in a low-income oncology clinic demonstrated reduction in depressive symptoms, better quality of life, and lower pain levels (Ell et al., 2008). Additionally, Pirraglia and colleagues (2012), found improved cardiovascular risk factors (e.g., BMI, blood pressure, and LDL cholesterol) for individuals with severe mental illness when primary care services were integrated into a Veterans mental health outpatient clinic.

Despite the proposed benefits of integrated healthcare, a significant barrier to change is the lack of providers with the knowledge necessary to practice in integrated settings (Richardson et al., 2001). Simply transitioning specialty care clinicians to integrated settings is ineffective due to poor skill fit between specialty mental health clinical practices and integrated care (Blount & Miller, 2009). Behavioral health specialists working in integrated health settings require training in medical conditions (asthma, diabetes, heart disease, etc.), co-morbidities for illnesses, psychopharmacology, care management, population health (health problems of underserved populations), health behavior change practices (e.g., for smoking and obesity), and screening tools- knowledge not included in previous academic training (Blount & Miller, 2009; Horevitz & Manoleas, 2013; Strosahl, 2005). Efficient strategies are needed to provide the specialized knowledge essential for current and future behavioral health providers to practice in integrated primary care and specialty care settings.

Computer application technology may be an effective method to disseminate knowledge essential for social workers to transition to integrated settings. Smartphone applications are widely used by providers in healthcare settings for timely access to information, accurate documentation, access to evidence-based decision support systems, and efficient work practices (Mickan, Tilson, Atherton, Roberts, & Heneghan, 2013). Benefits of smartphone applications are their intuitive nature, provision of opportunities for self-directed learning, verification of

knowledge at the point of care, ability to get to information quickly, and notification of upgrades or changes (Brown & Roberts, 2014). According to Luxton et al. (2011), computer applications developed to support clinical practice have the potential to improve quality and outcomes of behavioral healthcare. Despite the benefits of computer applications in healthcare, a computer application has not been developed to provide the knowledge required for behavioral health providers to practice in integrated healthcare settings. Integrated Healthcare v 1.0, a computer application that provides information essential to practice in adult integrated healthcare settings, was developed through a rapid protype method. Rapid prototyping is an application development process in which subject matter expert and end-user are involved in evaluating a series of protoypes (Jones & Richey, 2000). Obtaining feedback throughout the design process allows revisions to the application early in the process.

Development

The development and usability testing of the computer application followed a rapid prototyping model using information obtained from focus groups, individual interviews, and consultation with computer design experts. Specifically, Integrated Healthcare v 1.0 is a computer application that provides information on screening measures, medical and mental health diagnoses, interventions, and terminology essential for behavioral health clinicians to practice in adult integrated behavioral health or primary care settings. These content domains were identified and developed from the results of a systematic review of integrated healthcare models (Black, In preparation) and were confirmed by survey results of practitioners currently working in integrated healthcare systems (Black, In preparation).

Usability evaluations by domain experts as well as future users were conducted at different stages of development using Nielsen's heuristic methods (Wilson, 2014). Social

workers were the intended domain experts and users as licensed social workers are employed in both the physical health (13%) and mental health (37%) sectors of care, representing the largest profession within the mental health workforce (Mechanic & Olfson, 2015; Whitaker, Weismiller, & Clark, 2006). Flaws in design, content, and functionality were modified throughout the development of the computer application. The initial prototype consisted of screens created in Photoshop (Adobe Systems Inc., San Jose, CA) downloaded to InVision software (New York, NY) as a navigation tool. InVision allows designers to transform uploaded static screens into clickable, interactive prototype- giving users the experience of an actual computer application. The final computer application was built with HTML and CSS. Screenshots of Integrated Healthcare v.1 with key content elements are presented in Figures A-8 through A-11.

<Insert Figures A-8 through A-11 here>

Methods

Sample and Study Design

Prior to conducting the research, IRB approval was obtained from the Principal Investigator's university compliance office. The study was a qualitative research design with 2 focus groups at different stages of development of Integrated Healthcare v 1.0, followed by 5 individual interviews at the final stage. Focus group sessions lasting 45-60 minutes were held between September 2016 and January 2017. Focus group 1 consisted of a convenience sample of social work faculty. The faculty members have experience in training social work students, with some faculty members having specific expertise in integrated healthcare. Focus group 2 consisted of a convenience sample of graduate-level social work students, many of whom have knowledge and experience with integrated healthcare. Five interviews lasting 30-45 minutes were completed in February 2017- 4 via a videoconferencing service and 1 face-to-face session.

Interviews were conducted with a convenience sample of social work faculty and clinicians with knowledge and/or experience with integrated healthcare. These individuals represented experts providing direct patient care or training of social workers for direct patient care in integrated healthcare settings. They provided expertise on the content and usability of the computer application within the healthcare system.

Participants for the focus groups were contacted via university email system and invited to participate. Interview participants were contacted via advertisement at the Council on Social Work Education (CSWE) conference November 2016 and Society for Social Work and Research (SSWR) conference January 2017. Prior to conducting research, participants completed an informed consent and a brief demographic survey. The demographic survey included information on gender, age, race/ethnicity, level of knowledge of integrated healthcare, level of education, and years of clinical practice. Participants were provided a computer application prototype and asked to view the various screens on the prototype and respond to questions regarding design, content, and usability. All participants received compensation—lunch and/or gift card.

Data Collection

Two study investigators conducted each focus group, with one facilitating discussion and the other recording field notes. Focus groups were audio recorded. Focus Group 1 participants used an iPad with an application prototype developed in InVision. Topics covered in this focus group were related to content and included overall organization, content expected on each page, and relevance of the information for integrated healthcare settings. Questions included: 1) Is the content well-organized and clear? 2) On the diagnosis page, does the information contain correct content or is there additional content that should be included? 3) Is there anything that you can

think of that we can change to improve the usability in healthcare settings? Behavioral observations were recorded to capture nonverbal communications such as facial expressions while observing screens, length of time studying screens, navigation ability without assistance from the investigators, and content/screens viewed.

Focus Group 2 participants used an iPad that contained a web-based computer application. Topics covered in this focus group included content and usability, with questions that focused on content, design, navigation, and impact on clinical care. Sample questions included: 1) Is the information meaningful? 2) What could be added to help you learn from this program? 3) How would the use of this program impact your clinical care in an integrated setting? Field notes were taken to record responses to questions and nonverbal behaviors.

Interviews were conducted by one investigator, audio recorded, with field notes taken. Participants had a web-based link to the computer application to independently explore. Topics covered in interviews were related to content, design, navigation, and use in real-world integrated settings. The following questions were asked as part of the evaluation: 1) What did you like most and least about the design, content, and functionality? 2) What would you change to improve the program? 3) Is the content meaningful for real-world integrated healthcare settings? Behavioral observations included whether the participants could navigate without assistance, screens reviewed, and facial expressions.

Analysis

Results from the demographic survey were evaluated for descriptive statistics using IBM SPSS Statistics 22. Focus group sessions and interviews were audio-taped, transcribed verbatim,

with field notes taken during focus groups and interviews. Interviews were verified via member

checking (60% response rate). Usability issues from the focus groups and interviews were added

to a heuristic evaluation tool developed by Wyatt, Li, Indranoi, and Bell (2012) for analysis

(Table 3-2). Issues were reviewed for personal preferences vs heuristic flaw- match between the

<Insert Table 3-2 here>

system and the real world, learnability, error prevention, flexibility, simplicity, user control, or

aesthetic design. Heuristic flaws were evaluated for importance and ease of achievement on a 5

point Likert scale. Importance (I) was rated "1" for low importance to "5" for high importance.

Ease of achievement (E) was rated "1" for difficult to "5" for easy. Overall scores (product)

were calculated (P=I * E) with rankings 15 or greater incorporated into modifications of the

prototype and final application.

Results

Focus Group 1

A total of five female faculty members, ranging in age from 25-44 year, participated in

the focus group (Table 3-1). All the faculty members identified race/ethnicity as white, non-

Hispanic. Four faculty members were MSW graduates with one participant a PhD graduate.

<Insert Table 3-1 here>

Knowledge of integrated healthcare was identified as either very good (40%) or fair (60%) by

participants. The mean years of clinical practice by participants was 6 years (SD = 8.94).

Feedback from the focus group participants to the initial prototype identified design

strengths and limitations. Comments regarding the overall appearance included, "like how it

looks", "very clean", "I trust the information just because of how good it looks". Participants

reported that the functionality "was very easy to use", "liked the icons on the side", and information "easy to find". Content reflected that "there are so many tools that you can use", "you have links to substantial information", "like that they (diagnoses) are put together, "like that it has comorbid conditions, notes, and interventions". Despite the positive response, usability and content concerns were identified with the prototype: lack of a search function- "you have to know what you are going for", the back button not returning to previous page, lack of information on validated populations on screening measures page, lack of information on settings and population intended for the application, and problem with screening measure categories. Issues were entered into the heuristic evaluation form and identified as a flaw or preference (Table 3-2). Flaw were evaluated for importance and ease of achievement with product scores calculated, with scores 15 or greater incorporated into modifications of the prototype prior to evaluation by Focus Group 2.

Focus Group 2

A total of seven students (6 female, 1 male) participated in Focus Group 2 (Table 3-1). Six students identified race/ethnicity as white (85%) and one identified as other (14%). One student reported being Hispanic (14%). All students were second-year MSW students. Knowledge of integrated healthcare was identified as very good (29%), good (57%), or fair (14%). The mean years of clinical practice was 1.7 years (SD = 0.69).

The students actively engaged in exploring the content of the application with limited direction. Comments regarding the content included, "I like the overview", "it is all here and you don't have to worry about false information", and "this is just the amount of medical information that I would need to do my job, but not a lot of extra". Participants reported that the functionality was "easy to navigate" and "you don't get lost in a stream". Impact on clinical care

reflected that the use of the application could "help put together a more broader scope for a possible treatment plan", "formally integrate the lifestyle pieces", as well as help recall of "things that I have been trained in but forget you know in the moment", along with helping students "feel more comfort and probably confidence knowing I have this tool". Despite the positive responses, content and navigation concerns were identified with the application: terminology sections too wordy- "too many words on the first page" and the first sentence is four lines long", links not working properly- "arrows seem kind of a little deceiving", and lack of clarity of use and population for the application- "what's the use of this app?", "it seems more adults to me rather than specific to children". Issues were entered into the heuristic evaluation form, identified as flaws or preference, with flaws evaluated for importance and ease of achievement. Flaws with product scores 15 or greater were incorporated into modifications of the application prior to evaluation by the interviews.

Interviews

A total of five individuals (4 female, 1 male) with knowledge or experience with integrated healthcare participated in interviews (Table 3-1). All participants identified their race/ethnicity as white. One participant identified being Hispanic (20%). Two participants were PhD students (40%) and three were PhD graduates (60%). Knowledge of integrated healthcare was identified as either very good (80%) or good (20%). The mean years of clinical practice by participants was 5.6 years (SD = 3.78).

Each of the interview participants explored the content of the application without direction, with most exploring the home page first. Participants were observed actively reading the content on each page as demonstrated by the following comments about the content: "it hits on some of the really important things", "all inclusive, one stop reference guide", "you don't get

too much right away", and "it is really integrated in talking about the condition, and then the screening measures and the interventions and it does so in an intuitive way". Functionality was described as "very easy to navigate", "easy to find things and access things", and "connected up very logically". The use of the application for clinical care was described as: "a real helpful reminder" and "evidence based practice at their finger-tips when they're working with patients". Content and navigation concerns were identified through the interviews: lack of learning objectives, models section not helpful and contributes to confusion with navigation, additional guidance needed on social work role in lifestyle interventions, and clarification of documentation required in psychotherapy interventions. Issues identified in the interviews were entered into the heuristic evaluation form, identified as flaws or preference, with flaws evaluated for consideration of changes to the application. Flaws were evaluated for importance and ease of achievement with product scores 15 or greater incorporated into final modifications of the application.

Discussion

Although new to social work, mobile devices with their associated applications are being used by physicians and nurses in classroom learning as well as clinical practice (Koeniger-Donohue, 2008; Mickan, Atherton, Roberts, Heneghan, & Tilson, 2014; Walton, Childs, & Blenkinsopp, 2005; Wyatt & Krauskopf, 2012). The benefits reported by users are the intuitive nature, ability to get information quickly, and integration of accurate information at the point of care (Altmann & Brady, 2005; Brown & Roberts, 2014; Gikas & Grant, 2013). Despite these reported benefits, students also reported frustration when applications did not work as anticipated (Gikas & Grant, 2013). In order to develop a computer application that would support the needs

of users, a rapid prototyping method that incorporated user feedback throughout development was employed.

Focus group and interview participants provided feedback that was incorporated into design, removed errors in functionality, and enhanced use of the program in real-world integrated health settings. While faculty reported that the initial design of the application looked professional and contained useful information, Focus Group 1 participants also identified learning difficulties with the application that included missing diagnoses (e.g., HIV and cancer), problems identifying screening measures, and lack of clarity on populations addressed in the content. Revisions prior to Focus Group 2 included adding a search function, adding relevant diagnoses, re-organizing the screening measure categories, and adding information on the adult population for the application.

Students in Focus Group 2 demonstrated that the application was intuitive by quickly identifying many of the available features and benefits to clinical practice. Additionally, the students identified several limitations in the documentation and consistency (similar links not working the same). Revisions following Focus Group 2 included modifying definitions, adding terminology, incorporating an application user overview, adding references, and correcting color and link errors.

Interviews with integrated healthcare faculty and provider experts afforded further direction in ensuring an applications that was meaningful for learning and using in real-world integrated healthcare practice. Specifically, participants suggested changes that would provide direction on how to effectively use the application and integrate medical concepts in clinical practice. The final computer applications include revisions in the documentation for behavioral interventions, removal of healthcare models, addition of learning objectives, and revision of the

screening measure link. Future versions of the program will include additional learning tools such as videos, therapy forms, patient information handouts, and medication links.

Integrated Healthcare v 1.0 was specifically designed to enhance knowledge of integrated healthcare concepts for social workers practicing in adult integrated healthcare settings. Involving subject matter experts and end-users in the development process provided an opportunity for social workers to design an application that specifically addressed their practice needs. The final design included mapping of diagnoses to comorbid conditions that enhances awareness of the relationships between specific mental and physical health conditions. The inclusion of screening measures with interpretation supports a preventative health approach to early identification of comorbid conditions. Linking the diagnoses to evidence-based therapeutic and lifestyle interventions allows for enhanced treatment plans and retention of previous training. These features reflect the knowledge concepts identified in previous literature (Blount & Miller, 2009; Horevitz & Manoleas, 2013; Strosahl, 2005) and support the social work ethic of competence to remain current on emerging knowledge and applying evidence to professional practice (NASW, 2008).

Conclusions

While new to social work practice, the potential benefits of a computer application are easily identified. As with other healthcare professionals, social workers in this study reported benefits related to accessing information quickly, maintaining previously learned knowledge, and obtaining new knowledge from this computer application. The final version of the application provides an introduction to integrated healthcare concepts, reinforces the integrated nature of physical and behavioral health, and puts evidence-based knowledge at the point of care. The next step is to conduct further research as a means of testing the effectiveness of the application

in developing knowledge among individuals with limited or no previous training in integrated

healthcare, as well as the match between the application and the high, fast paced nature of

clinical care.

CHAPTER 4

Effectiveness of a Computer Application in Developing Social Workers Knowledge of

Integrated Healthcare: A Pilot Study.

Denise R. Black, Tami H. Wyatt, and Mary L. Held

Abstract

Disseminating evidence-based knowledge and strengthening the education program of the healthcare workforce is an essential first step toward achieving transformation of the U.S. healthcare delivery system to integrated healthcare. Computer applications may be an effective approach to improving knowledge on integrated healthcare. An experimental research design was used to compare instructional approaches among MSW students (N=15) composed of experimental (N=7) and control (N=8) group participants. Students completed a pre-test on integrated healthcare concepts and screening measures along with a post-test on screening measures. ANCOVA revealed no significant differences on post-test scores between the two groups. Training on an integrated healthcare topic using a computer application is comparable to using an asynchronous instructional method.

Keywords: Integrated healthcare, training, technology

The United States healthcare system is organized with separate systems of care for mental and physical health conditions. However, this organization results in failure to identify medical and psychiatric diagnoses, inappropriate utilization, and poor outcomes. Services offered in primary care settings can result in 50-60% of psychiatric diagnoses unrecognized and increased healthcare expenditures for chronic health conditions that include a behavioral health condition (Kuramoto, 2014). For example, anxiety disorders are recognized in only 23% of cases presenting to primary care and result in overuse of medical services, emergency department visits, hospitalization, and costs (Roy-Byrne & Wagner, 2004). In comparison, services in specialty mental health locations fail to address the significant medical comorbidities of individuals with severe mental illness, resulting in a life expectancy of 25 years less than the general public (Parks, Svendsen, Singer, Foti, & Mauer, 2006). More importantly, approximately 60% of these deaths are due to preventable medical conditions.

Changes are needed to healthcare processes to improve the quality of care for individuals with comorbid medical and mental health conditions, thereby improving these outcomes. According to the Institute of Medicine, strategies to transform the healthcare system are developing efficient methods of disseminating evidence-based knowledge and strengthening the educational programs of the healthcare workforce (Richardson et al., 2001). Integrated healthcare, "the systematic coordination of physical and mental health care" (Lopez, Coleman-Beattie, Jahnke, & Sanchez, 2008, p. 7), is an evidence-based practice approach specifically developed to meet comorbid healthcare needs. Developing provider knowledge on integrated healthcare is an essential first step to achieving transformation of the healthcare system. *Integrated Healthcare v 1.0*, a web-based computer application developed for mental health clinicians to obtain information essential to practice in adult integrated medical or behavioral

healthcare setting, may be an efficient strategy for disseminating integrated healthcare knowledge (Black, Held, and Wyatt, in preparation). Research is needed to determine if this computer application is an effective tool for providers to develop knowledge of integrated healthcare concepts.

Background

Healthcare research has focused on transitioning to integrated delivery systems to address the competing healthcare needs and to improve quality of health outcomes. Integrated healthcare yields higher quality of care for individuals with comorbid conditions through the co-location of primary care and mental health providers, population-health screening for comorbid conditions, and comprehensive evidence-based interventions (Berkman, 1996; Epping-Jordan, 2005; Kirk Strosahl, 1998). Empirical evidence of integrated care models implemented in primary care, specialty medical care (e.g., cancer or HIV clinics), and specialty behavioral health settings has demonstrated improved mental and physical health outcomes (Elle et al., 2008; Katon et al., 2004; Pirraglia et al., 2012). In addition, integrated healthcare systems are supported by the Affordable Care Act with incentives for accountable care organizations, patient-centered medical homes and preventative services (Fisher & Shortell, 2010; U.S. Preventive Services Task Force, 2014).

Despite research and policy recommendations for integrated healthcare, barriers prevent translating this evidence into care processes. One significant barrier is the difficulty experienced by behavioral health providers, trained to work in specialty care settings, to transition to integrated primary care settings. The skills used in non-integrated specialty care settings are a poor fit for integrated care delivery systems (Blount & Miller, 2009). According to Strosahl (2005), behavioral health specialists working in integrated settings require training in population

care (focus on health determinants and outcomes of a group of individuals), evidence-based care, medical conditions, psychopharmacology, behavioral medicine, health psychology, and use of mental and physical health screening measures. Social workers transitioning to these settings face medical models or diagnoses that were not included in their training (Pratt & Lamson, 2012).

Developing efficient methods to improve the dissemination of integrated healthcare research and strengthen the training of behavioral health providers is essential to improving healthcare quality (Richardson et al., 2001). Handheld devices in the form of smartphones and tablets, along with their applications, may be one strategy. Computers have the potential to change the way we think (Turkle, 2004). Through use of computer applications, we are absorbing the content on the screen and learning new ways to think and understand. Benefits of mobile device applications are the intuitive nature, ability to get to information quickly, and notification of upgrades or changes (Brown & Roberts, 2014). Within the healthcare setting, applications enable learners to efficiently identify and integrate accurate knowledge at the point of care (Altmann & Brady, 2005; Gikas & Grant, 2013). Specifically, healthcare providers use smartphones for timely access to information (e.g. evidence-based decision support systems), accurate documentation, and efficient work practices (Mickan, Tilson, Atherton, Roberts, & Heneghan, 2013). A systematic review of seven randomized studies examined literature comparing healthcare professionals who used handheld computers to those using paper resources (Mickan, Atherton, Roberts, Heneghan, & Tilson, 2014). They found that using handheld computers yielded significantly improved information-seeking behaviors and adherence to guidelines. In addition, Briz-Ponce and colleagues (2015) found a computer application

approach to instruction provided greater knowledge gain than traditional instruction strategies. However, this study was limited to undergraduates with a lack of random assignment.

Despite evidence of the effectiveness of computer applications in healthcare, mobile-based learning strategies are an unexamined pedagogical approach to social work and integrated healthcare. Further research is needed to understand the use of computer applications by behavioral health providers in integrated healthcare settings. Therefore, the objective of this study was to evaluate whether a computer application can be an effective tool for behavioral health providers to obtain integrated healthcare knowledge on screening measures. Screening is a population health approach used in integrated healthcare systems aiming for early identification of comorbid medical or mental health conditions common to a given population as well as monitor ongoing symptoms.

Methodology

Subjects

A convenience sample of 15 students enrolled in a master's level social work (MSW) program were involved in the study. The MSW program provides training for students in integrated and nonintegrated settings. Participants included students who had not completed their training or practicum in integrated care. Students were invited to participate through an invitation via the university email system. Two email invitations were sent to all 121 students enrolled in the master of social work program. The response rate was 12.4% (N = 15).

Reseach Design

Prior to conducting the research, Institutional Review Board (IRB) approval was obtained from the university IRB committee. This study was an experimental, pre-test/post-test design. The study site was a technology lab on one southeastern U.S. university campus. Once written

informed consent was obtained, students were randomly assigned to the experimental or control group and each was given a unique identification (ID) number. Students completed a 24-item pre-test measure administered through an online survey system using their ID number. Following the pre-test, participants in the experimental group received a link to a newly developed computer application (*Integrated Healthcare v 1.0*) to use for 20 minutes. *Integrated Healthcare v 1.0* provides information on screening measures, medical and mental health diagnoses, interventions, and terminology. Experimental group participants were instructed to explore the information contained in the application on integrated healthcare terminology and screening measures for this evaluation.

Participants in the control group observed a 20-minute asynchronous on-line training. The training session was developed using PowerPoint and consisted of 29 slides with information presented on general integrated healthcare concepts (e.g., definition and characteristics of integrated care) and screening measures for physical and mental health conditions (e.g., blood pressure, PHQ9, AUDIT). Images and information on integrated healthcare and screening measures were the same for the computer application and asynchronous training. Following the 20-minute sessions, participants completed a 16-item post-test measure on physical and mental health screening measures administered through the online survey system using their ID numbers. All participants received a gift card as compensation for participation.

Measurements

Knowledge of integrated healthcare terminology and screening measures was evaluated by a measure developed by the researchers from competencies identified by a systematic review (Black, in preparation) and review of recommendations by the Social Work and Behavioral Healthcare Project through the Council on Social Work Education and The Annapolis Coalition

on the Behavioral Health Workforce (Hoge, Morris, Larala, Pomerantz, & Farley, 2014). The 24-item, pre-test consisted of two demographic questions (items 1-2), 6 questions related to integrated healthcare terminology (items 3-8), and 16 questions evaluating knowledge of physical and mental health screening measure identification and interpretation (items 9-24). The 16-item post-test measure contained only the screening measure questions used in the pre-test, but questions were randomized. Each question was evaluated using a multiple choice question format with 4 response options. Total scores were determined based on the accurate responses to each of the questions. Questions 3-8 of the pre-test were aggregated to develop a score for integrated healthcare knowledge. Questions 9-24 of the pre-test were aggregated to develop a score for knowledge of screening measures. Content validity of the measure was established through review by 3 integrated healthcare experts and a psychometric analyst. Pre and post-test results were matched using the participant identification number.

Data Analysis

SPSS version 22 was used for the analysis. Data were screened for equality of variances, normality, linearity, homogeneity of regression slopes, and outliers. The difference between screening measure post-test scores of experimental and control groups were evaluated using analysis of covariance (ANCOVA). This test compared the post-test scores of the experimental and control groups using pre-test scores of knowledge of integrated healthcare terminology and screening measures as covariates.

Results

A total of 15 students participated in the study- 7 were in the experimental group and 8 in the control group. The demographic characteristics of the study participants are included in Table 4-1. The sample consisted of 13 females (86.7 %) and 2 males (13.3 %).

<Insert Table 4-1 here>

The racial distribution of the sample included 93.3 % white and 6.7 % black.

Means and standard deviations for pre-test and post-test scores were calculated (Table 4-2). Pre-test data were missing on all screening measure questions for one participant (6.7%).

<Insert Table 4-2 here>

Mean comparisons were conducted on the pre-test subscales using independent t-tests to evaluate the degree of randomization between groups. The mean integrated healthcare knowledge for the experimental group (M = 3.14, SD 0.90) was lower than for the control group (M = 3.63, SD = 1.41), with the – 0.49 difference between the means not statistically significant, t (13) = 0.78, p = 0.45, two-tailed, 95% CI [- 0.86, 1.82]. The mean pre-test knowledge of screening measures for the experimental group (M = 6.67, SD 3.14) was lower than for the control group (M = 7.75, SD = 2.43), and the – 1.08 difference between the group means was not statistically significant, t (12) = 0.73, p = 0.48, two-tailed, 95% CI [- 2.15 to 4.32]. The statistically nonsignificant results were consistent with the two groups being initially equivalent prior to the training. Reliability of scores (Cronbach alpha) were calculated as follows: pre-test knowledge of screening measures .572 and post-test knowledge of screening measures .629.

Students' scores in the experimental group and the control group were compared using ANCOVA, with the pretest knowledge of screening measures as a covariate. Pretest knowledge of integrated healthcare was not included as a second covariate as it did not meet the assumption of a linear relationship between the covariate and the dependent variable (visually reviewed via scatterplot). Listwise deletion of one participant was employed in analysis due to missing values on pre-test knowledge of screening measures. Group membership was statistically nonsignificant as it accounted for only 4% of the variance in post-test scores when controlling for pre-test knowledge of screening measure scores, $F (1,14) = 0.46$, $p = 0.51$. The observed power was .095. The adjusted mean post-test score of the experimental group increased by 4.66 points over the pre-test screening measure score. In comparison, the adjusted mean post-test score of the control group increased by 4.88 points. Re-analysis with pre-test knowledge of integrated healthcare included as a covariate did not change results.

Post-hoc analysis of increase in post-test scores of experimental and control group via a dependent sample t-test demonstrated that both groups had a statistically significant increase: control group, $t (7) = 7.32$, $p < .001$, two-tailed, 95% CI [3.30, 6.45]; experimental group, $t (5) = 3.88$, $p = 0.01$, two-tailed, 95% CI [1.58, 7.76].

Discussion

The results of this ANCOVA, given the limits of low power and unreliability of the scores, suggest no significant differences in using the computer application when compared to asynchronous PowerPoint training. However, the post-hoc analysis suggest that both approaches are effective in increasing knowledge of screening measures. These overall results provide additional evidence that computer applications might be an effective tool for disseminating evidence-based knowledge. These findings extend the work of Briz-Ponce and colleagues

(2015) by including randomization, graduate-level social work students, and integrated healthcare concepts. While the results did not support the computer application as a more effective educational tool than the PowerPoint presentation, students using the app demonstrated increased knowledge of both physical and mental health screening measures used in integrated healthcare settings. This is important given students had no initial instruction on the use of the computer application, suggesting the intuitive nature of *Integrated Healthcare v 1.0*.

The Council on Social Work Education (CSWE) has focused on including integrated healthcare training in master's level social work education since 2012. In addition to providing academic courses and practicum setting experiences, CSWE has developed 15 instructional PowerPoint modules to support social workers in developing competencies for integrated practice (Becker, Beecher, DeBonis, Lee, & Werner, n.d). The results of this pilot test suggest that training on an integrated healthcare topic using a computer application might be comparable to those using this asynchronous instructional method. Further, the portability of the computer application has the potential to enhance the application of evidence-based knowledge at the point of care.

Todays' healthcare environments are fast-paced, requiring providers to obtain information rapidly. Therefore, efficient instructional methods require not only the ability to gain accurate knowledge, but doing so quickly (Altmann & Brady, 2005). While both the computer application and comparison instructional method improved scores within a brief time period, computer application use has the potential to obtain information more rapidly. Computer applications allow the user to seek only the information needed, without taking additional time to receive instruction on unrelated content. Further, computer applications can be updated as

healthcare information changes, allowing social workers in integrated healthcare settings to remain current with both physical and mental healthcare knowledge.

Limitations

There were several limitations to this pilot study. The convenience sample of MSW students at one university are not representative of all social work students or social workers practicing in non-integrated healthcare settings. Scheduling the experiment in the spring semester and location may have contributed to the low response rate, resulting in a small sample size with limited diversity. Further, the small sample size and limited diversity impacted power and generalizability of the results. Increasing the number of participants across settings will increase power and generalizability. Another limitation of the study was the narrowing of analysis to only knowledge of screening measures. While the use of screening measures is an important population health approach in integrated healthcare settings, it does not fully represent the important knowledge concepts required to practice in these settings. Additional topics of medical conditions, brief interventions, team-based practice, and terminology are essential for social workers to transition to integrated healthcare settings. Further, the study evaluated outcomes with a measure that had low reliability, which could impact the ability to find a significant difference in the test scores. The 16-item measure did not contain enough items on physical and mental health screening measures to fully establish content validity. Adding additional items will be necessary in future studies to increase reliability scores.

Conclusions

The results of this pilot study suggest using computer applications may have a place in social work education and practice. As with other healthcare professionals, social workers

require tools to keep up with the ongoing changes in healthcare practice. Computer applications may be an essential resource for social workers to remain current with evolving evidence-based interventions. Further research with larger sample sizes, more diversity of participants, conducted at the point of patient care are needed to provide additional support for their use. In addition, future research on the impact of computer application use on clinician interventions and patient outcomes will provide additional support for their use in the clinical setting.

CONCLUSIONS & RECOMMENDATIONS

Developing the workforce is an essential step toward transitioning the U.S. healthcare system to integrated healthcare in order to improve the quality of care for individuals with comorbid mental and physical health conditions. The goal of this research was to identify the knowledge necessary for behavioral health providers to transition to integrated healthcare settings and determine whether a computer application could be an effective strategy to provide this knowledge. This was achieved through a systematic literature review to identify knowledge constructs, a survey of providers working in integrated settings to confirm these results, development of a computer application, and a comparative study of the computer application to formalized educational instruction.

The systematic literature review of 68 articles covering 16 years of research (1999-2015) provided evidence of the specific knowledge required for behavioral health providers to practice in integrated primary care, specialty medical care, and specialty behavioral healthcare settings. The majority of this evidence was from primary care settings, with emerging evidence in specialty behavioral health. Behavioral health providers require knowledge of both mental and physical health conditions, screening measures to assist with early identification of prevalent and comorbid conditions, and evidence-based interventions. The results extend the evidence of previous research, expert recommendations, and coalitions by providing more specific information on diagnostic categories, screening measures, and interventions based on the practice setting.

While specific medical and psychiatric diagnostic categories, screening measures, and interventions were identified as representing the latent construct "integrated healthcare knowledge", additional evidence was needed to strengthen these conclusions. Confirmatory factor analysis had not been previously used to confirm results of a systematic review, but this

methodology is an established approach to test the plausibility of hypothesized models. Survey results from providers working in integrated settings analyzed using confirmatory factor analysis provided additional support of the hypothesized model of "integrated healthcare knowledge". Further, this approach introduced an alternative methodology to strengthen conclusions of hypothesized models developed from systematic literature reviews that bridges the gap between research and practice.

The results of the systematic review confirmed by providers working in integrated healthcare settings provided specific content for inclusion in a computer application. Developing the computer application through an iterative process that included feedback of social work faculty, students, and integrated healthcare experts throughout the process was critical to creating an application that would specially address their practice needs. The final design included mapping of diagnoses to comorbid conditions that enhances awareness of the relationships between specific mental and physical health conditions, screening measures with interpretation to support early identification of comorbid conditions, and linking the diagnoses to evidence based therapeutic and lifestyle interventions. As with other healthcare professionals, social workers involved in the design process reported benefits related to accessing information quickly, maintaining previously learned knowledge, and obtaining new knowledge on integrated healthcare from this computer application.

While students involved in the development process identified the benefits of maintaining previously learned knowledge of integrated healthcare concepts, an essential step to transforming the healthcare system is disseminating information on integrated healthcare concepts to individuals with no prior training. Through a randomized experimental design, the computer application was compared to an asynchronous instructional method with comparable results.

While the sample size was small with limited diversity at a single location, results provided preliminary support for the use of this technology.

The overall impact of these results suggests that computer applications, when developed from evidence-based knowledge with support of end-users have the potential to support the dissemination of evidence-based research. These findings are significant given the focus of the social work profession on engaging in evidence based practice. As with other healthcare professionals, social workers require tools to keep up with the ongoing changes in healthcare practice. Computer applications may be an essential resource for social workers to remain current with evolving evidence-based interventions. Further research with larger sample sizes, more diversity of participants, at the point of patient care are needed to provide additional support for their use.

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APPENDIX

Table 1-1. Integrated Primary Care-Randomized Trials

Model/Study	Population	Diagnoses	Screening Measures	Interventions
Prospect-Prevention of Suicide in Primary Care Elderly (Alexopoulos et al. 2005; Bruce & Pearson 1999; Bruce et al. 2004)	20 practices in 3 states 1,238 patients	**Mental Health**: Depression and suicide-geriatric	**Mental Health:** MMSE,CESD, Hamilton Depression Rating Scale, The Scale for Suicidal Ideation	Interpersonal psychotherapy, care management
Improving Mood: Promoting Access to Collaborative Treatment-IMPACT (Callahan et al. 2005; Fann, et al. 2009; Hunkeler et al. 2006; Unützer et al. 2002; Unutzer et al. 2001; Unutzer et al. 2006)	18 clinics in 5 states- 1801 patients- average age 71, 65% female, 77% white	**Mental Health:** Depression in the elderly **Physical Health:** Cancer	**Mental Health:** 2 item depression screen from Prime MD, Mini Mental Status Exam, CAGE, PHQ 9; SCL-20, Hopkins Symptoms Checklist-HSCL 20-suicide. **Physical Health**: CDS-Chronic Disease Score, Sheehan Disability Scale, SF-12 Short Form Health Survey, IADL scale	Problem-solving therapy (PST), behavioral activation, stepped care, care management, relapse prevention, coping skills, medication adherence, education
Pathways Study (Katon et al. 2003; Katon et al. 2004)	329 diabetic patients with depression at 23% minority- 65% female	**Mental Health**: Depression **Physical Health**: Diabetes	**Mental Health:** PHQ-9, NIMH Diagnostic Interview Schedule on dysthymia, SCL-20 **Physical Health**: HbA1c. The Diabetes Symptom Burden Scale, The Diabetes Self Efficacy Scale, The Diabetes Self Care Activities Scale, WHO-DAS II, SF 36.	Problem-solving therapy (PST), stepped care, care management
PRISM-E: Primary Care Research in Substance Abuse and Mental Health for the Elderly (Krahn et al. 2006; Lee et al. 2009; Levkoff et al. 2004; Oslin et al. 2006)	10 multi-state sites- 5 VA, 3 community health clinics, 2 hospital networks 1,531 patients, 30.7% female, average age 73.9, 54.9% minority,	**Mental Health:** Depression, Anxiety, Alcohol Abuse	**Mental Health:** CESD, MINI, Brief Oriented Memory Concentration Task, Suicidal ideation questions of PRIME-MD, Baseline drinking, SMAGT- Geriatric Version. Number of drinks in past week, number of binge episodes in past 3 months, GHQ-12, BAI **Physical Health**: SF 36.	Assessment, care planning, counseling, case management, psychotherapy, brief alcohol counseling (3 sessions), motivational interviewing
Integration Management of Hypertension and Depression** (Bogner & de Vries, 2008)	64 patients in 53% African American-77% female	**Mental Health**: Depression **Physical Health:** Hypertension	**Mental Health**: MMSE, CES-D. **Physical Health**: Blood Pressure, SF-36	Medication adherence, education

Table 1-1 Continued. Integrated Primary Care-Randomized Trials

Model/Study	Population	Diagnoses	Screening Measures	Interventions
Integrated Management of Diabetes and Depression** (Bogner & de Vries, 2010; Bogner et al. 2012)	2010: 58 African American patients 85% female. 2012:180 patients from 3 facilities 102 African American, 7 Hispanic, 65 White; 68% female	**Mental Health**: Depression **Physical Health:** Diabetes	**Mental Health**: Pilot Study: MMSE, CES-D **Physical Health**: HbA1c. SF-36 **Mental Health:** 2012 Study: MMSE, PHQ 9 **Physical Health**: HbA1c, blood pressure, BMI, LDL cholesterol, SF-36.	Care management, medication adherence, education
Collaborative Care for Patients with Depression and Chronic Illness** (Katon et al., 2010)	214 patients- 48% female, 25% minority	**Mental Health**: Depression **Physical Health:** Diabetes, Coronary Heart Disease	**Mental Health:** PHQ2, PHQ 9; SCL-20. **Physical Health Screening:** Hemoglobin A1c, LDL cholesterol, Blood Pressure. Patient Global Improvement Scale, Satisfaction with Care.	Motivational and encouraging coaching, problem solving, education, self- monitoring, RX adherence, maintenance plan development.

** Model name from article title

Table 1-2. Integrated Primary Care-Quasi Experimental, Qualitative, or Descriptive Studies

Model/Study	Population	Diagnoses	Screening Measures	Interventions
Cohort Study (Price et al. 2000)	Family practice 137 patients	**Mental Health**: Generalized Anxiety Disorder, Major Depression	**Mental Health:** Shedler Quick PsychoDiagnostic Panel, Panic Subscale of SCL-90 **Physical Health**: SF-12	Cognitive behavioral interventions: behavior activation, physical and cognitive relaxation, identifying triggers, automatic thoughts, cognitive distortions; education, crisis stabilization.
IMPACT Model Post Study Cohort Study (Grypma et al. 2006)	116 patients from IMPACT (Mean age 72.2, 19% male) compared to 95 patients (mean age 62.9, 8.4% male)	**Mental Health:** Depression	**Mental Health:** PHQ9	Problem-solving therapy, relapse prevention program, depression group education class.
Intermountain Health Mental Health Integration Care Process Model-IHM MHI CPM Descriptive Study (Reiss-Brennan, 2006) Mixed methods (Reiss-Brennan, 2014)	59 patients, 50 staff	**Mental Health:** Depression	**Mental Health**: MHI Assessment packet (Detail from website: Initial History and Consult, Family Rating Scale, Anxiety and Stress Disorders Symptom Rating Scale, MDQ, ADHD Self Report Scale Symptoms Checklist)	Care management, family adherence, education, brief solution focused cognitive behavioral therapy
White River Model- VA-Primary Mental Health Care Clinic- PMHC Cohort Study (Watts et al. 2007) Descriptive Study (Pomerantz et al., 2010)	Veterans- 383 intervention compared to 287 96-98% white, 86-90% male, mean age 62-69.	**Mental Health:** Depression, Anxiety, PTSD, substance use. **Physical Health:** Smoking, Pain, chronic medical conditions.	**Mental Health:** PHQ9, PTSD Checklist-Military Version, GAD-7, Audit-C, 2 question depression screening instrument, State-Trait Anxiety Scale, BDI **Physical Health**: SF-12	Problem focused psychosocial assessment, behavioral recommendations, problem solving therapy, case management, medication monitoring, brief psychotherapy, brief substance abuse counseling, healthy/adaptive behavior interventions: smoking cessation, weight loss, stress management, pain and at risk drinking; chronic medical conditions management.

Table 1-2 Continued. Integrated Primary Care-Quasi Experimental, Qualitative, or Descriptive Studies

Model/Study	Population	Diagnoses	Screening Measures	Interventions
CBHB Model: Harris County Community Behavioral Health Quasi-experimental study (Begley et al., 2008)	1,224 Hispanic, 833 African American, 752 white	**Mental Health:** Depression, Anxiety, Bipolar Disorder, Substance Abuse	**Mental Health:** BASIS-24	Curbside consultations and behavioral interventions- not specific
The Integrated Health Program-IHP Case Study (Tucker et al. 2008)	University of Texas Austin- 1 international student of Arabic descent	**Mental Health:** Depression, Anxiety	**Mental Health:** Brief depression screen	Mindfulness individual and group approach, depression management group, risk assessment, supportive psychotherapy, cognitive behavioral interventions, crisis stabilization, problem solving.
Integrated, Collaborative, Accessible, Respectful, and Evidence Based-ICARE Descriptive Study (Collins, 2009)	50 Primary Care Practices in North Carolina	**Mental Health:** Substance abuse, Depressive Disorder, ADHD/ADD, episodic mood disorder, Anxiety, adjustment reaction, PTSD, Bipolar Disorder, and Schizophrenia.	**Mental Health:** Social-Emotional (ASQ:SE), BAI, BDI-II, Edinburgh Postnatal Depression Scale (Edinburgh) GAD-7, PHQ 2 and 9	Brief interventions, self- management, referrals; SBIRT Model for substance abuse
SLI2CE Quasi-experimental study (Brawer et al. 2010)	Primary Care, Women's Clinic, Post Deployment Clinic- 2812 Veterans: 42 % African American, 56% white, 22% female	**Mental Health:** Depression, PTSD, mood disorder, Adjustment Disorder, Anxiety Disorder, Alcohol Abuse/Dependence, Bipolar Disorder, Bereavement. **Physical Health:** Diabetes, Chronic Pain, sleep disturbance, Obesity, Congestive Heart Failure.	**Mental Health:** Behavioral Health Screen for women (weight, trauma, pain conditions, chronic health problems, mental health conditions, smoking, alcohol/drug use	Brief therapeutic interventions, trauma-focused services, diabetic education, sleep hygiene

Table 1-2 Continued. Integrated Primary Care-Quasi Experimental, Qualitative, or Descriptive Studies

Model/Study	Population	Diagnoses	Screening Measures	Interventions
BHL- Patient Centered Medical Home Descriptive Study (Tew, Klaus, & Oslin, 2010)	Philadelphia Veterans	**Mental Health:** Depression, Anxiety, substance misuse	**Mental Health:** Blessed Orientation Memory Concentration Test, PHQ 9, PTSD checklist civilian version or PCL-c, MINI, Paykel (suicide),, alcohol use and dependence screen, illicit drug use screen **Physical Health:** SF-12	Case management outreach, motivational interviewing, crisis intervention for suicide or psychosis, stepped care, brief alcohol interventions, problem solving therapy, behavioral activation, self-management, medication compliance
VISN 2 Collaborative Care Descriptive Study (Funderburk et al., 2010) Cross-Sectional (Funderburk et al., 2011; Possemato et al., 2011) Qualitative (Beehler & Wray, 2012)	Veterans: Funderburk- 180 patient records: 88% male, 72% white, 12% African American, mean age 57. Possemato: 133 patient records: 98% male, 72% white, mean age 62.	**Mental Health:** Depression, Anxiety, PTSD, substance use, Bipolar, psychosis, Dementia, Adjustment Disorder, suicidal ideations, personality disorders, ADHD, cognitive disorders, Somatoform Disorder **Physical Health:** Nicotine Dependence	**Mental Health:** PHQ-2, Primary Care PTSD screen, AUDIT-C, military sexual trauma	Medication management, education; behavioral activation, CBT; relaxation techniques, communication skills, problem solving, anger management; crisis intervention, level of care determination, coping skills, grief therapy, pain management, relapse prevention, motivational interviewing, SMART goal setting.
Mental Health Primary Care Program- MHPC Descriptive Study (Barber et al. 2011)	Veterans: 305 records-Connecticut – 6% female, 75% white, 18% African American, 5% Hispanic	**Mental Health:** Depression, Anxiety, stress, PTSD, cognitive disorders, substance abuse, Risk (SI/HI). **Physical Health:** Sleep problems	**Mental Health:** Depression, PTSD, alcohol use and SI-measure used not specified	Brief treatment (3-5 visits, stepped care
Descriptive Study (Correll, Cantrell, & Dalton, 2011)	Rural Appalachian pilot 86 patients	**Mental Health:** Depression, Anxiety. **Physical Health:** Obesity, sleep, Chronic Pain, sexual dysfunction, tobacco use, Diabetes, neurological disorders, Cancer, Irritable Bowel Syndrome	**Mental Health:** PHQ2, PHQ 9	Crisis intervention, brief cognitive behavioral, weight management, smoking cessation, basic nutrition, self-care.

Table 1-2 Continued. Integrated Primary Care-Quasi Experimental, Qualitative, or Descriptive Studies

Model/Study	Population	Diagnoses	Screening Measures	Interventions
Quasi-experimental Study (Gros & Haren, 2011)	Southeaster VA Behavior Activation Study Veterans: 35 patients- 66% male, 54% white	**Mental Health:** Major Depression	**Mental Health:** PHQ-9, Hospital Anxiety and Depression Scale (HADS)	Behavioral activation- 4 session
Veterans Integrated Care Clinic Retrospective Cohort Study (Seal et al., 2011)	San Francisco: 526 Veterans, mean age 26, 12% female, 42% minorities	**Mental Health:** PTSD, Depression, high risk drinking**. Physical Health:** Traumatic brain injury.	**Mental Health:** PC-PTSD, PHQ-2, Audit C, TBI	Psychoeducation, brief interventions, specialty referrals
DIAMOND Program-Depression Improvement Across Minnesota Descriptive Study (A New Direction 2010) Cohort Study (Williams et al. 2011)	Williams: 2 sites Mayo Clinic in Rochester: 466 patients, mean age 40	**Mental Health:** Depression, Anxiety, substance use, Bipolar	**Mental Health:** PHQ9; MDQ, AUDIT, GAD-7.	Care management, registry tracking, stepped care approach to treatment- bipolar disorder stepped care, relapse prevention program development, consultation with psychiatrist, motivational interviewing, behavioral activation.
Cohort Study (Auxier et al., 2012)	6 sites in 4 states 200 patients- mean age 35, 60% white, 32% Hispanic	**Mental Health:** Depression, Anxiety, substance use, stress. **Physical Health:** Medical conditions and behavior change.	**Mental Health:** Screening instruments for depression and anxiety.	Assessment, consultation, and behavioral health treatment.
Behavioral Health Consultant Model (PCBH) Descriptive Study: (Robinson & Strosahl, 2009) Quasi-experimental study (Bryan, Morrow, & Appolonio, 2009; Ray-Sannerud et al., 2012) Longitudinal Study (Bryan et al., 2012; Bryan et al., 2012) Survey Study (Corso et al., 2012)	Air Force: 2009: 338 patients: 62% female 2012:497 patients: 58% female, white 54%, African American 15%, Latino 15% 2012: 541 patients, 57% female, 56% white, 14% African American, 14% Latino RaySannerud:70 patients- 37% male, 48.6% white, 12.9% African American, 21.4% Latino.	**Mental Health:** Depression, Anxiety, Panic, stress, ADHD, anger management, substance use, memory impairment, grief, relationship problems, parenting skills. **Physical Health:** Insomnia, pain, tobacco use, sexual functioning, weight management.	**Mental Health:** BHM-20, Duke Health Profile, Therapeutic Bond Scale	Brief problem focused interventions (cognitive behavioral), psychoeducation, acute crisis resolution, brief relaxation and mindfulness training, behavioral activation, cognitive restructuring, stimulus control and sleep hygiene, stepped care

Table 1-2 Continued. Integrated Primary Care-Quasi Experimental, Qualitative, or Descriptive Studies

Model/Study	Population	Diagnoses	Screening Measures	Interventions
Behavioral Health Consultant Model (PCBH) Survey Study (Funderburk et al. 2013)	Air Force Integrated Behavioral Health providers (23) and (159) Veterans Health Administration Behavioral Health providers	**Mental Health:** Depression, PTSD, Anxiety, alcohol, and domestic violence. **Physical Health:** Smoking, Chronic Pain, chronic health conditions, weight changes, Insomnia	**Mental Health:** depression, anxiety, alcohol, PTSD, and domestic violence-not specific on measure. **Physical health:** smoking.	Cognitive behavioral, behavioral, psychodynamic, interpersonal, insight, acceptance and commitment therapy (Thorpe, Ogden, & Galactionova).
IMPACT Model Descriptive Study (Unützer et al. 2013)		**Mental Health:** Depression	**Mental Health:** PHQ9	Case management, brief structured psychotherapy-cognitive behavioral therapy, crisis management, referral management, treatment adherence, motivational interviewing, behavioral activation, problem solving treatment, relapse prevention.
Primary Care Mental Health Integration-PCMHI; CCC a form of PCMHI Descriptive Study (Kearney et al. 2014) Survey (Beehler et al. 2013)	Veterans	**Mental Health:** Depression, anxiety, PTSD, substance misuse **Physical Health:** Cardiac stress; medical disorders	**Mental Health:** PHQ9, PCL, brief cognitive screening	Brief behavioral or cognitive interventions (CBT), crisis interventions (suicide intervention), lifestyle interventions- smoking cessation, weight control, stress management, medication adherence; psychoeducation groups; brief family consultations; motivational interviewing, behavioral activation, problem solving therapy

Table 1-2 Continued. Integrated Primary Care-Quasi Experimental, Qualitative, or Descriptive Studies

Model/Study	Population	Diagnoses	Screening Measures	Interventions
Virginia Commonwealth University Health System Quasi experimental study (Sadock et al. 2014)	452 patients, 63.7% female, mean age 52.29, 51% white 59.2 % African American	**Mental Health**: Depression, Anxiety, substance use **Physical Health:** Pain, Obesity, Smoking	**Mental Health:** PHQ9, GAD7 **Physical Health:** SF-MPQ Short-form McGill Pain Questionnaire, ISI-Insomnia Severity Index, weight, number of cigarettes smoked per week.	Psychoeducation, supportive counseling, self-monitoring, goal setting, problem solving, behavioral activation, cognitive behavioral therapy, interpersonal intervention, assertiveness training, relaxation training, graded exposure, Play your Cards Right Intervention, introduction to the Gate Control Theory Activity, pacing, stimulus control, urge surfing, motivational interviewing, sleep restriction, sleep hygiene.
Mental Health Integration Program Cross Sectional (Bauer et al. 2013) Survey Study (Eckstrom et al. 2015)	Community Health Programs-Washington State-11,015 members-49% women	**Mental Health:** Depression, Anxiety, Bipolar Disorder, Psychotic Disorder, PTSD, Cognitive Disorder, Alcohol/Substance Abuse. **Physical Health:** Chronic Pain, Pregnancy.	**Mental Health:** PHQ9, PHQ 2, PHQ 8, GAD7, GAIN-SS	Medication education, coping skills, CBT, assistance with social services, referral management, case management
Integrated Behavioral Health Care- IBHC Quasi experimental studies (Bridges et al., 2014; Bridges et al., 2015)	Federally Qualified Health Center-2014:793 patients 64% Latino, mean age 29, 65% female 2015: 1150 patients, mean age 30, 67% female, 60% Latino	**Mental Health** ADHD, behavioral problems, Adjustment Disorder, Anxiety, Depression **Physical Health:** Dietary concerns, sleep difficulty, sexual disorders.	**Mental Health:** ACORN questionnaires	Brief cognitive behavioral interventions: behavioral activation, exposure therapy, relaxation training, psychoeducation, parent management training, sleep hygiene, diet and exercise counseling, medication adherence
IMPACT- model rural vs urban Survey study (Williams et al. 2015)	64 clinicians (45 urban), Interviews 27 clinicians (20 urban)	**Mental Health:** Depression, Anxiety	**Mental Health:** PHQ	Care Coordinators: medication education, teaching coping skills, cognitive behavioral therapy, assisting with social service access, appointment reminders, follow up.

Table 1-3. Integrated Specialty Medical Care

Model/Study	Population	Diagnoses	Screening Measures	Interventions
Multifaceted Oncology Depression Program- Pilot for ADAPt-c Randomized Trial (Dwight-Johnson et al., 2005)	Safety net oncology clinics in California: 55 patients: 28 intervention, 27 usual care. Mean age 47. Latino population.	**Mental Health:** Depression **Physical Health:** Carcinoma of the cervix, Breast Cancer	**Mental Health:** PHQ 9, 3 Prime MD Dysthymia questions, Anxiety module of PHQ, Hispanic Stress Inventory, Partners in Care **Physical Health:** KPSS, FACT-G	Problem solving therapy, medication adherence, system navigation, depression education, medication side effect monitoring, consultations with psychiatrist and oncologist
Alleviating Depression Among Patients with Cancer- ADAPt-C (based on Impact model) Randomized Trial (Ell et al., 2007; Ell et al., 2011; Ell et al., 2008)	Safety net oncology clinics in California: 472 patients- 88% Hispanic, 85% female, mean age 48.7 (Intervention group 242)	**Mental Health:** Depression, Anxiety **Physical Health:** Cancer	**Mental Health:** PHQ 9, Audit, BSI Anxiety **Physical Health:** Karnofsky Performance Status Scale (KPSS), Functional Assessment of Cancer Therapy Scale (FACT-G), Brief Pain Inventory Short Form (BPI), SF12	Psychiatric assessment, cultural competency, problem solving therapy, care management, depression education, relapse prevention, symptoms monitoring, medication side effect monitoring, medication compliance monitoring, behavioral activation, motivational support, navigation of health care and community services, stepped care, clinical tracking.
Randomized Trial (Groessl et al. 2013; Ho et al., 2015)	Hepatitis C Clinics- VA San Diego, VA Palo Alto, Bronx VA: 363 Patients- 98% male, 37% white, 39% African American, 18% Hispanic	**Mental Health:** Substance use, depression, PTSD **Physical Health:** Hepatitis C	**Mental Health:** BDI II, Audit C, Drug Use Questionnaire, The Timeline Follow back Calendar for Alcohol Use/ Drug use, The Duke Social Support Index, PTSD Symptom Checklist PCL-C **Physical Health:** Client Satisfaction Questionnaire CSQ-8, SF36 Quality of Life, HCV Hepatitis Quality of Life, ED-5D Quality of Life	Brief cognitive behavioral interventions, motivational interviewing, care management, medication management, patient activation, self-help techniques
Cohort Study (Winiarski et al., 2005)	HIV Clinic: 47 sample subjects and 100 comparison group	**Mental Health:** Substance use **Physical Health:** HIV	**Mental Health:** Client Diagnostic Questionnaire. ETAC24 indices. Likert scale self-report of alcohol use, powdered cocaine, crack and heroin use. **Physical health screening:** HIV symptom checklist.	Individual, group or family counseling, support groups, crisis intervention, case management.

Table 1-4. Integrated Specialty Mental Health Care

Model/Study	Population	Diagnoses	Screening Measures	Interventions
Randomized Trial (Druss et al., 2001)	Veterans Specialty Mental Health: 120 patients- 68% white, 99.9% male (1 female)	**Mental Health**: Schizophrenia, PTSD, major affective disorder, substance use disorder. **Physical Health (comorbidity of sample)**: Cardiac Disease, Chronic Lung Disease, Hypercholesterolemia, Hypertension, Arthritis or back problems, Gastrointestinal or Liver Disease.	**Mental Health:** Symptom Checklist 90, Addiction Severity Index **Physical Health**: SF-36, US Preventative Services Taskforce and VA guidelines: Education- Nutrition, exercise, smoking; vaccines, Lab screenings- diabetes, hepatitis, cholesterol, tuberculosis; Physical exam-weight, blood pressure.	Case management outreach
Randomized Trial (Boardman, 2006)	Salem, Mass. Specialty Mental Health: 76 total- 39 experimental- 37% male; 37 controls- 25% male	**Mental Health:** Severe and persistent mental illness, comorbid substance use (25%) **Physical Health**: Cervical Cancer, Breast Cancer, Diabetes, Hypertension, Colon Cancer, Prostate Cancer, Nutrition, Smoking, Tuberculosis, Tetanus, Cardiac Disease, Anemia, Flu or pneumonia, Hypercholesterolemia, pulmonary, HIV	**Mental Health:** blood and urine drug test **Physical Health:** Pap smear, mammogram, breast examination, Hemoglobin A1C, foot exam, colonoscopy, weight, blood test, tuberculosis screen, anemia screen, electrocardiogram, guaiac test	Mental health and substance abuse counseling, case management
Washtenaw Model Descriptive Study: (Reynolds, Chesney, & Capobianco, 2006)	Primary Care and Specialty Mental Health	**Mental Health**: Severe and persistent mental illness. **Physical Health**: Diabetes, CVD, Obesity, pulmonary problems.	**Mental Health:** Health Risk Appraisal Instrument (agency developed): smoking, drinking, sexual vulnerability/exploitation, potential health conditions. **Physical Health**: Hemoglobin A1c.	
The Serious Mental Illness Primary Care Clinic (SMIPCC) Cohort Study: (Pirraglia et al., 2012)	Specialty Mental Health Care- Providence VA: 97 male, white, mean age 55.3; 14 Bipolar, 23 Schizophrenia, 36 Major Depression; 24 Schizoaffective	**Mental Health:** Severe and persistent mental illness. **Physical Health**: CVD, Diabetes	**Physical Health:** Blood pressure, HbA1c, cholesterol, BMI	Case Management

Table 2-1. Survey Sample Characteristics
(N=154)

Factor	N (%)
Gender	
Male	40 (26.1)
Female	113 (73.9)
Ethnicity	
White	119 (77.3)
Black or African American	11 (07.1)
American Indian or Alaskan Native	2 (01.3)
Asian	3 (03.2)
Hispanic or Latino	10 (06.5)
Other	7 (04.5)
Integrated Healthcare Setting	
Primary Care	102 (66.2)
Specialty Behavioral Health	35 (22.7)
Specialty Medical (ie. Cancer Center)	3 (01.9)
Other	14 (09.1)
Years worked in Integrated Care Setting	5.75 (5.82)*
Years worked on current healthcare team	4.34 (5.92)*

*Mean and Standard Deviation reported.

Table 2-2.Item and Scale Analysis

Item	Mean (SD)	Agree N (%)*	Disagree N (%)*	Cronbach Alpha
Medical Diagnoses	63.60 (11.23)	139 (88.3)	15 (11.7)	.954
Diabetes	5.17 (1.07)	145 (94.2)	9 (5.8)	
Cardiovascular Disease	4.90 (1.07)	144 (93.5)	10 (6.5)	
Hypertension	5.00 (1.04)	144 (93.5)	10 (6.5)	
Cancer	4.34 (1.15)	129 (83.8)	25 (16.2)	
Pain	5.35 (0.93)	149 (96.8)	5 (3.2)	
Sexual Dysfunction	4.56 (1.08)	137 (89.0)	7 (11.0)	
Irritable Bowel Syndrome	4.49 (1.17)	130 (84.4)	24 (15.6)	
Nicotine Dependence	5.25 (1.05)	143 (92.9)	11 (7.1)	
Obesity	5.37 (0.96)	146 (94.8)	8 (5.2)	
Insomnia	5.44 (0.87)	149 (96.9)	5 (3.2)	
COPD	4.65 (1.16)	137 (89.0)	17 (11.0)	
HIV	4.66 (1.18)	132 (85.7)	22 (14.3)	
Metabolic Syndrome	4.41 (1.23)	126 (81.8)	28 (18.2)	
Psychiatric Diagnoses	40.67 (2.61)	153 (99.4)	1 (0.6)	.897
Depression	5.92 (0.32)	154 (100)	0 (0.0)	
Panic Disorder	5.82 (0.50)	153 (99.4)	1(0.6)	
Generalized Anxiety Disorder	5.88 (0.36)	154 (100)	0 (0.0)	
Bipolar Disorder	5.76 (0.51)	154 (100)	0 (0.0)	
Psychotic Disorders	5.64 (0.64)	153 (99.4)	1 (0.6)	
Substance Use	5.80 (0.50)	153 (99.4)	1 (0.6)	
Post-Traumatic Stress Disorder	5.85 (0.41)	154 (100)		
Screening Measures	36.18 (5.54)	142 (90.9)	12 (9.1)	.877
Blood Pressure	4.88 (1.19)	140 (90.9)	14 (9.1)	
Hemoglobin A1c	4.84 (1.33)	134 (87.0)	20 (13.0)	
Body Mass Index	4.92 (1.22)	139 (90.3)	15 (9.7)	
Cholesterol	4.59 (1.21)	134 (87.0)	20 (13.0)	
Mood Disorders (PHQ, MDQ)	5.72 (0.64)	152 (98.7)	2 (1.3)	
Anxiety Disorders (GAD 7)	5.67 (0.69)	152 (98.7)	2 (1.3)	
Drug or Alcohol Use (CAGE, AUDIT)	5.55 (0.79)	151 (98.1)	3 (1.9)	
Interventions	48.80 (4.85)	153 (99.4)	1 (0.6)	.872
Medical Medications	4.74 (1.00)	139 (90.3)	15 (9.7)	
Psychiatric Medications	5.55 (0.70)	153 (99.4)	1 (0.6)	
Medical Levels of Care	4.86 (0.99)	140 (90.9)	14 (9.1)	
Psychiatric Levels of Care	5.54 (0.68)	152 (98.7)	2 (1.3)	
Substance Use Levels of Care	5.53 (0.70)	153 (99.4)	1 (0.6)	
Case Management	5.40 (0.83)	152 (98.7)	2 (1.3)	
Lifestyle Interventions	5.63 (0.77)	151 (98.1)	3 (1.9)	
Brief Substance Use Interventions	5.68 (0.67)	151 (98.1)	3 (1.9)	
Brief Therapeutic Interventions	5.86 (0.38)	154(100)	0 (0.0)	

*Agree combines the following response options: Somewhat Agree, Agree, and Strongly Agree
*Disagree combines the following response options: Somewhat Disagree, Disagree, and Strongly Disagree

Table 3-1. Focus Group and Interview Participants

	FG 1 (N = 5)	FG2 (N = 7)	Interviews (N = 5)
Gender			
Male		1 (14%)	1 (20%)
Female	5 (100%)	6 (85%)	4 (80%)
Age			
18-24		3 (43%)	
25-35	1(20%)	4 (57%)	2 (40%)
36-44	4 (80%)		2 (40%)
55-64			1 (20%)
Race/Ethnicity			
White	5 (100%)	6 (85%)	5 (100%)
Other		1(14%)	
Hispanic		1(14%)	1 (20%)
Knowledge of Integrated Healthcare			
Very Good	2 (40%)	2 (29%)	4 (80%)
Good		4 (57%)	1 (20%)
Fair	3 (60%)	1 (14%)	
Education Level			
MSW 2nd year		7 (100%)	
MSW Graduate	4 (80%)		
PhD Student			2 (40%)
PhD Graduate	1 (20%)		3 (60%)
Years of clinical practice*	6 (SD 8.94)	1.7 (SD 0.69)	5.6 (SD 3.78)

*Mean and standard deviation reported.

Table 3-2. Heuristic Evaluation

Content Issue	Focus Group/ Interview	Flaw or Preference	Importance (I) Low (1) …High (5)	Ease of Achievement (E) Difficult (1) …Easy (5)	Product I*E
Lack of search function	FG1	Flaw	5	3	15
Lack of application purpose on the home screen	FG1	Flaw	5	4	20
Link screening measures to electronic medical record	FG1	Preference	3	1	3
Unable to locate multi-condition screening measures	FG1	Flaw	5	4	20
Terminology language not simple	FG2	Flaw	5	5	25
Develop ability to share information with clients	FG2	Preference	3	2	6
Difficulty determining if item is a link	FG2	Flaw	5	4	20
Include instructional videos for therapeutic techniques	FG2	Preference	3	1	3
Unclear role of social worker in lifestyle interventions	I	Flaw	5	4	20
Confusion when going through models to content	I	Flaw	5	3	15
Add Geriatric Depression Scale	I	Preference	4	5	20
Include multiple languages for screening measures	I	Preference	4	2	8

Table 4-1. Demographic Characteristics of Experimental Study Participants

		Experimental (N=7)	**Control (N=8)**	*p-value*
	Gender			
Female		6 (85.7 %)	7 (87.5 %)	
Male		1 (14.3 %)	1 (12.5 %)	1.00
	Ethnicity			
White		6 (85.7 %)	8 (100 %)	
Black		1 (14.3 %)	0 (0 %)	0.47

Table 4-2. Mean (SD) and Statistics of Experimental and Control Group Comparisons

	Experimental (N=7)	Control (N=8)	Statistic	Significance
Pre-Test			*t-test*	*p-value*
Integrated Knowledge	3.14 (SD = 0.90)	3.63 (SD =1.41)	0.78	0.45
Screening Measures	6.67 (SD = 3.14)*	7.75 (SD = 2.43)	0.73	0.48
Post-Test			*F-test*	*p-value*
Screening Measures	11.33 (SD = 1.37)*	12.63 (SD = 2.87)	0.46	0.51

*N=6- Missing data on screening measures for 1 participant.
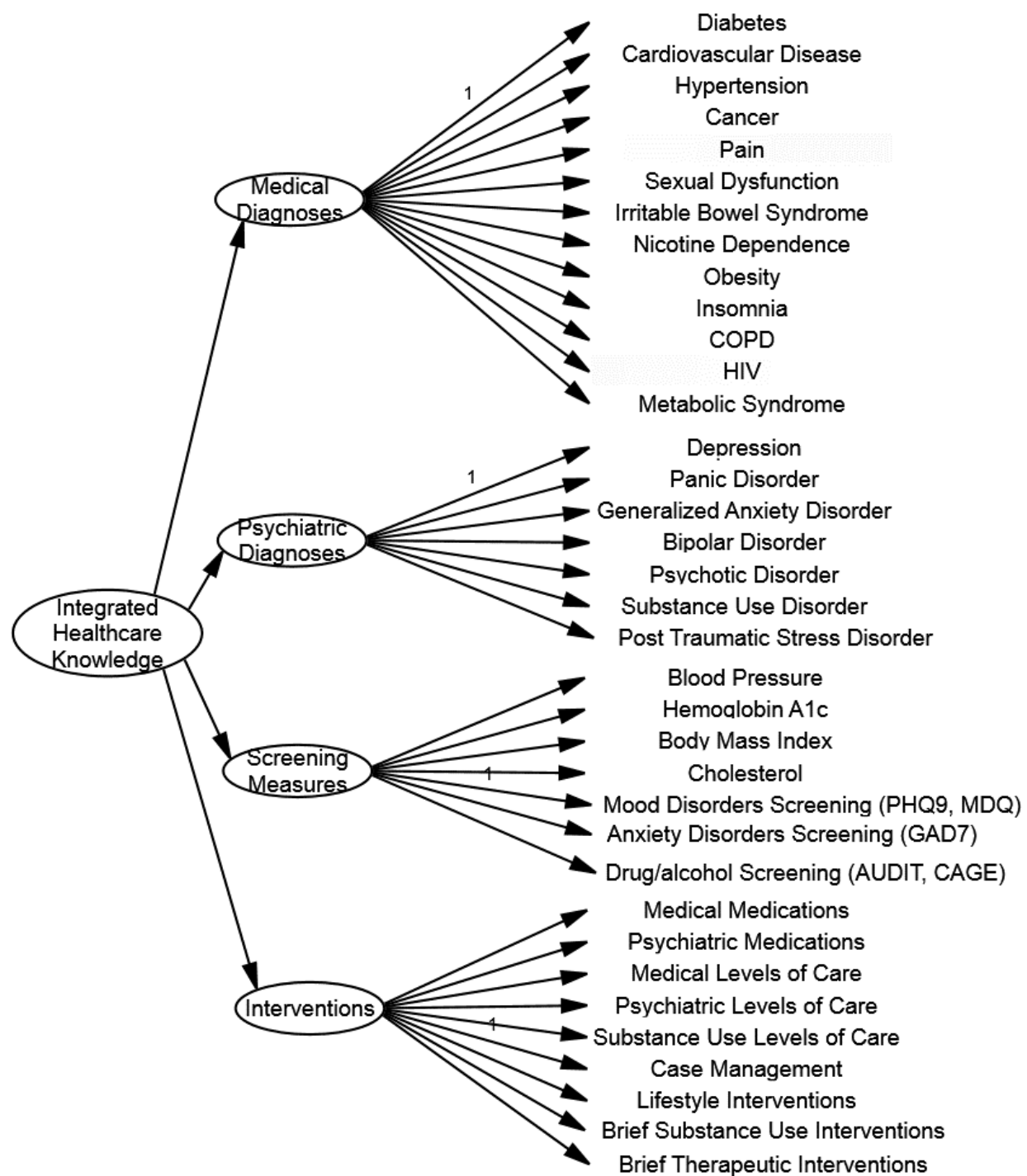
Figure A-1: Model of Knowledge Needed for Working in Integrated Healthcare Settings
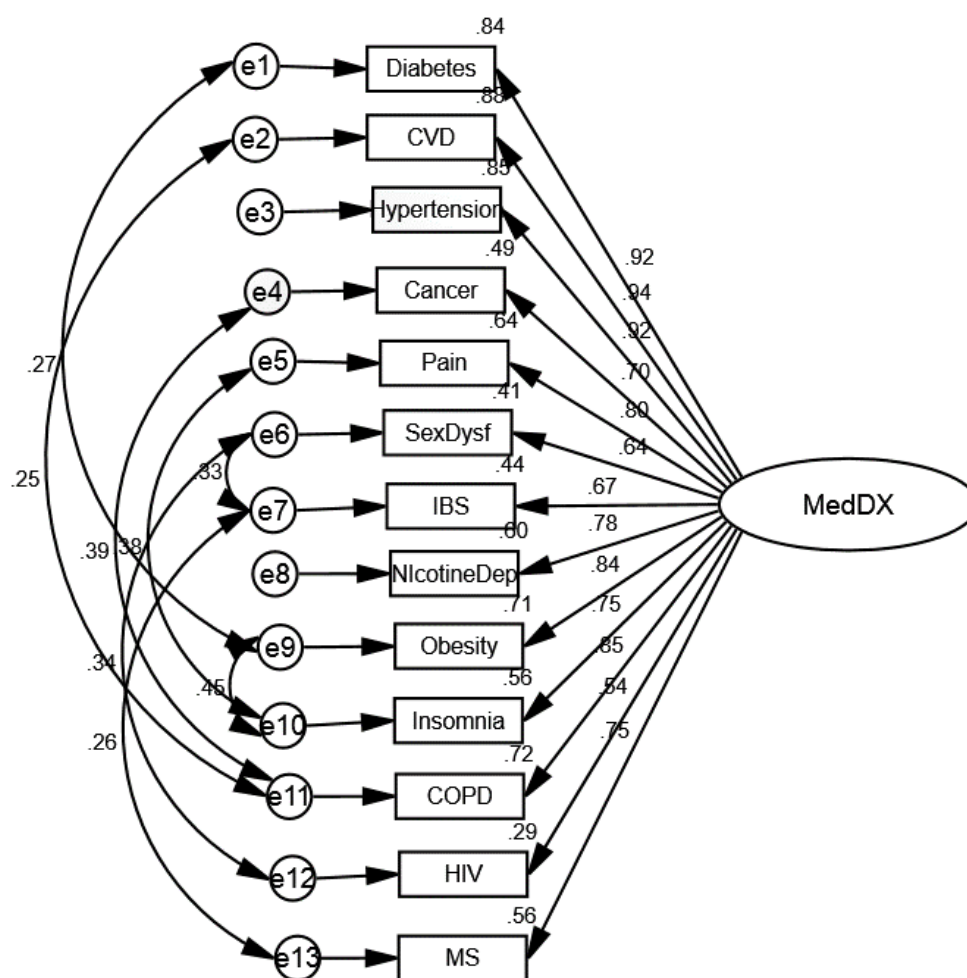
Figure A-2: CFA Model of Medical Diagnoses
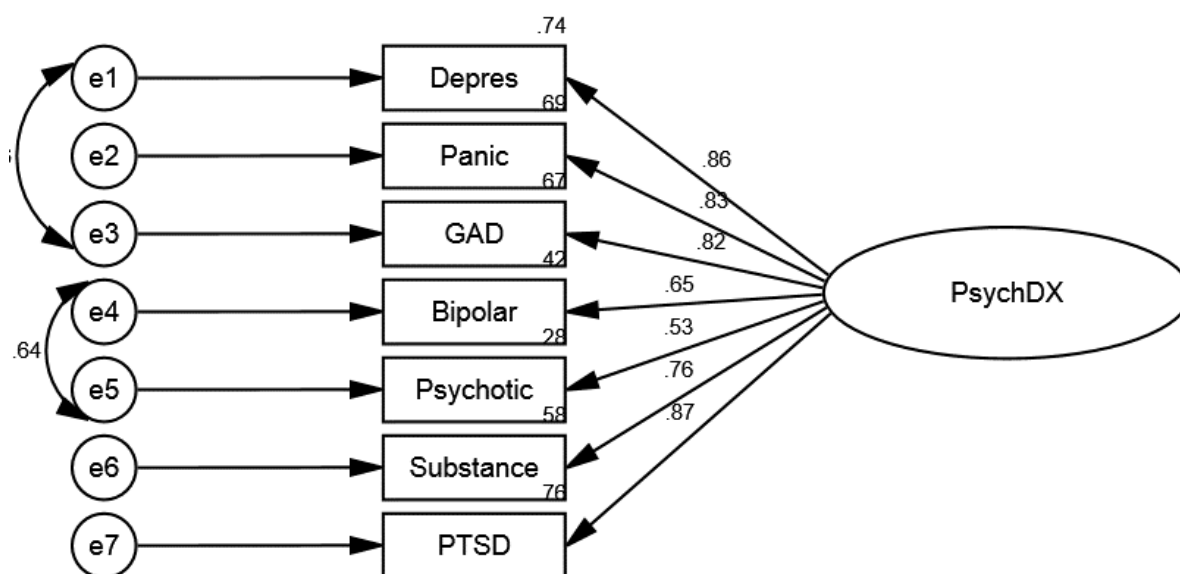
Figure A-3: CFA Model of Psychiatric Diagnoses
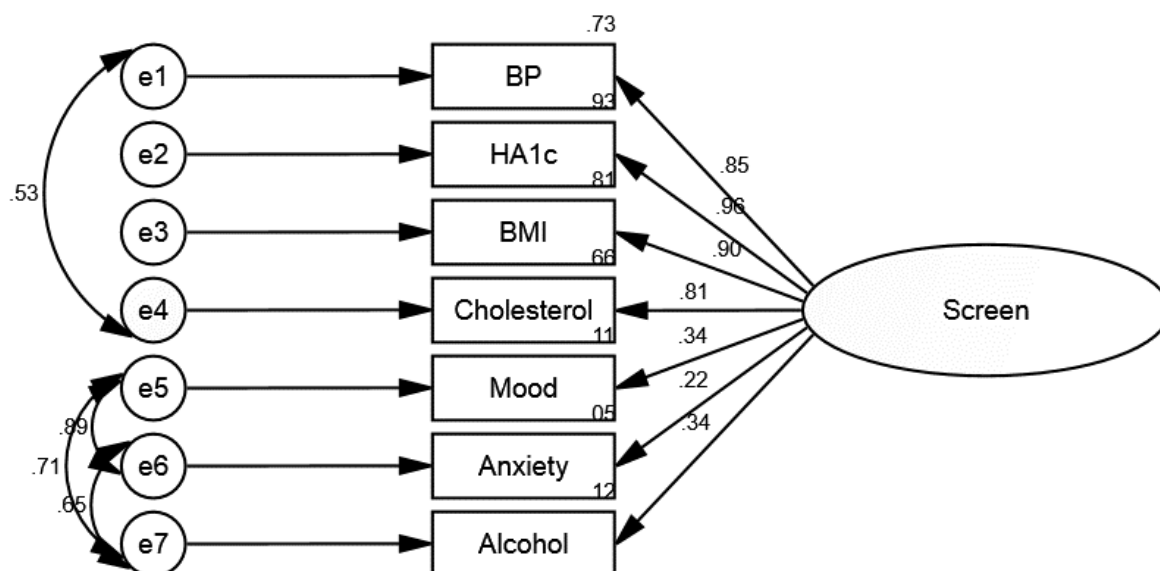
Figure A-4: CFA Model of Screening Measures
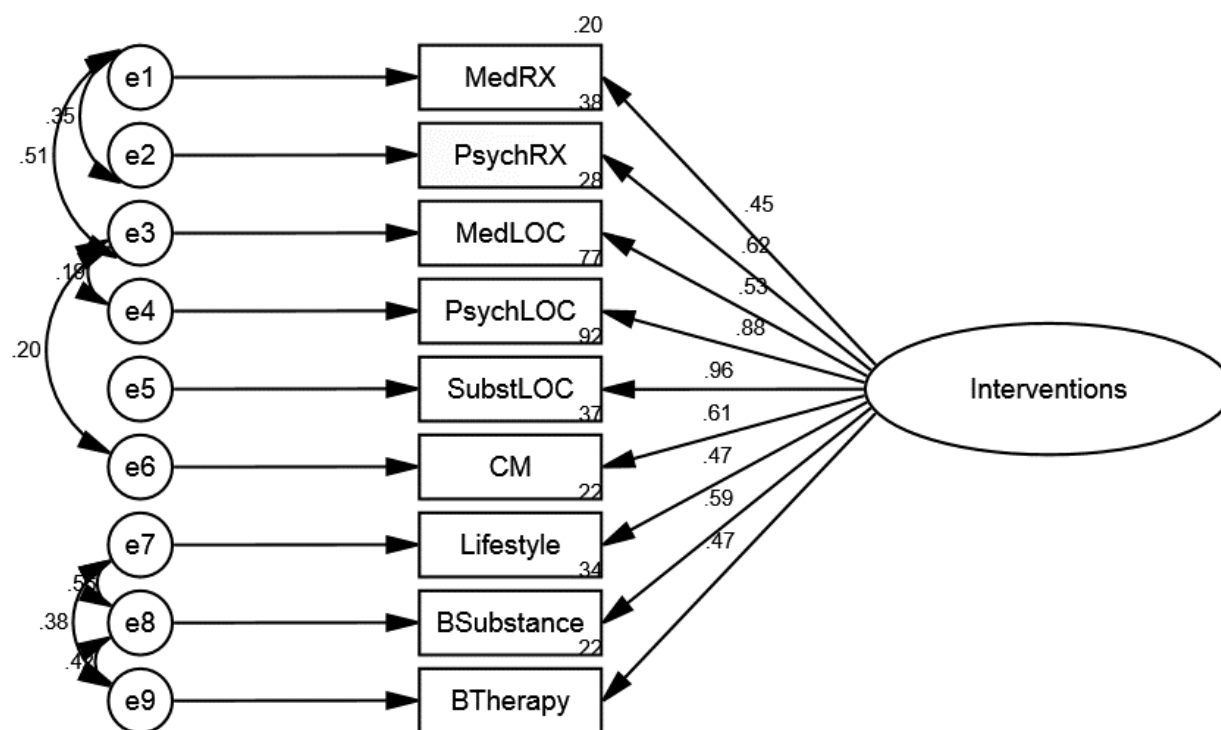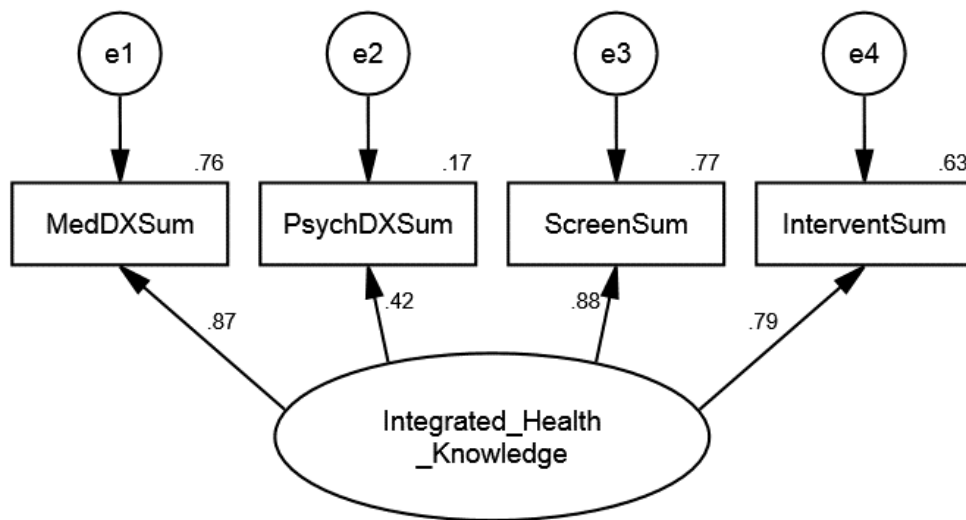
Figure A-5: CFA Model of Interventions

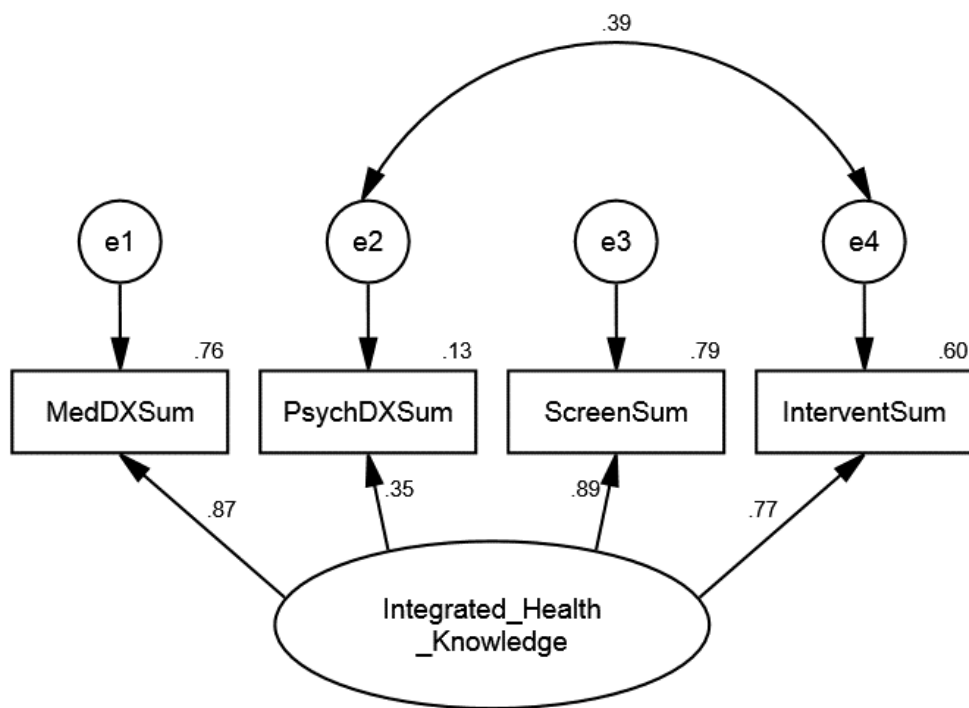*Figure A-6*: CFA Model of Integrated Healthcare Knowledge

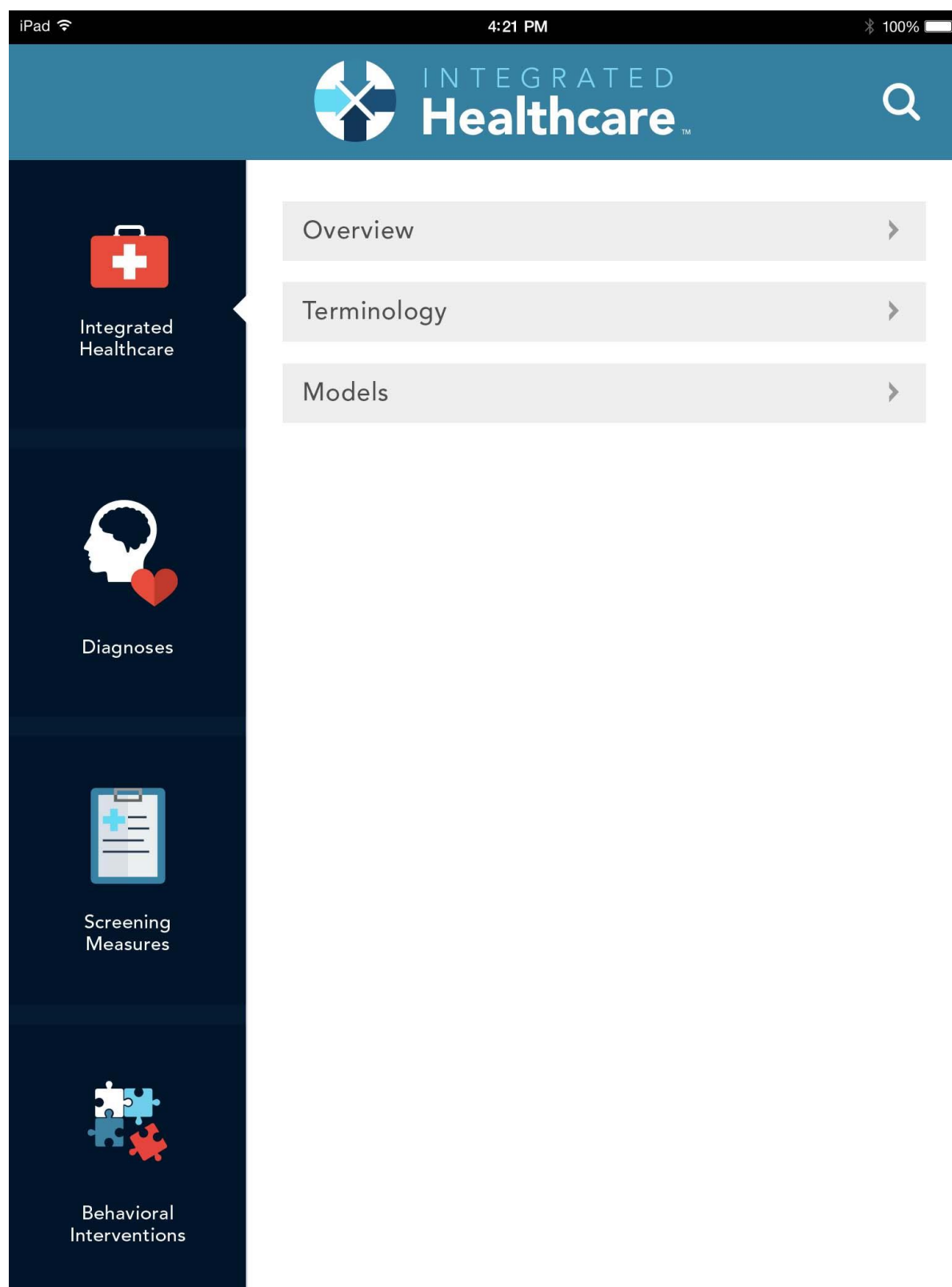*Figure A-7*: CFA Model of Integrated Healthcare Knowledge Revised
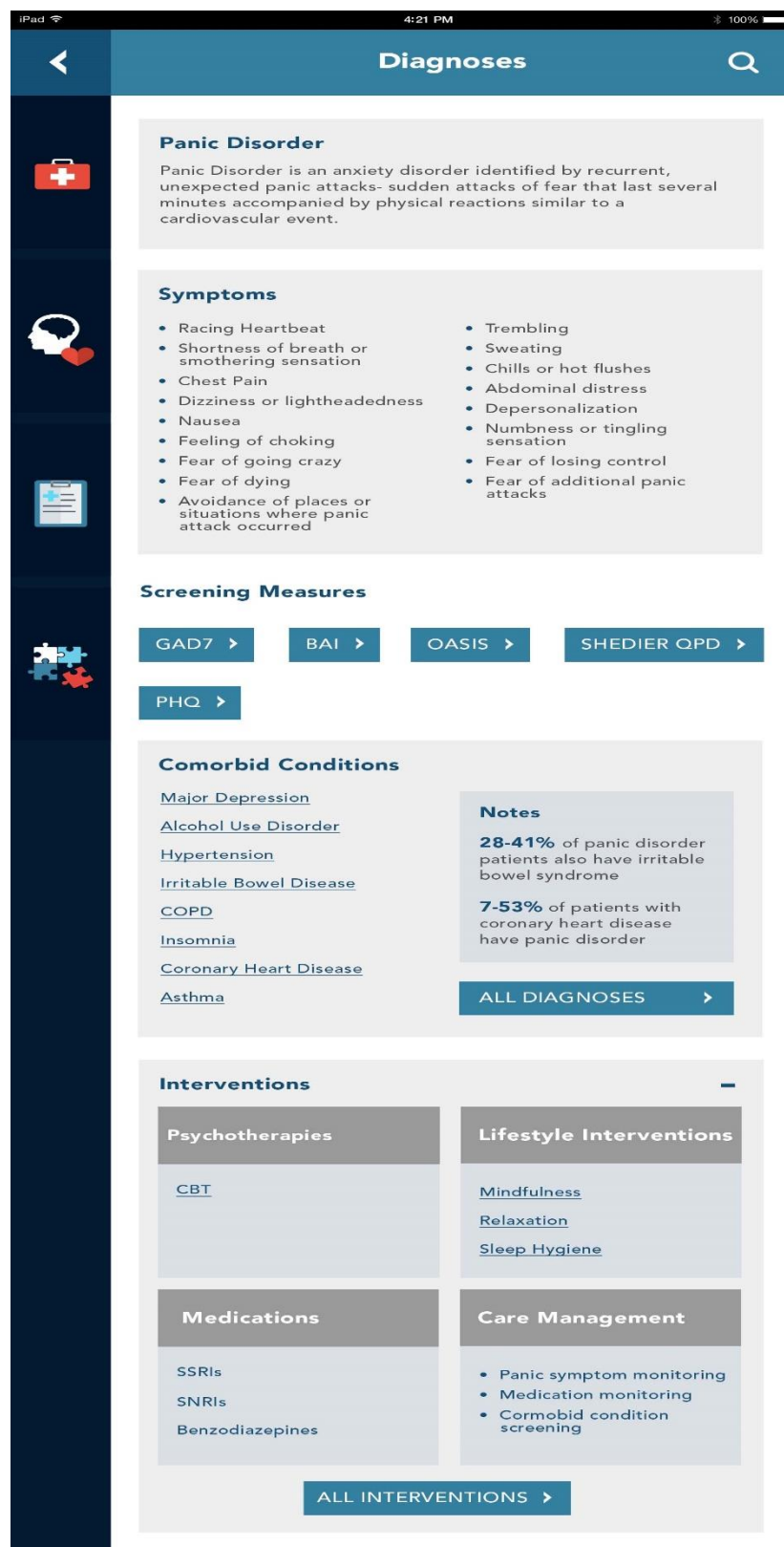
Figure A-8: Computer Application Home Page

Figure A-9: Computer Application Diagnosis Page

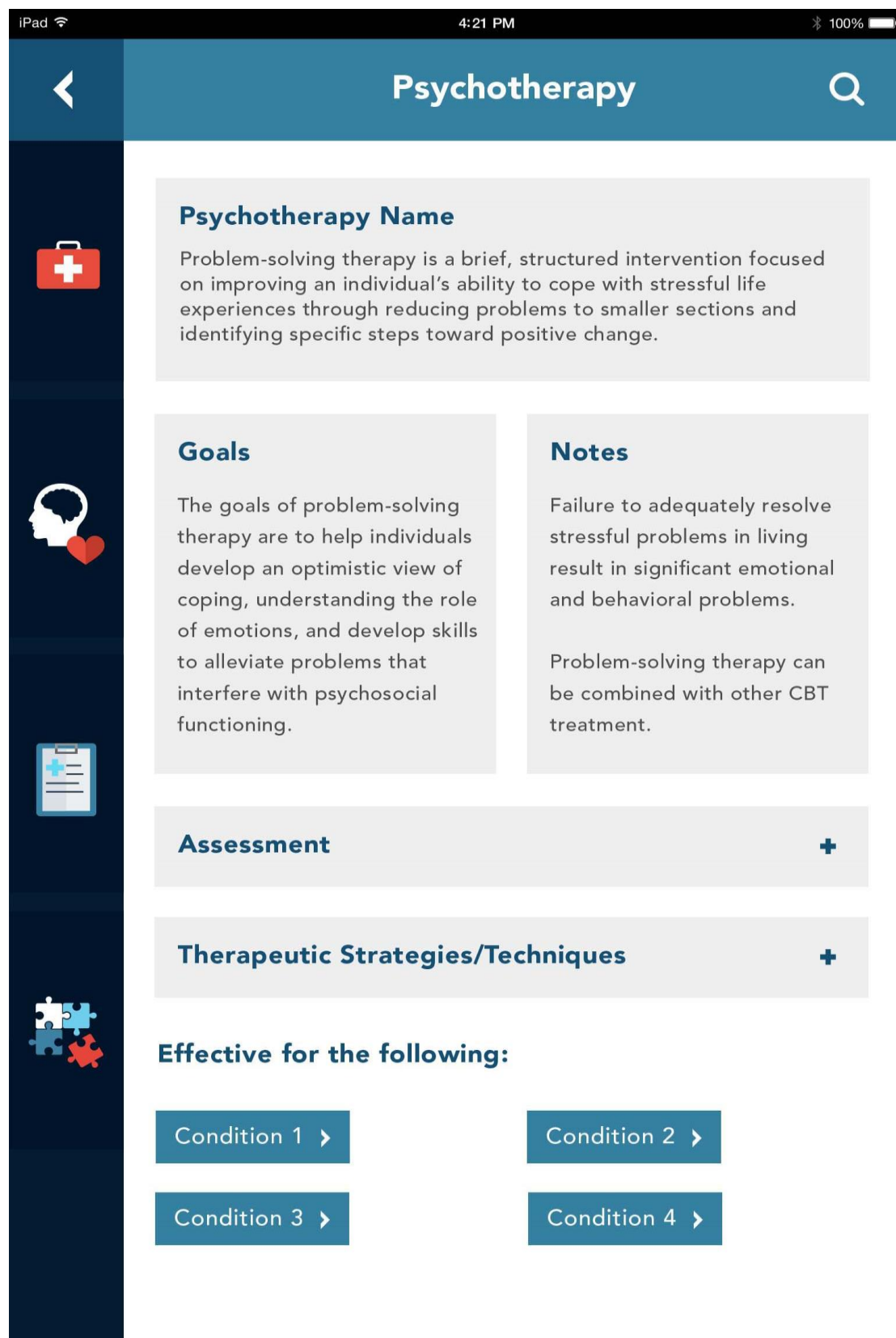*Figure A-10:* Computer Application Screening Measure Page

Figure A-11: Computer Application Psychotherapy Intervention Page

VITA

Denise Black was born in Phoenix, Arizona, to Gary L. and Reva J Ratliff. She attended elementary school in Columbus, Ohio and high school in Jonesboro, Georgia. She attended several colleges (Georgia State, Clayton State, and Brigham Young University) prior to graduating with her Bachelor's Degree in Child and Family Development Pre-Marriage and Family Therapy from the University of Georgia in 1992. It was during her coursework at UGA that she was introduced to the idea of family therapy, which instilled a desire to become a therapist. She pursued this interest by obtaining her Masters of Social Work degree from the University of Georgia in 1994. Following graduation, she moved to Oklahoma where she worked to obtain her clinical licensure in 1996. While in Oklahoma she worked for a community mental health as a case manager, assisting those with serious mental illness. She returned to Georgia in 1996 and worked for Kaiser Permanente for the next 18 years in both direct practice and management. It was during this time that she was introduced to the Institute of Healthcare Improvement which peeked her interest of improving healthcare quality. She is continuing to pursue this interest through her pursuit of a Doctor of Philosophy in Social Work at the University of Tennessee.